Corrosion Control/Cathodic Protection for Aboveground Storage Tanks

Presented by:
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Why is Corrosion Control Important?

- Preserve Assets
- Reduce Maintenance Costs
- Reduce Inspection Cost
- Company/Government Requirement
- Preserve The Environment
Corrosion of Metallic Structure
External Corrosion of Tank Bottom

Anodic Area -600mV

Cathodic Area -550mV

SAND

CURRENT FLOW
Corrosion Cell Caused by Foreign Material in Sand Cushion
Corrosion Caused by Poor Water Drainage
New Steel Coupled to Old Steel
CP Installation on Double Bottom Tank
Galvanic Cathodic Protection

- Cathode
- Anode
- Magnesium
- Structure (Cathode)
Recommended Practices

API-651 - Cathodic Protection of Aboveground Petroleum Storage Tanks:

“Galvanic anodes method is not practical for protection of large bare structures.”

NACE RP0193-2001 - External Cathodic Protection of On-Grade Carbon Steel Storage Tank Bottoms:

“Galvanic protection systems can be applied to tank bottoms where the metallic surface area exposed to the electrolyte can be minimized through the application of a dielectric coating or the area is small due to the tank size or configuration.”
Impressed Current Cathodic Protection

- Rectifier
- Anode
- Return

CURRENT FLOW
Shallow Anodes

Tank

Rectifier

Anode

(+)

(-)
Shallow Anodes

Anode

Typical Depth 20'

Splice

Rectifier

(+)

(-)

Tank
Deep Anode

Tank

Tank

Tank

Tank

Rectifier

(+)

(-)
MFL Floor Inspection
Cathodic Protection Monitoring
Portable Reference Cell

Soil

Tank

Rim Potential Measurements

-850mV
Directional Boring Under Existing AST
Test/Access Station

Aboveground Storage Tank

Grade

3’ Typical

2” Ø PVC

Monitoring Tube

REFERENCE CELL MONITORING TUBE
**Reference Cell**

**Bullseye® Monitoring Tube**

**Test / Access Station**

**boveground storage Tank**

**Rim**

**Center**

**Potentials (mV)**

<table>
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ABOVEGROUND STORAGE TANK

CATHODIC PROTECTION

Anode Material

Anode Tube

3" Ø PVC 20% Exposure

Test/Access Station

Aboveground Storage Tank

Grade

10' Typical
TYPICAL ANODE INSTALLATION

- Tank Bottom
- Slotted Pipe
- Coke Breeze
- Native Earth
- Anode Material Centered in Coke Breeze
Computer Guided Horizontally Bored Anode System

- Rectifier
- Anode Splice Box
- Anode Pipe
- Monitoring Pipe
- Tank
Leak Detection Monitoring Station
CP Applications for Re-bottomed or New Tanks
CP Installation on Rebottomed Tank
Above Ground Storage Tank Bottoms with or without Secondary Containment
Secondary Containment

- Environmental Protection
- Minimize Liability
- State and Local Regulations
New Tank Construction with Liner
Anode & Reference Cell Placement in High Resistance Sand
Ringwall Conduit for CP Wiring
Floor Plate Installation
Installation of CP System on Lifted AST
System Energization
Impressed Current System

- Rectifier
- Anode
- Groundbed
- Pipeline (Structure)

Current Flow

(-) (+)
Inspection of CP System
Remote Monitoring of CP
Internal Corrosion

Fuel Product

Water / Sediment

Anode

Cathode
Internal Corrosion
Recommended Practices

API-651 - Cathodic Protection of Aboveground Petroleum Storage Tanks:

NACE RP0193-2001 - External Cathodic Protection of On-Grade Carbon Steel Tank Bottoms:
Pipeline Inspection Tool