

Conductive P-150 Piping System

Background:

Safety concerns regarding ignition caused by static discharge in certain piping, generated inquiries for pipe with conductive linings. RPS had some experimental and field experience in the

largely on Chemical Plant Design with Reinforced Plastics. The range & capability of materials has increased since then, with introduction of less expensive carbon veils and very conductive/superconductive carbon blacks. The appropriate combination of these materials for adequate conductance and the means to incorporate them in a successful corrosion resistant laminate of sufficient strength was not evident from the literature available. A series of trials was undertaken to establish these parameters.

The assembly advantages of the RPS tapered joining system along with the possibility of grounding the liners through the joints, as opposed to having to pierce the pipe wall with a grounding pin, prompted inclusion of the tapered joint in the trials also.

Investigation:

A resistance criterion was set of 2600 ohms between grounding points at opposite ends of 6 meter pipe. This was measured with a digital multi-meter with an imposed voltage of less than 1 volt.

Samples of carbon veil and modern carbon-black formats were obtained from suppliers. These included particulate, flake, pelletized and fumed material. Trials established optimum mixing procedures; maximum obtainable dispersions of different carbons; workability of the different carbon mixtures; the precautions, limits and means for ensuring an adequate resin cure. Laminate structures with these mixes were compared to determine the optimum and economical laminate to balance the electrical criteria with corrosion & mechanical properties. Pipe was then manufactured, measured, and assembled into joint specimens. Resistance was measured first between conductive strips of silver paint on panels; then between silver strips on pipe and finally through the tapered joint itself to a simple copper wire wound into the adhesive fillet. Pipes and joints

were pressure tested in excess of 2000 psi to establish integrity comparable to non-conductive piping systems and electrical resistance across joints tested again to ensure no degradation after physical abuse.

Conclusion:

From these trials it was established:

- resistance in the liner: 20-30 ohms/meter
- resistance across the tapered joint: 20-50 ohm
- resistance through the adhesive to the outside of the

- resistance between grounding connections on two joints 6 meters apart to be less than 2600 ohms.

It was therefore concluded that the P-150 tapered joining system could be used with a conductive liner and conductive adhesive. A simple rule of grounding every pipe length, or every (say) third joint in assembled piping should be followed.