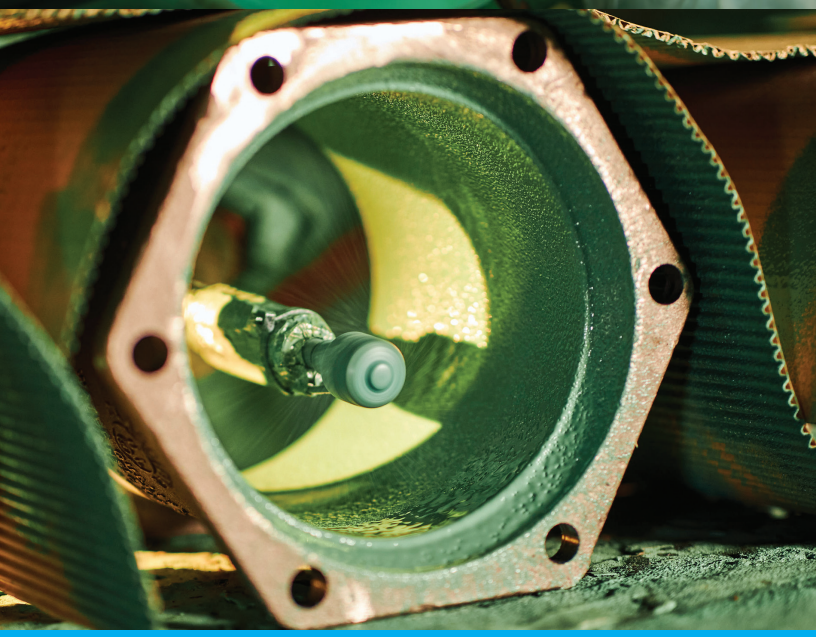
TNEMEC

INNOVATION IN EVERY COAT.™

PERMA-SHIELD® PL

ADVANCED PROTECTION FOR STEEL AND DUCTILE IRON PIPE AND FITTINGS



FEATURES AND BENEFITS

- **100% solids epoxy; coal tar free**
- **Ceramic microsphere modified for exceptional abrasion resistance**
- **Excellent adhesion**
- **Resistant to chemicals and H_2S**
- **Aboveground storage life of 7 years**
- **No cracking, even during pipe compression**
- **Impact-resistant during backfilling**
- **Green color provides ease of inspection**
- **Compatible with high-velocity jet sewer cleaning (hydrocleaning) with 0-degree tips**
- **Meets the requirements of AWWA C210**

THE PRODUCT

Series 431 Perma-Shield® PL is a 100% solids, high-build epoxy liner derived from Tnemec's successful Perma-Shield line and developed for the unique needs of steel and ductile iron pipe and fittings.

EXCEPTIONAL ABRASION RESISTANCE

A high loading of quality ceramic microspheres in the coating provides exceptional resistance to abrasive and high velocity flow environments. Series 431 applies quickly in one or two coats allowing for fast and efficient through-put of pipe and fittings.

CRACKING AND IMPACT-RESISTANT

Designed to endure impacts from construction equipment, backfilling, abrasive wastewater transmission, and installation challenges without cracking, Series 431 ensures long-lasting protection for critical infrastructure. This advanced coating safeguards against physical damage and maintains structural integrity over time.

EASE OF INSPECTION

The distinct green color of Series 431 enhances ease of inspection, allowing for clear visual assessment, particularly in confined spaces. This high-visibility hue improves camera-based inspections, making it easier to identify coating continuity and ensure proper application.

ABOVEGROUND STORAGE LIFE

Series 431 is engineered for long-term aboveground storage. Its resin-rich, coal tar-free formulation resists cracking over time. Its advanced chemistry ensures stability and performance even in fluctuating environmental conditions. With an impressive 7-year storage life, Series 431 offers dependable, long-lasting exterior exposure capabilities.

THE PERFORMANCE

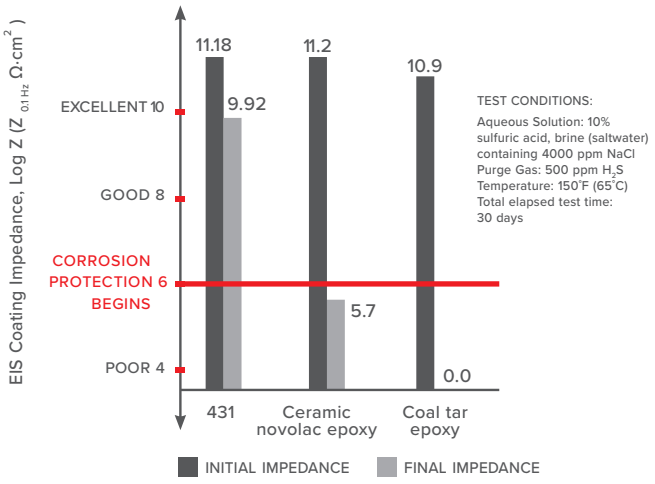
Wastewater coating technology has changed dramatically in the past several years, driven primarily by changes in wastewater that have lead to elevated levels of hydrogen sulfide gas (H_2S) and Microbiologically Induced Corrosion (MIC) that quickly corrode unprotected, or poorly protected, substrates. Tnemec recognized older coating technology no longer offered sufficient protection and launched a major research initiative to formulate a protective liner designed to resist the biological and chemical components found in wastewater streams and aggressive soils.

The result was the Perma-Shield line of fluid-applied epoxy wastewater coatings. Extensively tested in accelerated laboratory environments, and backed by decades of reliable field service, Perma-Shield has demonstrated performance superior to older coating technology and even newer ceramic epoxy lining products.

For more performance information, contact your local Tnemec representative at tnemec.com.

SEVERE WASTEWATER ANALYSIS TEST ASTM G210-2013 (S.W.A.T.)

In order to evaluate coating performance, Series 431 Perma-Shield PL underwent exposure to the Severe Wastewater Analysis Test (S.W.A.T.). This accelerated wastewater corrosion testing program was developed by Tnemec in conjunction with leading engineers, municipalities, and testing laboratories to test a coating's resistance to sewer gas permeation, which is the leading cause of coating failure within wastewater environments. The Severe Wastewater Analysis Test has been modified and adopted by ASTM as G210.



CONTINUOUS BARRIER

Series 431 offers excellent surface wetting, flow, and leveling characteristics to minimize pinholes – especially on porous or uneven surfaces – ensuring easier installation and better corrosion resistance.

The coating also features high dielectric film strength compatible with current high-voltage holiday detection per **NACE SP0274** or **SP0188** standards. Testing for pinholes confirms a continuous, pinhole-free protective barrier, lowers the risk of premature failures, and improves long-term protection of the asset.

HYDROCLEANING

Series 431 has been rigorously tested with a myriad of jet nozzles, angles of incidence to pipe walls, and stationary times. During the tests, the focus was laid on product film durability, with no damage to the lining or delamination from the ductile surface. Series 431 is capable of withstanding up to 30 degree angle of incidence to the pipe wall and 2,500 psi (172 bar) 0-degree jets producing a maximum of 80 gpm (302 Lpm) with a 60 second stationary (hold) time.

TNEMEC®

PROJECT SUPPORT FROM START TO FINISH

With over 100 representatives located across North America and beyond, you can expect a high level of expert assistance wherever you need it. Our agents are well-versed in corrosion protection, with unmatched industry knowledge and the ability to recommend products based on each project's particular conditions and location.

Contact your local Tnemec representative today at tnemec.com.

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