



**PDHonline Course C232 (2 PDH)**

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# **UST Systems - Maintenance Basics**

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**2020**

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## Section 5 — Corrosion Protection

To prevent leaks, all parts of your UST system that are underground and routinely contain product need to be protected from corrosion. The UST system includes the tank, piping, and ancillary equipment, such as flexible connectors, fittings, and pumps. Unprotected metal UST components can deteriorate and leak when underground electrical currents act upon them.

One way to protect UST components from corrosion is to **make them with nonmetallic, noncorrodible materials**, such as USTs made of (or clad or jacketed with) fiberglass reinforced plastic (FRP) or other noncorrodible materials — as illustrated by the FRP tank on the right. Noncorrodible USTs like these do not require O&M for corrosion protection.



UST components made from metal, however, that routinely contain product and are in direct contact with the ground need corrosion protection provided by cathodic protection or (in some cases) lining the interior of the tank, as described below. These options require O&M.

**Note: Metal tanks or piping installed after December 22, 1988 must have a dielectric coating (a coating that does not conduct electricity) in addition to the cathodic protection described below.**

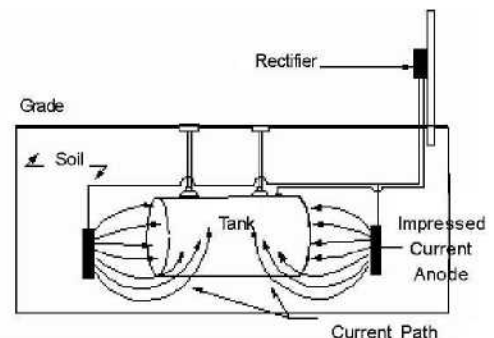
### Cathodic Protection Using Sacrificial Anode Systems

Sacrificial anodes are buried and attached to UST components for corrosion protection — as illustrated on the right by an anode attached to a tank. Anodes are pieces of metal that are more electrically active than steel, and thus they suffer the destructive effects of corrosion rather than the steel they are attached to.



### Cathodic Protection Using Impressed Current Systems

An impressed current system — as shown on the right — uses a rectifier to provide direct current through anodes to the tank or piping to achieve corrosion protection. The steel is protected because the current going to the steel overcomes the corrosion-causing current flowing away from it. **The cathodic protection rectifier must always be on and operating to protect your UST system from corrosion.**



## Corrosion Protection Using Internal Lining Of The Tank

This corrosion protection option applies only to tanks installed before December 22, 1988. These older tanks can be internally lined by trained professionals to meet the corrosion protection requirements — as shown on the right, in which a professional follows industry codes to safely and effectively line a tank's interior.



It may help you to see your corrosion protection options displayed in the following table.

<b>Corrosion Protection Choices</b>	
<b>Option</b>	<b>Description</b>
<b>Noncorrodible Material</b>	The tank or piping is constructed of noncorrodible material.
<b>Steel Tank Clad Or Jacketed With A Noncorrodible Material</b>	Examples of cladding or jacket material include fiberglass and urethane. Does not apply to piping.
<b>Coated And Cathodically Protected Steel Tanks Or Piping</b>	Steel tank and piping is well-coated with a dielectric material and cathodically protected.
<b>Cathodically Protected Noncoated Steel Tanks Or Piping</b>	<i>This option is only for steel tanks and piping installed before December 22, 1988. Cathodic protection is usually provided by an impressed current system.</i>
<b>Internal Lining Of Tanks</b>	<i>This option is only for steel tanks installed before December 22, 1988. A lining is applied to the inside of the tank. Does not apply to piping.</i>
<b>Combination Of Cathodically Protected Steel And Internal Lining Of Tanks</b>	<i>This option is only for steel tanks installed before December 22, 1988. Cathodic protection is usually provided by an impressed current system. Does not apply to piping.</i>
<b>Other Methods Used To Achieve Corrosion Protection</b>	If you have tanks or piping that do not meet any of the descriptions above, check with your state UST agency to see if your UST system meets the requirements for corrosion protection. You also will need to ask about the operation, maintenance, and record keeping requirements applicable to this type of UST system.

Note: In addition to tanks and piping, all other metal components in direct contact with the ground that routinely hold product — such as flexible connectors, swing joints, fittings, and pumps — must also be cathodically protected.

**Use the O&M checklist on the next page. Following the checklist look for record keeping forms and discussions of special corrosion protection situations.**

## ✓ Basic O&M Checklist For Corrosion Protection

<p><b>Sacrificial Anode Cathodic Protection Systems</b></p>	<p><b>You need to have a periodic test conducted by a qualified corrosion tester to make sure your cathodic protection system is adequately protecting your UST system. This test needs to be conducted:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Within 6 months of installation.</li> <li><input type="checkbox"/> At least every 3 years after the previous test.</li> <li><input type="checkbox"/> Within 6 months after any repairs to your UST system. <ul style="list-style-type: none"> <li>• Make sure the professional tester is qualified to perform the test and follows a standard code of practice to determine that test criteria are adequate.</li> <li>• If any test indicates your tanks are not adequately protected, you need to have a corrosion expert examine and fix your system.</li> <li>• Testing more frequently can catch problems before they become big problems.</li> </ul> </li> <li><input type="checkbox"/> <b>You need to keep the results of at least the last two tests on file.</b> See the next page for a cathodic protection test record keeping form.</li> </ul>
<p><b>Impressed Current Cathodic Protection Systems</b></p>	<p><b>You need to have a periodic test conducted by a qualified corrosion tester to make sure your cathodic protection system is adequately protecting your UST system. This test needs to be conducted:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Within 6 months of installation.</li> <li><input type="checkbox"/> At least every 3 years after the previous test.</li> <li><input type="checkbox"/> Within 6 months after any repairs to your UST system. <ul style="list-style-type: none"> <li>• Make sure the professional tester is qualified to perform the test and follows a standard code of practice to determine that test criteria are adequate.</li> <li>• If any test indicates your tanks are not adequately protected, you need to have a corrosion expert examine and fix your system.</li> <li>• Testing more frequently can catch problems before they become big problems.</li> </ul> </li> <li><input type="checkbox"/> <b>You need to keep the results of at least the last two tests on file.</b> See next page for a cathodic protection test record keeping form.</li> <li><input type="checkbox"/> <b>You need to inspect your rectifier at least every 60 days to make sure that it is operating within normal limits.</b> <ul style="list-style-type: none"> <li>• This inspection involves reading and recording the voltage and amperage readouts on the rectifier. You or your employees can perform this periodic inspection.</li> <li>• Make sure your cathodic protection professional provides you with the rectifier's acceptable operating levels so you can compare the readings you take with an acceptable operating level. If your readings are not within acceptable levels, you must contact a cathodic protection professional to address the problem.</li> </ul> </li> <li><input type="checkbox"/> <b>You need to keep records of at least the last 3 rectifier readings.</b> See page 39 for a 60-Day Inspection Results record keeping form.</li> <li><input type="checkbox"/> <b>You should have a trained professional periodically service your impressed current system.</b></li> <li><input type="checkbox"/> <b>Never turn off your rectifier!</b></li> </ul>
<p><b>Internally Lined Tanks</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Within 10 years after lining and at least every 5 years thereafter, the lined tank must be inspected by a trained professional and found to be structurally sound with the lining still performing according to original design specifications. Make sure the professional performing the inspection follows a standard code of practice.</li> <li><input type="checkbox"/> <b>Keep records of the inspection (as specified in industry standards for lining inspections).</b></li> </ul>