

Struggling With Corrosion and Coated Conduit in the Harshest Environments

ETL verification of coated conduit helped a brine processor outside Death Valley make sure its electrical systems were protected no matter how tough the surroundings

'Not all coated products, such as PVC-coated rigid metal conduit, perform the same way.' By Don Musser



Just the Facts About Corrosion

Searles Valley Minerals processes brine to recover minerals such as boron, sodium sulfate and soda ash from an underground body of salt water in extreme atmospheric conditions about 60 miles from California's Death Valley. Processing these chemicals has caused constant corrosion damage to the electrical systems in the facility. Critical pieces of equipment such as recirculating pumps — pumps that pull and return salt water from the underground lake — require continual corrosion protection. Why? Very short durations of downtime can lead to an extreme loss of product and productivity. If water is not constantly recirculating, the crystal beds needed for processing materials can be lost. As a result, production can be shut down for as long as two weeks. Therefore, finding corrosion protection solutions for this environment became imperative. The company's electrical council investigated the corrosion issues and outlined two causes: the minerals themselves and the atmospheric environment. The minerals inherently cause corrosion on many of the alloys that protect the electrical system. Meanwhile, the daily temperature of the company's desert location can fluctuate 35 to 50 degrees. The temperature can rise to 130°F during the day in the summer and drop to 10°F during the night in the winter. In addition, humidity from steam lines, where the conduit is placed, and daily washdown practices throughout the facility create sources of corrosion.

Coated conduit products were specified at Searles Valley Minerals to help control the effects of corrosion. However, the company's electrical council found that certain coated products were vulnerable to failure. An important factor in dealing with corrosion is understanding that coating failure in coated conduit products is the direct result of poor adhesion. In other words, if the coating sticks, the conduit will prevent corrosion. If the coating

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doesn't stick, the conduit system will fail from attack and damage by corrosion. Searles Valley Minerals recognized that not all coated products, such as PVC-coated rigid metal conduit, perform the same way. As a result, the company had a secondary challenge: determining how to evaluate product performance to differentiate brands of coated conduit. With regard to UL listings, available PVC-coated conduit brands are covered, but UL standards relate primarily to safety issues and not performance reliability. Fortunately, there is something that relates specifically to product performance – the ETL verification label. It helped Searles Valley Minerals determine which PVC-coated conduit was most likely to succeed long-term in its harsh environment. ETL, a division of Intertek ETL Semko and a leader in product testing, inspection and certification, provided an objective third-party product evaluation. ETL had tested and evaluated PVC-coated conduit. Three of the brands demonstrated performance superiority in side-by-side testing and received ETL verification. Those brands were Plasti-Bond, Perma-Cote and KorKap. Because ETL's performance guidelines were quantifiable and based on ASTM standards, Searles Valley Minerals was confident that the specified conduit's coating would adhere and provide reliable corrosion protection for many years. The side-by-side tests not only measured product performance in accelerated environments of heat and humidity but also in water immersion. The precise details of these tests can be accessed through ASTM. The designations of the tests are: D 2247-02 (Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity) and D 870-02 (Standard Practice for Testing Water Resistance of Coatings Using Water Immersion). When comparing the results of PVC-coated conduit brands that received ETL verification with those that did not, the difference was startling – represented by more than a 10 times longer life cycle of reliable coating adhesion. In addition, proper installation of the product is vital to avoid failure. In fact, Searles Valley Minerals insists that installers of conduit be certified by the manufacturer. *Don Musser is a projects superintendent at Searles Valley Minerals. To further his knowledge of corrosion prevention, he attended Corrosion College, a two-day, hands-on workshop in Gilmer, TX. Additional information about the three conduits mentioned in this article is available at Plasti-Bond's website (www.plastibond.com), Perma-Cote's website (www.permacote.com) and KorKap's website (www.korkap.com). Information about Corrosion College is available at www.corrosioncollege.com and about ETL at www.etl.org.*

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