

## ***New Advances in High Solids Liquid Epoxies for OCTG Tubing Applied Exclusively by Mobile Pipe***

Oil Country Tubular Goods (OCTG) and small diameter gathering lines play a critical role in oil & gas production. The tubing provides an essential conduit to transport the product from the reservoir to surface gathering lines, oil separators and holding tanks. In this downhole environment, the tubing must withstand corrosion from the water or steam produced with hydrocarbons that may contain dissolved carbon dioxide (CO<sup>2</sup>), hydrogen sulfide (H<sub>2</sub>S), and salts containing chloride ions. High temperatures accelerate the corrosion rate by increasing the rate of ion exchange, making corrosion protection of the tubing critical to preserving the structural integrity of the well in order to maintain well production.

Historically, corrosion control has been managed mainly through tubing material selection, plastic liners and powdered epoxies. Currently available powder epoxies and thermoset plastics, however, have temperature limits under 350°F (see Table 1 below). With recent advancements in liquid epoxies, end-users can now achieve protection at higher temperatures with better wear resistance due to increased lining thickness. This ultimately decreases the life-cycle cost of the tubular product and provides a more robust tubular lining for end-users.

Denso® Archco 466P epoxy lining is a two-part phenolic-novalac epoxy coating system. It was designed for applications in tanks and holding vessels requiring superior resistance to oil products, sulfuric and hydrochloric acids, solvents, inorganics and salts. Archco 466P epoxy provides dry heat resistance up to 500°F and can be used in continuous service temperatures up to 420°F, depending on the fluids present.

Mobile Pipe, in conjunction with Denso and a prominent oil and gas producer in California, partnered to develop a new application technique to apply the liquid coating within small diameter tubing. Previously, liquid coatings applied within small diameter pipe were subject to irregular thickness and poor finish quality. The new process produces an internal lining with a smooth, uniform finish and produces a process that is repeatable over hundreds of joints.



**Figure 1:** Finished 2-3/8" J-55 threaded tubing lined and coated with Denso® Archco 466P Epoxy.



**Figure 2:** While not the only critical quality parameter, achieving a blast profile of 2.5-3.5 mils is essential in preparing the surface for proper adhesion of the epoxy.

Proper application is critical to a successful product. There are several key steps that need to be addressed to ensure the proper application of the liquid coating, beginning with a pre-wash to remove oil and grease followed by abrasive blasting of the steel to a 2.5-3.5 mil anchor profile. Coating application is then performed using automated equipment to achieve consistent results prior to performing extensive quality control tests, including holiday detection.

Mobile Pipe holds an industry-recognized SSPC-QP3 quality certification, helping to ensure that each joint has been rigorously tested and complies with the customer specification, industry standards, and manufacturers' recommendations. Additionally, our customized website allows our customers to actively manage their pipe inventory stored at our 40-acre facility.

	<b>Denso® 466P</b>	<b>Fletcherkote</b>	<b>Axalta Nap- Gard® Black Beauty</b>	<b>3M™ XC-6171</b>	<b>Tube-Kote™ TK-70</b>	<b>Western Falcon Ultratube™</b>
<b>Temperature</b>	420°F	266°F	285°F	203°F	225°F	350°F
<b>Resin Type</b>	Liquid	Powder	Powder	Powder	Powder	Thermoset Plastic
<b>Thickness</b>	20-60 mils	12-16 mils	10-20 mils	10-20 mils	10-20 mils	285 mils

**Table 1:** Performance data from four powder epoxy manufacturers are listed in the table above illustrating the temperature and thickness differences between liquid epoxy and powders.

If you have more questions regarding this application, please contact Andy Sterling at: [asterling@mobilepipe.net](mailto:asterling@mobilepipe.net)

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