



**FARWEST CORROSION
CONTROL COMPANY**

Magnesium Anode Performance

The Farwest Corrosion UltraMag High Potential Anode

Introduction

There is great interest today concerning the quality of magnesium anodes used for cathodic protection, specifically high potential magnesium anodes. This interest is due, in part, to the departure of all U.S. manufacturers and the flood of overseas anode manufacturers to the United States.

This issue had not received much attention until these new manufacturers entered the market. Previous to that, customers either tested anodes at random or relied on manufacturing and distributing companies to ensure anode quality. With the departure of all U.S. anode ingot manufacturers, the industry began to notice some deterioration in anode quality and performance. However, this depended a great deal on the specific anode manufacturer and their commitment to anode quality and performance.

Making high potential magnesium anodes can be a difficult proposition. Much like adding ingredients to a cake recipe, it is fairly simple to meet ASTM B 843 (Standard Specification for Magnesium Alloy Anodes for Cathodic Protection) requirements for anode composition. However, the difficult part in the process is the way the anode is made, which can greatly affect the ultimate performance of the anode.

Anode Performance

What is acceptable anode performance? Two factors, open circuit potential and current efficiency, are the industry standards by which anode performance is measured. These factors are confirmed by conducting laboratory tests in accordance to ASTM G97 (Laboratory Evaluation of Magnesium Anode Test Specimens for Underground Application) requirements. In this test, anode “pencils” or samples are taken from randomly selected anodes and are measured over a period of fourteen days. At the conclusion of the test, open circuit potential is measured and weight loss is analyzed to determine current efficiency.

While there are no specific industry standards for open circuit potential and current efficiency, the “accepted” levels are typically:

- Open Circuit Potential: -1.70 volts with respect to a saturated Calomel electrode (-1.774 volts with respect to a Cu/CuSO_4 electrode)
- Current Efficiency: 50% or 500 amp hours



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What happens when an anode fails to meet the above levels? If an anode falls below -1.70 volts open circuit potential; there will be a corresponding decrease in output current produced by that anode. Simply put, the anode will produce less protective current. Conversely, as open circuit potential increases, additional output current will be obtained, assuming similar circuit resistance. Similarly, if anode current efficiency drops below the 50% target, the life of the anode will also decrease. If current efficiency increases, so too will anode life.

If these targets are not met, is the anode still a good anode? This may depend on your level of tolerance or a specification you are required to meet. An anode measuring -1.68 volts is not necessarily a bad anode nor is an anode measured at 49% efficiency. However, you must understand that these factors affect the overall anode performance.

Who tests for these requirements? Reputable anode ingot manufacturers conduct these tests and tests for anode chemistry. In the U.S., there are at least two third-party laboratories that test to ASTM G97 standards. Bear in mind, however, that ASTM tests are destructive and that an anode must be sacrificed for every test.

How often are anodes tested to ASTM G97 requirements? This depends. As mentioned above, manufacturers should have their own internal testing standards. In some cases, anode manufacturers, in an effort to determine anode performance, will test a number of anode “heats” or “lots” during anode production. Additionally, some anode distributors send randomly selected anodes to third-party laboratories for confirmation testing. Whatever the case, the more often tests are conducted, the better the opportunity for learning about anode performance. Keep in mind, however, that these tests can be costly (at least \$600 per anode) and will add to the overall cost of the anode.

The Farwest Corrosion UltraMag Anode

Our industry reputation and commitment to quality dictates that we provide a quality, high potential magnesium anode. Therefore, our goal is to consistently provide high potential anodes capable of meeting industry requirements for performance and life.

The Farwest Corrosion UltraMag Anode is the answer to that goal. To maintain this level of performance, we work very closely with our manufacturer, who is extremely diligent regarding quality and testing. Additionally, we conduct our own third party ASTM G97 tests to reaffirm this commitment.

Does this cost more? Very simply, yes it does. However, the cost of an anode is relatively minor when compared to the installation costs or the cost of an anode that doesn't perform to expectations. We believe the additional cost is well worth the expense and so do most of our customers.



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How do I know the UltraMag is a quality anode? We will be happy to provide you with manufacturing certificates, manufacturing test results as well as copies of our third party ASTM G97 test results if requested. These are not secret documents and are available to our customers at any time.

Are all distributors this careful about anode quality? Unfortunately, this is not the case with all distributors. Because of the pressures of competition and the bottom line, some in our industry cut costs to increase their business. Ultimately, the customer ends up losing, as any potential savings at time of purchase may be lost over the life of the anode.

Conclusion

The anode purchased at the lowest cost may not ultimately be the lowest cost anode. Depending on the performance characteristics of that anode, the real cost may not be evident at time of purchase. There are many anode manufacturers and not all of them are experienced or even reputable. Be careful what you're buying and ask for test results to ensure quality.

We appreciate the opportunity to serve you and should you have any questions about magnesium anode quality or any other corrosion related topic, please contact your Farwest sales associate at (888) 532-7937 (888-5-FARWEST).