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PREMIERE ISSUE

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External Tank Bottom Cathodic Protection—State-of-the-Art Anode Technology

TED HUCK, MATCOR

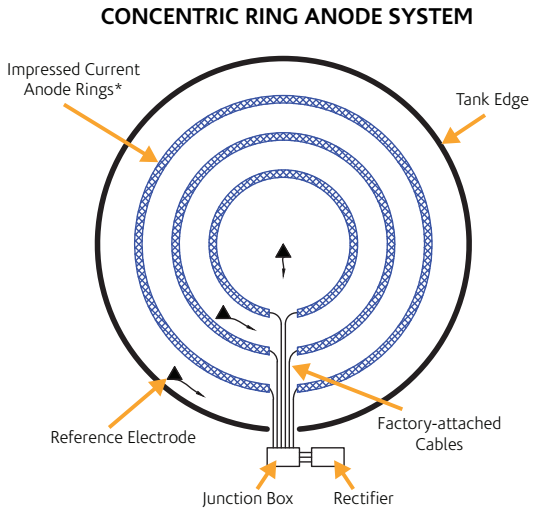
External corrosion of tank bottoms is a significant problem for tank owners. Corrosion professionals tasked with protecting these structures should consider multiple factors. One thing is clear: proper installation of an impressed current cathodic protection (CP) system plays an important role in reducing corrosion and extending the service life of the tank bottom.

For new tank construction (and many tank bottom replacements), state-of-the-art corrosion prevention requires clean, chloride-free sand bedding combined with a dedicated impressed current anode CP system directly under the tank. The use of oil sand, crushed stone, asphalt, or other materials directly under the tank bottom should be avoided, as these hinder effective CP. The vast majority of new tank construction projects utilize mixed metal oxide (MMO) impressed current anode systems. MMO anodes offer long life, low cost, and design flexibility, making this type of system the best choice for tank owners and system designers.

Two primary CP configurations are used in tanks worldwide. The field-erected anode grid configuration was an early application of MMO anodes for tank bottoms and has a large global installed base. This system utilizes MMO ribbon anodes field cut into strips and laid out in parallel. Titanium ribbon conductor bars are also field cut and laid perpendicular to the MMO anodes. The MMO ribbon and titanium conductor bars are field tack welded at the intersections. Separate power cables are then tack welded to the titanium conductor bars and the cables are fed back to a junction box.

A newer design to protect tank bottoms is a system of linear anodes in concentric rings. The key advantage of a concentric ring anode system is that there is no field cutting or welding—the anode rings are supplied factory assembled, tested, and ready to be laid into position prior to backfilling. The anode is typically backfilled within a pre-packaged tube filled with a high-quality carbon backfill. This enhanced backfill protects the anode during installation, keeps the anode weighted and in place, improves performance, and reduces system resistance. It can also reduce depolarization caused by oxygen generation, which can impact CP system performance. For tank replacements where there is very little space between the tank bottom and the anode, a sand backfill can replace the carbon backfill to help ensure that the anode does not short due to contact with the tank bottom.

The grid system continues to be specified by many, however the factory-assembled concentric ring system should be strongly considered. There is only one opportunity to properly install the CP system prior to field erection of the tank. Once installed and the tank is erected, there is no access or ability to go back and repair the system. A design that eliminates field cutting and welding of the anode and the anode-to-cable connections significantly improves system reliability. With the concentric ring system, all anode segments are factory assembled and tested, with no field connections or welds. This greatly reduces installation time and helps ensure a long, reliable life.



Ted Huck is an electrical engineer and CP expert with over 20 years of experience in technical sales. He has authored over a dozen articles in a wide range of publications, and is a frequent presenter at corrosion conferences in the U.S. and internationally. Ted can be reached by phone at +1 267-759-3605 or by email at matcorsales@matcor.com.

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