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PIPELINE PRODUCTS

RD-6[®] Anti-Corrosion Coating System



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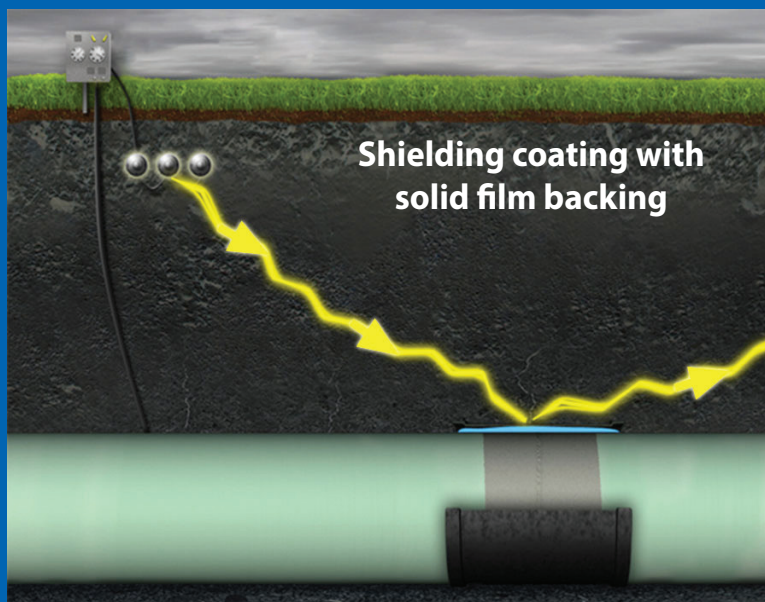
TALK TO AN OWNER

What separates Polyguard's Pipeline Division from our competitors? Our Technical Offering! While others are cutting back, we are investing in people, training and education. Polyguard is 100% Employee Owned. So when you call for details, need help protecting a pipeline, or want someone to assist you at a job site, an "owner" is at your disposal, with a "team of owners" backing them up. This multi-level of personal service dovetails with the superior systems we offer, some for more than 60 years. Let one of our owners talk to you about how addressing critical issues like non-shielding, soil stress, and speed to job completion can make a major difference.

Polyguard's RD-6® leads our product offerings which include NHT-5600™ and NHT-6100™ 2-part epoxies. We design, develop, test and manufacture our products from our headquarters in Ennis, Texas, but our products and technical expertise are utilized on virtually every continent.

ABOUT POLYGUARD

Polyguard was founded in 1953 in Oklahoma by Robert Nee and Frank McNulty. Polyguard moved to Ennis, Texas in 1978. Our CEO John and his wife Kathy Muncaster purchased Polyguard in 1986. In 1987, John and Kathy decided to allow the employees to directly benefit from their hard work by offering all of the employees an opportunity to be part of an Employee Stock Ownership Plan (ESOP). In December 2014, the company became 100% ESOP owned.



Shielding coating with solid film backing



Non-shielding RD-6 coating allows protective current to reach exposed steel

If an anti-corrosion coating loses adhesion to the pipe surface ("disbonds") and moisture enters the area of disbondment, the corrosion process can start unless the area is protected by a cathodic protection (CP) system.

CP systems are designed to mitigate corrosion on the pipeline surface. When a coating defect is found, electrical current from the CP system enters the steel, and an electrical circuit is completed within the CP system. The electrical current which would have caused corrosion has instead been drawn away to a sacrificial anode.

However, CP systems can be ineffective if a "shielding" anti-corrosion coating is used on the pipe. The most common type of shielding coating is one with a solid film backing. The high dielectric strength of shielding coatings can block, or "shield" CP electrical current from locating coating defect on the pipe surface. The shielding process is graphically illustrated above.

Over the past few years, the pipeline community has become aware of the need to use corrosion coatings which do not shield protective current from CP systems. Newly issued DOT regulation Title 49 CFR §192.112 specifically requires the use of non-shielding coatings on steel pipe using alternative maximum allowable operating pressure.

Polyguard's RD-6 coating was designed from its beginning in 1988 to overcome the CP shielding problem. In the unlikely event of disbondment from poor application, protective currents have been shown to reach the disbonded areas. Cathodic shielding has also been defined as a primary cause of SCC (Stress Corrosion Cracking).

See our website for articles and papers about research on CP shielding and RD-6.
www.polyguardproducts.com/pipeline/technical-reference/

RD-6® COATING SYSTEM FOR LINE PIPE AND GIRTH WELDS

Polyguard's RD-6® Coating System is a non-shielding anti-corrosion system used on buried and submerged line pipe, rehabilitation and new construction girth welds. RD-6® can also be used above ground but the coating must be protected from harmful UV rays.

When used above ground, Polyguard recommends using the RD-6 UVO for an extra layer of protection from the sun. RD-6 consists of a liquid adhesive, a geotextile backed protective pipeline coating and SP-6™ outerwrap. Corrosion protection comes from the polymer modified coating layer.

Bonded to the outside surface of this coating is a strong, tightly woven, polypropylene geotextile fabric, which provides non-shielding properties plus high breaking strength and low elongation. It is suitable for use with pipeline operating temperatures not exceeding 145°F (63°C). RD-6 has been in use since 1988 providing effective corrosion protection.

RD-6 coating is manufactured in rolls for ease of

application using a Polyguard approved machine such as the Wrapster or power operated machine. These machines are recommended for application in order to achieve optimum coating tension that is necessary to resist soil stress and aid in the adhesion process. RD-6 is produced with a silicone coated release liner to prevent the layers from adhering to one another and assist in the application process.

The Polyguard Wrapster is designed with two spindles, one providing tension of the RD-6 coating being applied to the pipe and the other to spool the release liner during the application process.

RD-6 utilizes compression and tension during the application process made possible by the woven geotextile, polypropylene backing to ensure proper long-term performance. RD-6 may be applied manually without using the Wrapster, but it is important to recognize that adequate tension should be used consistently during its application.

RD-6® is a non-shielding coating

- In the rare case where disbondment may occur, the pipeline is still protected because cathodic protection currents can reach the disbonded area. Once there, the current will mitigate corrosion, raising the pH of the water underneath the disbonded area as a result of the cathodioc reaction .
- The geotextile fabric backing of RD-6® does not shield cathodic protection currents.

RD-6® is less likely to fail (to become disbonded) because

- RD-6® has high adhesion, even if surface preparation is less than perfect.
- RD-6® is highly resistant to soil stress, a major cause of coating disbondment.
- RD-6® application time is quicker than almost any other coating, and requires no cure time allowing for immediate backfill.

RD-6® has a long record of successful installations in the field

- The first installations of RD-6® were in 1988. By 1992, the product was being widely used in North America. Today, there have been thousands of installations.



Accessories

SP-6™ UNBONDED OUTERWRAP

"Non-Shielding" Outerwrap for Soil Stress Resistance

Polyguard SP-6™ Unbonded Outerwrap is an integral part of the RD-6® Coating System.

SP-6™ consists of a strong non woven, felt-like polypropylene fabric. The product is engineered to provide high tensile and low elongation properties. The result is a system with improved soil stress resistance.



There is no adhesive on the surfaces of either side of the fabric. For years, the pipeline coating industry relied upon bonded outerwraps. However, permanent adhesion of the outerwrap to the corrosion coating underneath is not desired. The fabric, when unbonded, has the freedom to be moved by the forces of soil stress, independently of the coating over which it has been applied. The fabric allows cathodic protection currents to pass through it. The porous property keeps the outerwrap from contributing to the cathodic protection shielding problem.

WRAPSTER

Shown below is the application of RD-6® using the Wrapster, which provides tension around the pipe. The Wrapster is available for purchase from Polyguard Products.



606 FILLER COMPOUND

Fabric Reinforced Coating for Molding Irregular Surfaces

606 Filler Compound is a filler material used where bridging or tenting may be evident, such as on longitudinal weld seams, step downs, and weld on sleeves to avoid coating voids.



FEATURES

- Easily applied and provides excellent conformation and molding properties.
- Has excellent resistance to water or vapor transmission.
- Not subject to deterioration from below ground acids and alkalis that are encountered in normal soil.
- Has excellent ability to resist infiltration of moisture.
- Has elastomeric properties to accommodate normal expansion of the substrate.

600 LIQUID ADHESIVE

Polyguard's fast-drying, rubber-based 600 Liquid Adhesive is used in conjunction with Polyguard's RD-6® and other 600 series coatings. It is available in solvent systems that will conform to most local VOC requirements.

APPLICATION:

600 Liquid Adhesive may be applied with a roller or brush to a clean and dry pipe surface. It should be applied at a rate of approximately 400 ft² per gallon (10m²/liter). **DO NOT THIN LIQUID ADHESIVE.** In the event of cold weather, store inside prior to use.

FEATURES

- Fast drying - no down time between primer coat and RD-6® application.
- Rubber-based - works synergistically with the RD-6®.
- Both brush and roller application can be used - allows the application and/or operator to specify application method based on pipe size and conditions.
- Only a thin coat is necessary - which results in a quicker dry time and more efficient coverage.

Polyguard also offers a low VOC Adhesive (601 Zero VOC Liquid Adhesive) that is formulated with VOC exempted solvents to meet all federal and most state VOC requirements.

IRO™ (Impact Resistant Outerwrap) & IRO™ HD

POLYGUARD IRO™ (Impact Resistant Outerwrap) and IRO HD are strong, water-activated fiberglass thermoset coating that offers superior impact and abrasion resistance. Once hardened, IRO provides an impact and abrasion resistant fiberglass reinforced composite sleeve. IRO is easy to apply and ready for backfill in minutes. It is used over RD-6 and other coatings for bore or directional drill applications to protect from impact and abrasion.

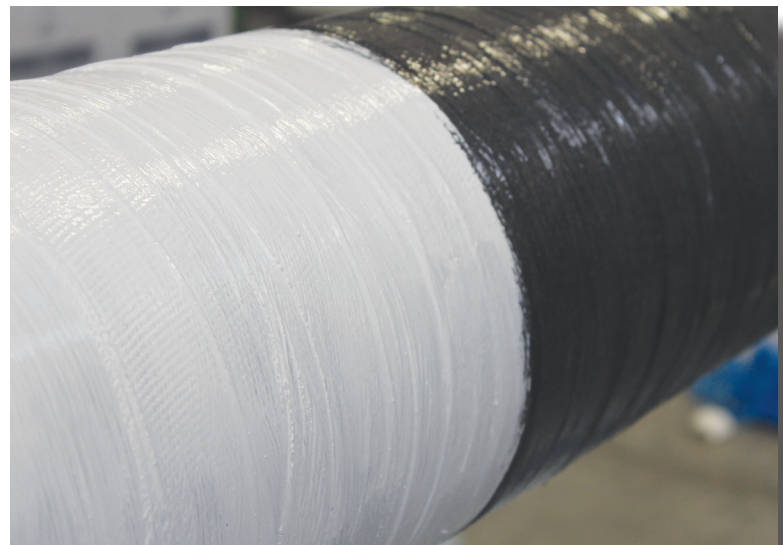
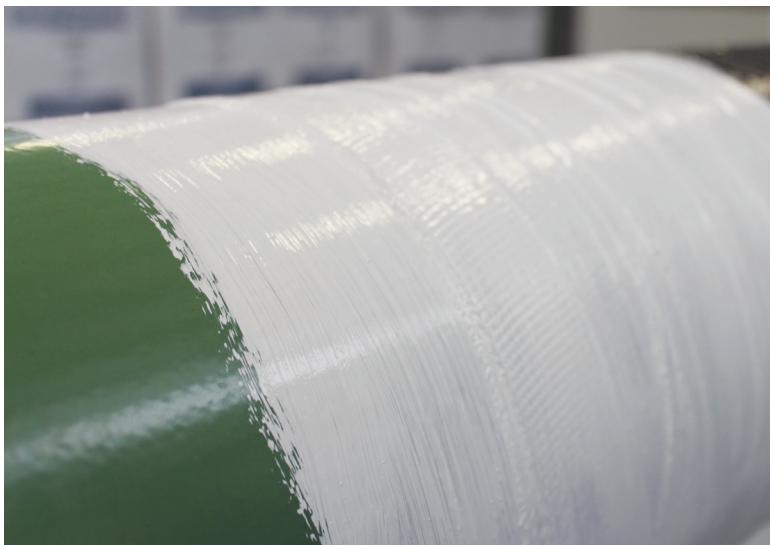
FEATURES & BENEFITS USING IRO

- Polyurethane resin impregnated fiberglass wrap - provides a strong, abrasion and impact resistant coating for use in HDD, boring, and areas with potential impact damage.
- Water activated - no harmful activator needed.
- Activated with fresh or salt water.
- End product is a thermoset composite - will not be affected by elevated temperatures.
- Petroleum and other chemical resistant - no need for additional treatment in adverse chemical conditions.
U.S. Patent #8522827



RD-6® UVO™ RD-6 UV Overcoat

RD-6® UVO™ is a single component, low-VOC, UV resistant, water-based liquid coating that is highly resistant to the damaging effects of UV light rays. RD-6 UVO protects coatings such as RD-6, FBE and two-part epoxies from harmful UV rays. RD-6 UVO can also be applied over ARO or IRO coatings, as well. Direct exposure to sunlight will result in degradation of the RD-6 and other types of below grade corrosion coatings.





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Polyguard's Pipeline Division was the first coating manufacturer to highlight the cathodic shielding problem, and the first to develop a coating to address the shielding problem. We've been active in the pipeline protective coating industry for more than 60 years. In addition to standard types of corrosion coatings, this division has designed, manufactured, and introduced a number of innovative underground pipeline coatings and girth weld coatings, which have become commercially accepted as standards for the industry. They are both non-shielding coatings and soil stress tolerant.

RD-6®

RD-6® Pipeline anti-corrosion coating is a system that allows cathodic protection currents to reach any disbanded area that occurs on the pipeline. RD-6 has been used on thousands of projects for over 30 years. In that time, neither external corrosion nor SCC (Stress Corrosion Cracking) has been a problem for RD-6. Today, some of the world's biggest operators utilize RD-6 as their standard coating. The base of installed projects is in the thousands, both large and small.



Two-Part Epoxy

NHT-5600™ 2-Part Epoxy is a 100% solid, low VOC epoxy designed to work in conjunction with FBE coated pipe and is specially formulated for extended pot life while maintaining a cure time comparable to other epoxies.

NHT-6100™ 2-Part Epoxy is a 100% solid, low VOC two-part epoxy coating designed to work with higher temperature applications up to 350°F (177°C) intermittent service.



IRO & IRO HD

POLYGUARD IRO (Impact Resistant Outerwrap) and IRO HD are strong, water-activated fiberglass thermoset coatings that offer superior impact and abrasion resistance. Once hardened, IRO and IRO HD provide an impact and abrasion resistant fiberglass reinforced composite sleeve. Both products are easy to apply and ready for backfill in minutes. IRO and IRO HD can be used over RD-6, FBE and two-part epoxies for bore or directional drill applications to protect from impact and abrasion.



Accessories

Polyguard offers a variety of companion products for completing your pipeline system: • 600 Series Coating Systems • 600 Liquid Adhesive • 601 Low VOC Liquid Adhesive • 606 Filler Compound • 600 UV 350 • CA-9™ Mastic (oil resistant) and CA-14™ Mastic (general maintenance) • 400 Wrap • SP-6 Unbonded Outerwrap • RD-6 UVO



For information about our products:

Contact Polyguard by email: pipeline@polyguard.com

Contact Polyguard by phone: 281-580-5700

Visit our website: www.polyguard.com/pipeline

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