Zerust® Pipe Casing

The Problem

Underground pipelines are required to have cathodic protection to protect them from corrosion. When these pipelines run under roadways, railway lines, etc. they have historically been required to have protective metal casings. Over time, there may be movement of the product carrying inner pipeline (“carrier pipe”) and/or the casing that brings the carrier and casing into contact. This results in a “metallic short” that causes the cathodic protection current to pass through the casing.

The regulatory requirement for pipeline casings with metallic shorts is for pipeline owners to do one of the following:

• Excavate the buried pipeline, fix the short and resume operations ($$$)
• Fill the pipe casing with wax ($$)
• Use a Vapor Corrosion Inhibiting gel ($)

The Solution

Zerust has developed a unique blend of corrosion inhibitors and gels that is injected into the annular pipe casing space. The Zerust corrosion inhibitors protect the carrier pipeline both in direct contact, using Soluble Corrosion Inhibitors and also through Vapor Corrosion Inhibitors that protect the entire annulus vapor space.

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Description</th>
<th>Application Guide</th>
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<tr>
<td>Zerust PGH Gel 300</td>
<td>Sessile polymer, bulk powder in piles</td>
<td>Fills annular space of pipe casing</td>
</tr>
<tr>
<td>Zerust PGH Gel 400</td>
<td>Sessile polymer, bulk powder in piles</td>
<td>Fills annular space of pipe casing, larger granular size and increased swell time than PGH 300</td>
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Using VCI to protect pipe casings is a cost-effective option to extending the life of these important assets. Corrosion rate monitoring can be provided using ER probes or coupons. Installation of the VCI and monitoring equipment, in most cases, can be accomplished through the vent pipes without excavation.
How the pipe casing solution works

High Viscosity Gel Application

WHEN: For pipelines with a metallic short (i.e. casing in contact with the carrier pipe) or pipelines where a static fill anti-corrosion solution is needed. This also meets PHMSA requirements for a protection system that remains in place.

HOW: The gel system is installed as a low viscosity slurry which sets up as a high viscosity gel. The VCI molecules volatize from the gel to protect the vapor spaces in the annulus. The SCI in the product neutralizes contaminants on contact. The gel system has advantages over the other two applications in that, as the gel sets up, it can bridge small penetrations and reduce the possibility of the solution leaking out of the casing. Conversely, it helps slow down the ingress of contaminants from the outside.

Powder Application

WHEN: For pipelines without a metallic short, but for which providing internal corrosion protection is a good operating procedure, Zerust recommends the use of its dry powder inhibitor. As long as there is minimal water ingress (i.e. end seal integrity is maintained) the system will protect the carrier pipe from corrosion.

HOW: A simple blower system is used to blow Zerust’s proven blend of Zerion powder inhibitors down into the pipe casing through the casing vent pipes. The Zerion powder is blown down the entire length of the annulus and settles on the bottom of the casing pipe. SCIs neutralize contaminant in the bottom while VCI volatizes to protect the metal surfaces in the vapor space. The entire annular space of the cased pipeline is protected.

Slurry Application

WHEN: For long lengths of pipe with varying elevations, bends and other geometric/dimensional parameters where a powder or gel is not feasible.

HOW: Zerust’s unique Zerion FVS is first mixed with water. Gravity or a low pressure pump is then used to inject the inhibitor slurry through the casing vent pipe into the annular space. The SCI in the product neutralizes contaminants on contact. The VCI molecules are released and equalize in the remaining vapor space, protecting both the exterior of the carrier pipe and inside of the casing. The entire annulus space of the cased pipeline is protected. The liquid injection is especially beneficial for longer casings as long as the integrity of the casing and end seals can be proven.

Gel System: Gel crystals are introduced prior to injection through the vent pipes.

Inhibitors neutralize contaminants on contact and in the vapor space of the annulus. The amount of VCI required depends on the volume of the annulus and any contaminants that may be present.

Zerust’s FVS product contains both VCI and SCI components. The SCI neutralizes contaminants on contact in the liquid phase while the VCI vapor molecules protect in the vapor space.

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