

Manhole Rehab: Chemistry And Concrete

By Jennifer Frakes

"Rehabbing 25 manholes for the city of Montrose, Colorado could have been a real nightmare, but with SPI's Ultra Bond III polyurea coating and portable LPG proportioner, the job went smoothly," says Eddie Kelley of Airtight Foam Solutions. "In fact, it was pretty much flawless."



Synergy Series LPG proportioner and Ultra Bond III polyurea. Together, these two innovative technologies are invaluable when relining concrete manholes.

Merciless Conditions

The wastewater treatment process produces significant sulfur reducing bacteria (SRB) growth and hydrogen sulfide gas (H₂S). These two factors can cause significant concrete damage as they break down the concrete's silica and calcium. Over time, exposure to these harsh conditions erodes the concrete to such a degree that the manhole must be replaced or relined. Manhole replacement involves digging up the existing manhole and completely replacing all of its components. This process is both expensive and labor intensive, and therefore not a viable option for most wastewater districts. Recoating the manhole is the option chosen by the majority of municipalities. The right protective coating will shield the concrete from decay-causing bacteria, extending the service life of the manhole structure. The proper coating system will also have enough elongation to handle thermal expansion and contraction from annual freeze/thaw cycles.

Eliminating Steps and Saving Money

Although recoating is not as cost prohibitive or labor intensive as the replacement of a manhole structure, it is still a daunting task. That is, it was until the invention of SPI's Synergy Series chemistries and the LPG proportioner. These two technologies address the many challenges of manhole rehabilitation, making the process much more manageable, and ultimately saving time and money for wastewater districts.

"Using the LPG proportioner, Ultra Bond III can be applied directly onto the porous concrete substrate," says Chas Weatherford of SPI. "There is minimal prep work other than removal of damaged concrete by pressure washing and abrasive blasting. No primer is required."



Chemistry in Action

The best way to demonstrate just how well Ultra Bond III and the LPG work together out in the field is to visit the city of Montrose manhole rehabilitation project. The city of Montrose, Colorado Public Works Utilities Division had 25 manholes that needed new protective linings due to concrete degradation. The manholes had been in service for approximately 25 years. According to Weatherford, the city decided that recoating the manholes was more cost advantageous than the replacement of the sewer infrastructure. This is where Kelley of Airtight Foam Solutions comes into play.

"We got the contract and were initially going to spray polyurethane foam over the concrete and then coat with polyurea. After running into several pre-job issues, we talked with SPI and they suggested using the Ultra Bond III material, without the use of spray foam, and applying it with the LPG proportioner," says Kelley. "We were happy to use this innovative technology, especially since it saved so much time and money."



According to Kelley, many of the manholes were in pretty bad shape. "The concrete was badly deteriorated due to the hydrogen sulfide gas and high moisture content."

Live Sewer, Big Challenge

In addition, some of the manholes had an epoxy coating that had been applied a few years before. The epoxy coating had not withstood the harsh conditions. The application of Ultra Bond III would significantly extend the service life of the manholes, as it is specifically designed to endure exposure to severe chemical and weather conditions.

Also, since the sewer lines were running, Kelley had to engineer a containment system. "We built wood benches around the invert. It was a tri-fold contraption that was lowered into the manhole structure with a tri-pod and winch and then unfolded. A canvas tarp was on top of the wood, allowing us to catch all the debris," says Kelley.



Once the containment apparatus was in place, the crew removed all damaged concrete and then pressure washed and abrasive blasted the manhole. Thanks to the coatings chemistry and the application technology, the manhole was ready for the polyurea – without the need for primers, mortars, or foam.

Prior to the application of the Ultra Bond III, Kelley and his crew used a 400,000 BTU ducted heater to pump heat into the manhole. "This dry, hot air took the moisture out of the manhole structure and raised the temperature to about 90°F inside the manhole," says Kelley.

The heat duct was removed from the manhole and the crew then applied an average of 120 mils of Synergy Series - Ultra Bond III polyurea to the concrete substrate. The applicator adjusted the product output using controls at the Lock-n-Load gun.

Once the polyurea application was completed, the heating duct was again used to pump heat into the manhole. The duct remained there for one hour in order to expedite the front-end curing of the product. The return to service was immediate; the sewer was live the entire time and there was no disruption of the wastewater system.

With the Ultra Bond III and LPG Synergy Series technology, Kelley and his crew were able to prep and spray all 25 manholes in 14 days, an impressive feat to say the least. "The application equipment was simple to use and not having to apply another material prior to the polyurea saved an unbelievable amount of time and money," says Kelley.



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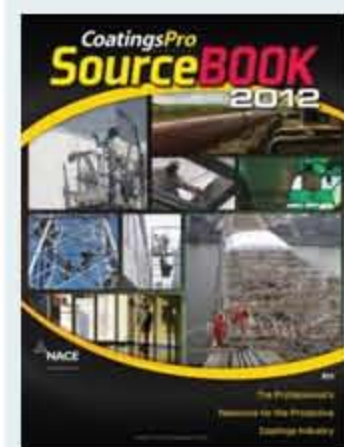
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