

Monel Steel Reactor Has Long History Using Protective ChemLine® Coating

ChemLINE®
CASE STUDY

The history of this Monel steel reactor vessel coating project at the former Fenoquímia S.A. de C.V. facility in Minatitlan, Veracruz, Mexico, dates back to 1998. At that time, Fenoquímia wanted to test Advanced Polymer Coating's (APC) high performance coating (today called ChemLine®) to see if it could be used to line an important plant reactor vessel handling hazardous acids. This vessel was designed to mix a continuous immersion of Sulfuric Acid 60%, Mixed Amide, and 40% Acetocianhidrine, at operating temperatures of 98-104°C.



1 1998 Original ChemLine® Coating



(Left) The R-310 reactor vessel. (Center) Reactor first lined and protected with ChemLine® in 1998. (Right) Reactor vessel in 2001 before re-coating.

In 1998, Advanced Polymer Coatings México S.A. de C.V., provided Fenoquímia with small test samples coated with ChemLine® so that they could perform several chemical resistance tests. The test panels were first immersed into Methacrylic acid (MAA), and performed well, and then also immersed into Methacrilamide (MAM), in which the ChemLine® coating also met all resistance requirements.

Later that year Fenoquímia then put the ChemLine® coating into service at the plant by lining Reactor R-310 to a final dry film thickness of 14-16 mils. The coating was cured with hot forced air at 177°C for eight hours. The total installation job, including coating inspection, was completed in 72 hours. The ChemLine® coating was then inspected annually for three years, with no changes noted.



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2 2001 ChemLine® Re-Coating



(Left) Re-lining the R-310 reactor vessel with ChemLine®. (Center) ChemLine® coating of the stainless steel coil used in the reactor. (Right) Reactor and coil, both coated with ChemLine®, ready for service again.

In 2001, Fenoquímia requested a new coating of ChemLine® be applied to the reactor, as mechanical damage had occurred to the original coating. After the ChemLine® re-coating was completed, the reactor then continued

operating for many years working in the same chemical service conditions with no problems.

3 2014 ChemLine® 784/32 New Coating



(Left to Right) Reactor vessel prior to coating in 2014. Stainless steel mixer and stainless steel coil then removed from reactor. Base coat of 'red' ChemLine® 784/32 applied to coil. Top coat of 'grey' ChemLine® 2400/31 applied. (Right) Reactor and coil, both coated with ChemLine®, ready for service again.

During 2014, this Fenoquímia facility was acquired by another company under the UNIGEL brand. The new owner wanted to make sure the facility was in excellent condition. During a review, the company discovered that Reactor R-310, which is the heart of the facility, had been working since 2001 with no failure of the ChemLine® coating. So UNIGEL contacted APC México to inspect the coating in the reactor and specify with the latest

version of ChemLine® for preventative maintenance work. UNIGEL asked that APC México re-coat the inside of Reactor R-310 to a final dry film thickness of 14-16 mils with DFT of ChemLine®, even though there was no failure of the original coating of more than 16 years of harsh service. Other reactor parts would be replaced as needed once the vessel could be examined.

3 2014 - Continued

When the Reactor R-310 vessel was opened, it was discovered that the coating had protected the stainless steel coil very well. The mixer, however, was more damaged, as it had not been originally coated with ChemLine®. However UNIGEL determined the steel still met its thickness measurements and that the vessel, mixer and coil could still be used if they were all newly coated with ChemLine®. This meant a large savings compared to replacing these parts, and also helped reduce the shut down time needed for running this valuable reactor.

The coating application, following APC's guidelines, started with grit blasting to remove all existing ChemLine® coating. The contractor noted the previous coating was "extremely hard to remove." Next, a coat of ChemLine® 784/32 was applied

with 'red' as the base coat color, and followed by the 'grey' color top coat of ChemLine® 2400/31, to a final dry film thickness of 14-16 mils. After application, the coating was heat cured for 10 hours to 140°C and was then ready to be put back into service.

Following the success with this project, UNIGEL has asked APC México to also specify ChemLine® coating to line a spent sulfuric acid tank of 3,000 square feet, and also a concrete tank for neutralization. In addition, APC México is looking to specify ChemLine® coatings in the next six tanks at the UNIGEL plant this year.

(Left to Right) The reactor's mixer is coated with ChemLine® 784/32 red base coat, and then with grey top coat of ChemLine® 2400/31.



(Left) After blasting, now preparing to line the reactor. (Center) First coat of ChemLine® applied. (Right) Top coat of ChemLine® applied and heat cured.



(Left) Re-inserting newly coated coil into lined reactor. (Right) Completed unit with mixer, coil and reactor ready for hazardous acid service once again.



Contact Us

For more information on ChemLine® coatings for your corrosion protection needs, please contact your APC representative, and in Mexico, contact David Cervera from Advanced Polymer Coatings México S.A. de C.V.