



**STORAGE TANK BOTTOM  
CORROSION PROTECTION**

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PROTECTION**

Soil-side bottom (SSB) corrosion of aboveground storage tanks (ASTs) causes costly repairs, downtime, and environmental risks. While traditional cathodic protection (CP) systems have limitations, Zerust Vapor Corrosion Inhibitors (VCIs), recognized in API 2610 Section 12.5 and API TR 655, offer a cost-effective, reliable alternative. VCIs provide durable protection for AST bottoms, reducing maintenance costs and corrosion-related failures.

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**Problem: Costly Repairs and Revenue Loss Due to Corrosion**

Soil-side bottom (SSB) corrosion of aboveground storage tanks (ASTs) is a leading cause of tank failures, resulting in expensive repairs, operational downtime, and environmental hazards. Traditional cathodic protection (CP) systems are commonly used to combat corrosion but often face challenges such as foundation resistivity, current flow disruptions due to environmental factors or tank construction, and void spaces. These limitations highlight the need for alternative or supplementary corrosion protection methods.

**Maintenance Expenses**

- Purging and Cleaning
- Bottom Plate Replacement
- Installation of Release Prevention Barrier (RPB) Liner
- Increased Inspection Efforts
- Opportunity Cost of Tank Downtime

**Operation Costs**

- Repair or Replacement Downtime
- Environmental Impact
- Revenue Loss
- Increased Inspection Requirements

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**Solution: Zerust VCIs – Cost-Effective Corrosion Protection**

Soil-side corrosion of aboveground storage tank bottoms poses serious risks, including costly repairs and environmental damage from leaks. Zerust Vapor Corrosion Inhibitors (VCIs), recognized in API 655, provide an economical and effective solution for protecting tank bottoms. Proper application and consistent monitoring ensure long-lasting corrosion prevention for the underside of steel storage tanks.

- **Comprehensive Protection:** Shields hard-to-reach voids, interstices, and soil-side tank bottoms.
- **Minimal Surface Preparation:** Requires little to no preparation for tank plates and welds.
- **Uniform Coverage:** Advanced VCI dispersion ensures consistent protection across all areas.
- **Cost-Effective Solution:** Significantly extends tank bottom service life at a low cost.
- **Eco-Friendly Technology:** Provides safe, non-permanent corrosion protection at the molecular level.
- **Uninterrupted Operations:** Maintenance and inspection can be performed without stopping tank operations.
- **Proven Results:** Backed by industry standards (API 2610 and API TR 655) and field-tested success.
- **Reduced Costs:** Helps tank farm owners minimize maintenance expenses and operational downtime.

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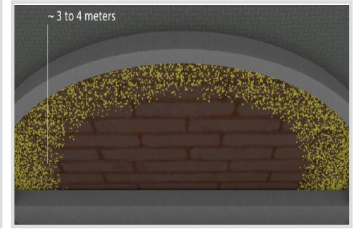
## ZERUST SOLUTIONS FOR IN OR OUT OF SERVICE TANK BOTTOMS

### Chime Ring Dry

Zerust's Chime Ring Dry IDS solution is specifically designed for storage tanks with concrete ring walls, offering targeted corrosion protection for the chime and annular ring. This innovative system utilizes a VCI/SCI (Soluble Corrosion Inhibitor) application method, where VCI dry sleeves are strategically placed at the chime-concrete interface and sealed to form a protective enclosure.

The VCIs migrate via vapor pressure under the tank's edge and adsorb onto metal surfaces, delivering effective corrosion protection. This diffusion process safeguards the critical 10 to 15 feet of metal from the tank edge, ensuring long-term durability in this vulnerable area.

**FOUNDATION(S): CONCRETE, BITUMEN, COMPACTED SAND OR SOIL.**

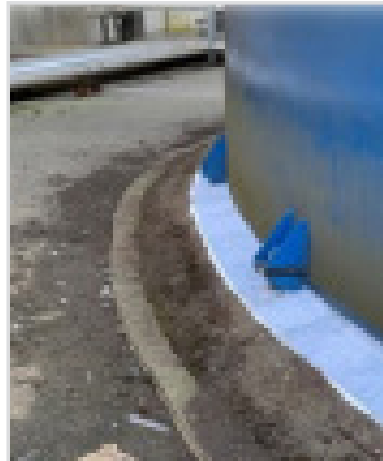


### Chime Injection

Zerust's Chime Injection IDS is ideal for storage tanks with concrete, bitumen, or asphalt pads with liner foundations. This VCI/SCI injection system protects tank bottoms using various injection methods, including the tube system shown or other owner-approved designs.

As the inhibitor slurry is pumped into the system, VCIs migrate to metal surfaces while the slurry neutralizes contaminants on the bottom plates or foundation. Together, VCIs and SCIs provide effective, long-term corrosion protection for vulnerable tank bottom areas.

**FOUNDATION(S): CONCRETE, BITUMEN, COMPACTED SAND OR SOIL (ALL FOUNDATIONS MUST INCLUDE A LINER OR RPB).**

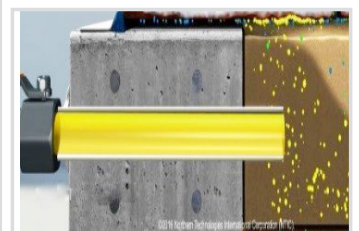
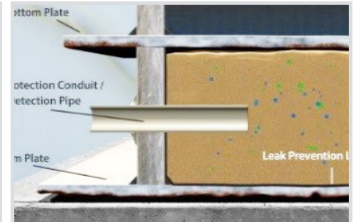
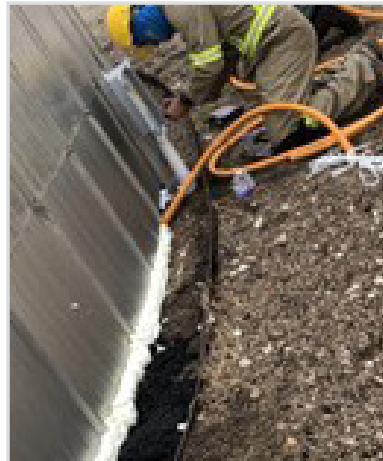


### Underside Injection

Zerust's Underside Injection IDS is designed for tanks with compacted sand fill, Release Prevention Barriers (RPBs), double bottoms, or hard pads like concrete or asphalt.

A low-viscosity inhibitor slurry is injected through ring wall ports, with SCIs neutralizing contaminants and VCIs migrating to protect the metal surface. The VCIs spread through the sand bed via capillary action and gravity, ensuring full tank floor protection.

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## ZERUST SOLUTIONS FOR OUT OF SERVICE TANK BOTTOMS

### Internal Flood

The Internal Flood IDS solution is designed for tank foundations made of concrete, bitumen, or compacted sand with a liner. Low-viscosity inhibitor slurry is injected through temporary ports installed at selected locations in the tank floor. The slurry emits VCIs that migrate and bond to the metal surface, while SCIs neutralize contaminants on the bottom plates or foundation. Multiple injection points ensure rapid and uniform dispersion of the slurry across the entire tank bottom.

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### Dry Tube

The Dry Tube IDS system protects tank bottom plates during construction or new floor installation, ideal for tanks with concrete, bitumen, or compacted sand foundations, with or without liners. Shallow trenches are created to house perforated, mesh-covered PVC pipes, which are filled with sand.

The tank chime is sealed to block moisture and contaminants, and VCI-infused dry mesh sleeves are installed in the pipes. This sealed system allows VCIs to rise from the sand, effectively preventing corrosion on the metal bottom plates.

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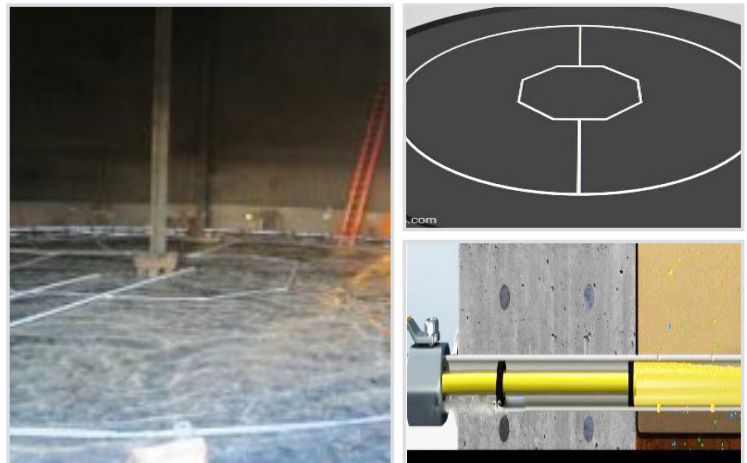


### Underside Drip Tube

The Underside Drip Tube IDS protects tank bottom plates in single or double bottom tanks during construction or new floor installation. A network of perforated PVC pipes with mesh sleeves is installed in rings atop the tank liner within the sand foundation, with inlet pipes extending through the ring wall for access.

The tank chime is sealed to block moisture and contaminants. Low-viscosity inhibitor slurry is injected through the ports, and the PVC pipe network distributes it evenly across the sand bed. VCIs protect the metal bottom plates, while SCIs neutralize contaminants. Injection ports allow for future inhibitor replenishment.

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## API-Referenced Standards for VCI Technology

Zerust Vapor Corrosion Inhibitors (VCIs) are recognized in API 2610 Section 12.5 as an effective corrosion mitigation method. Additionally, API Technical Report 655 (API TR 655) highlights the use of VCIs for soil-side corrosion protection of AST bottoms. This approach offers comparable performance to cathodic protection systems and is supported by extensive field data. For more details, contact a Zerust representative.

## VCI and CP Compatibility

While the DOT – PHMSA does not currently allow the use of VCIs without Cathodic Protection (CP) for “break-out” tanks, most non-regulated tanks may use VCIs independently or in scenarios where CP is limited or inapplicable, as outlined in API 651. In these cases, VCIs provide an effective alternative corrosion protection solution.

## Corrosion Monitoring with ER Probes

Electrical Resistance (ER) probes measure the corrosivity of the sand or soil foundation beneath a tank. Baseline corrosion rates are established by tracking resistance changes over time. VCI vapors emitted from the slurry protect the ER probes, demonstrating the inhibitor’s effectiveness. ER probe tubes are installed at various points to estimate bottom plate corrosion. The probe cables are stored outside the ring wall, enabling corrosion readings without interrupting tank operations.

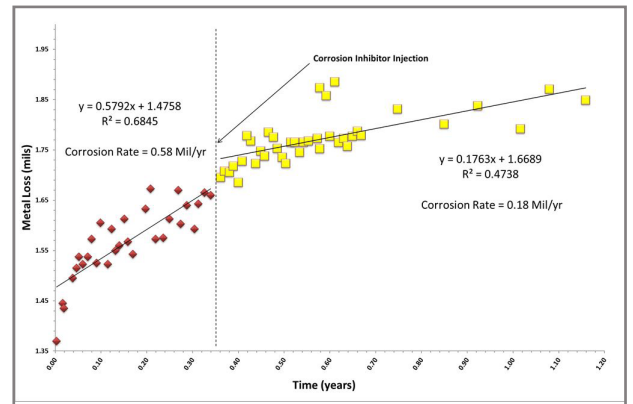


## Case Study: SSB Tank Protection

Zerust successfully demonstrated its Underside Injection IDS solution in a challenging installation where tank operations could not be stopped. This system introduced a liquid inhibitor slurry into the sand bed base beneath the tank through injection ports. The slurry spread evenly across the lined sand bed, releasing VCIs that volatilized to protect the entire soil-side bottom of the tank.

Effectiveness was validated using metal loss readings from ER probes before and after injection. Data collected showed a threefold reduction in the corrosion rate compared to baseline levels, confirming the efficacy of the Underside Injection IDS solution. Refer to the “Metal Loss Versus Time” graph to the right.

Metal Loss Versus Time



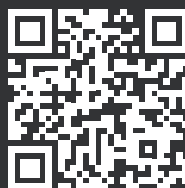
### ‡ DECLARATION

Corrosion protection claims are based on Northern Technologies International Corporation (NTIC) internal laboratory testing performed under controlled parameters on contaminate-free substrates. Real-world application corrosion protection duration on different substrates will vary and depends on factors such as, but not limited to, the application or use, environmental/ storage conditions, surface cleanliness, type of substrates, and coating thickness (where applicable). The use of the term “Up to” in reference to time is defined as any time duration from zero up to a specified time frame, but in no event beyond the specified time frame. The use of the term “for years” is based on NTIC’s experience with its products but is in no way guaranteed. The use of the term “Up to” in reference to volume is defined as any volume from zero up to a specified volume but in no event beyond the specified volume of protection. It is the customer’s/user’s obligation to evaluate product performance, corrosion protection duration, safety, and suitability for intended use within the scope advised in the data sheet and to comply with all applicable laws and regulations.

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