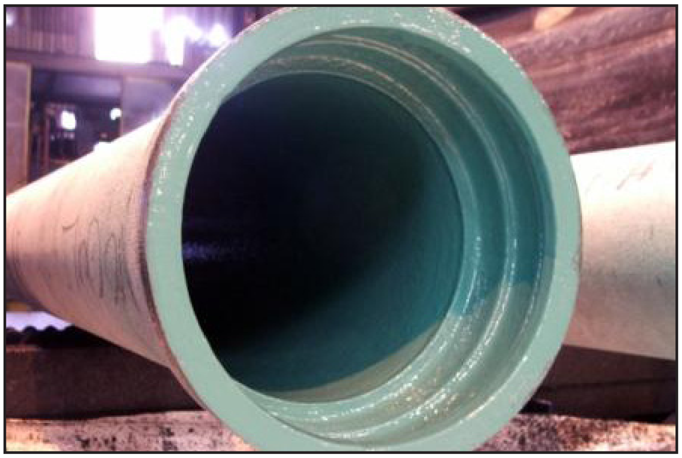
Tneme-News

TNEMEC

TESTING VERIFIES PERFORMANCE OF DUCTILE IRON PIPE LINING

The need for improved coating technology for ductile iron pipe and fittings for wastewater collection and treatment plants has changed dramatically in recent years due to the elevated levels of hydrogen sulfide (H2S) and other sewer gases, which is the leading cause of coating failure in wastewater environments. "Permeability resistance is the key measure of a high-performance lining for ductile iron pipe and fittings used in these severe wastewater environments," according to Vaughn O'Dea, director of Sales, Water & Wastewater Treatment for Tnemec. "The protective lining must be capable of providing an impenetrable barrier to the elevated sewer gases and the Microbiologically Induced Corrosion (MIC) process, which can rapidly corrode ductile iron pipes and fittings."



Prior to the release of Series 431 Perma-Shield PL, a 100 percent solids modified polyamine ceramic epoxy for use on ductile pipe and fittings, the product was extensively tested for permeation resistance. The high-performance lining, which is intended for use at 40 to 50 mils dry film thickness, was tested using the Standard Practice for Rapid Evaluation of Coatings and Linings by Severe Wastewater Analysis Test (S.W.A.T.).

"The S.W.A.T. protocol simulates the wastewater headspace environment and measures the permeation resistance of protective linings with respect to sewer gases and sulfuric acid," O'Dea explained. "Prior to S.W.A.T., testing programs were based on chemical immersion in H2SO4 and did not reflect corrosive conditions found in sewer headspaces above the waterline in enclosed sewer pipes and structures."

Developed by Tnemec in conjunction with leading engineers, municipalities and testing laboratories, S.W.A.T. uses Electrochemical Impedance Spectroscopy (EIS) to determine the level of coating degradation when exposed to wastewater headspace conditions. By measuring a coating's resistance as impedance to an electrical current before, during and after testing provides a correlation to a lining's overall performance. Higher resistance is an indication of lower permeability to gases, liquids, chlorides and ions, which means more protection for the substrate.

At the beginning of the S.W.A.T. testing, coated specimens of Series 431 and a widely-used competitive ceramic epoxy both had an initial EIS impedance of 11.2. After 28 days, Series 431 had a final EIS impedance of 10.7, which is in the "excellent" range, compared to a final EIS impedance of 5.7 for the other product. In the same test, coal tar epoxy had an initial EIS impedance of 10.9 and finished with a final impedance of 0.0.

Continued on back.

Following exposure to S.W.A.T., Series 431 also tested excellent for visual inspection in accordance with these American Society of Testing and Materials (ASTM) standards:

• ASTM D610 Standard Test Method for Evaluating Degree of Rusting on Painted Steel Surfaces

• ASTM 714 Standard Test Method for Evaluating Degree of Blistering of Paints

• ASTM 60 Standard Test Method for Evaluating Degree of Checking of Exterior Paints

• ASTM 661 Standard Test Method for Evaluating Degree of Cracking of Exterior Paints.

Abrasion resistance is another important performance requirement for high-performance lining technologies for wastewater environments. In BSI BS EN 598: 2007 + A1 2009 for ductile iron pipe, fittings, accessories and their joints for sewerage applications, a mechanical rocking abrasion device is used to simulate service conditions of ductile iron pipe. For this test, a section of coated pipe containing a slurry of pea gravel and capped at both ends is placed in the rocking device causing the aggregate to slide back and forth within the pipe. In Tnemec testing, after 50,000 cycles, the average loss of film thickness along 15 points was 0.6 mil for Series 431 and 2.39 mils for the competitive ceramic epoxy. After 1 million cycles, Series 431 had an average loss of 5.5 mils, while the competitive product had an average loss of 21.35 mils.

In ASTM D4060-07 Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser, coating erosion is determined by the milligrams of film loss when subjected to 1,000 cycles under a coarse abrasive wheel loaded with 1,000 grams of weight. After 1,000 cycles, Series 431 had an average film loss of 76 mg based on three tests performed by Tnemec. This is significantly better abrasion results compared to the competitor that reported a 340 mg loss (ASTM D 4060-90).

The chemical resistance of Series 431 was measured in accordance with NACE TM0174-2002 Laboratory Methods for the Evaluation of Protective Coatings and Lining Materials on Metallic Substrates in Immersion Service. This method requires coated specimens to be continuously immersed in a solution of hydrochloric acid, sulfuric acid and sodium hypochlorite, respectively. "After six months immersion, Series 431 showed no signs of deterioration," O'Dea reported. "There was no blistering, cracking, checking, erosion or delaminating of film. Gloss and general appearance of areas that were immersed were the same as areas not immersed in chemicals." Series 431 also passed the British Standards Institute (BSI) BS EN 598: 2007 + A1 2009 Chemical Resistance to Effluents test.

Originally included in the August 2010 E-News.

TNEMEC

Tnemec Company Incorporated 6800 Corporate Drive Kansas City, Missouri 64120-1372 1-800-TNEMEC1 Fax: 1-816-483-3969 www.tnemec.com