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Oil Tech Services, Inc.

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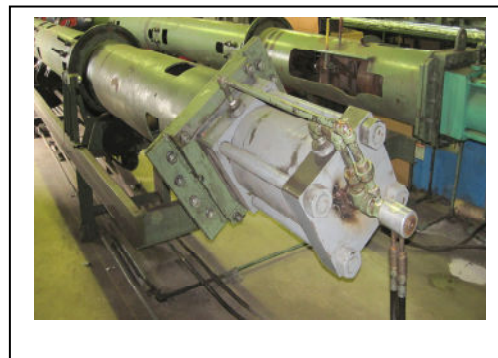
PRESTRESSING: An important design feature of insulated tubing is the method to overcome thermal expansion differences between the inner and outer tubes. The theoretical concepts and mathematical formulas used by OTSI are well known in the industry, but we like to keep our methods proprietary therefore they are not disclosed herein.

Details:

Equipment: The amount of prestress in the product is important for service performance and for assurance for the product reaching its expected in-service life. Therefore, each step in the prestress operation is equally important.

The prestress machine consists of a large fixture that holds an entire ThermalTube joint. In the prestress operation hydraulic clamping devices on the OD of the outer tube, the ID of the inner tube, and the inner tube to outer tube weld at one-end of the joint provide the holding and restraining mediums, respectively.

Immediately after loading an insulated inner tube inside an outer tube one end of the joint is welded and heat treated. After the completion of this welding process the joint is loaded into the prestress machine. A set of ID clamping slips is run into the inner tube and the slips are positioned near the un-welded end of the joint. Hydraulic pressure and movement are used to engage the slips grabbing onto the ID of the inner tube. Hydraulic clamping devices are engaged around the outer tube and hold the outer tube in position.



A hydraulic cylinder connected to the ID slips locked onto one end of the inner tube provides the force to physically prestress the joint. Hydraulic pressure is applied to the cylinder causing its piston to extend, the inner tube being welded at one end is thereby stretched to a predetermined length. The amount of prestress is measured with machinist ruler and compared to the calculated prestress values in the accompanying work order. When the specified stretch of the inner tube is reached the operator will engage zero leakage lock valves mechanically holding the prestressed inner tube in position relative to the outer tube. An automatic welding machine is positioned and commences the welding procedure followed by heat treating. After welding and heat treating hydraulic pressure is used to unlock the zero leakage load holding valves releasing the completed joint which is then removed from the prestress fixture and ready for the next manufacturing operation, bakeout.