ANA G. CERVANTES, POLYGUARD, PRESENTS THOUGHTS ON THE FIRST NON-SHIELDING POLYMERIC MESH-BACKED COATING SYSTEM.

Is the polymeric mesh-backed coating system a tape?

A standard definition of a tape is ‘a strip of paper or plastic coated with adhesive and sold in a roll, used to stick things together.’ The polymeric mesh-backed coating system is a long strip with coating compound wound on a roll. It has the portable, easy installation advantages of tapes but instead of the solid stretchable film of the tapes or heat shrinkable systems used for corrosion protection of pipes, it has a high strength, low elongation woven polypropylene geotextile backing that does not shield the cathodic protection currents.
Additionally, the fact that the mesh is a customised polypropylene mesh means that the elongation of the coating system is much less. When combined with a much stronger adherence, this self-healing compound leads to a significantly higher resistance to disbands of the coating from the metal when subjected to high force soil stresses.

What does non-shielding vs cathodic protection current mean?
The cathodic protection system serves as a backup whenever a disbonding area happens underneath the corrosion coating system, taken the job of protecting the area of failure. However, even the best corrosion coating systems develop areas of failure over time, this is often caused by poor installation of the coating.

NACE defines shielding as ‘Preventing or diverting the cathodic protection current from its intended path’.

In areas of disbonding on the pipelines coated with non-shielding coating, the protective currents from the cathodic protection system penetrate to the pipeline surface where it can complete its circuit and return back to the rectifier. This effect is defined as non-shielding vs cathodic protection current. This is an essential property of the non-shielding polymeric mesh-backed systems on which the pipe will be safe because the protective current will be able to reach any water under the disbonded area, and complete the circuit. A symptom of that is the change the pH of the water to higher or more alkaline level at which corrosion to steel in minimised while returning to the rectifier.

Shielding of cathodic protection currents is a major problem in pipelines coated with high resistivity solid film backing systems. This is because they block the passage of protective currents from the anodes bed of the cathodic protection system to any defective area. Shielding can lead to a critical situation in which the protective currents cannot reach the steel surface of the pipeline to find the return path to the rectifier. In such cases, the cathodic protection does not protect the pipe as intended during the design phase.

Does having a non-shielding coating result in a higher consumption of CP current?
Yes – in the rare event that non-shielding mesh-backed coating disbands. An increase on the protection current consumption would mean that a disbonded area was detected, and thus the cathodic protection system is doing its function of protecting the pipeline integrity.

Let’s remember that the cathodic protection system is designed to send out a direct current that will always look for a return path by searching for any defect in the coating through which it can reach the steel surface of the pipeline and return to the rectifier.

If an area of a non-shielding coating becomes disbonded from the steel surface of a pipeline and water penetrates causing corrosion, the installed cathodic protections system will be triggered ‘on’.

The non-shielding coating allows protective currents to penetrate the coating to reach the pipeline surface where it can close its circuit and return to the rectifier. The cathodic protection system is now using more current, but it is doing its job as backup corrosion protection; the cathodic protection...
current will change the water pH by an electrochemical process that minimises the corrosion of the affected area of the steel pipeline as well.

Bear in mind that if the corrosion protection system is doing its job of protecting the pipe, very little current is used as defects are not present. Additionally, very few coatings have decades of experience knowing they are genuinely ‘non-shielding’.

**What are the advantages of non-shielding polymeric mesh-baked systems vs the solid stretchable films coatings?**

Polymeric mesh-backed coatings on underground applications have several advantages:

1. **Very high resistance to soil stress** that usually comes from backfill pressure as it settles around a pipeline resulting on a ‘bag and sag’ effect at the 4 and 8 o’clock positions. This advantage comes from its high strength backing with its low elongation polypropylene geotextile mesh that helps prevent soil stress in three different ways:
   - Higher tensile strength: up to 200% higher than tapes and 20% higher than HDPE shrink sleeves.
   - Less stretchable: 1/20th as stretchable as shrink sleeves or tapes.

2. **Surface preparation quality tolerance.** This property is especially important at the girth weld area of pipelines, where coatings are field applied and subject to surface preparation and application quality problems. Polymeric mesh backed systems should be applied with a NACE 3 in an ideal situation, but have demonstrated over decades very strong adhesion to even poorly prepared substrates.

3. **Faster installation than other coatings** as it requires no cure time.

**Are you using fail-safe coating on your assets?**

In order to determine this you should assess if your pipeline coating is compatible with your cathodic protection system. Would it let currents coming from your cathodic protection system penetrates to the surface of our steel pipe in case of any coated area disbands or would it block it?

Fusion bond epoxies and the polymeric mesh backed coating system have proven non-shielding properties that are fully compatible and can ensure the functionality of the cathodic protection system you have invested in to protect your assets. Polymeric mesh-backed tapes have been successfully installed on many projects for almost 28 years. By 2014 the total non-shielding polymeric mesh backed coating system installations exceeded 35 million ft² (3.25 million m²) of assets that are fully compatible with their cathodic protection systems.

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