

## **Are aluminum sacrificial anodes more ocean-friendly than zinc?**

U.S. marinas and ports berth many thousands of vessels that use sacrificial anodes to protect under water metal parts from damaging galvanic corrosion. Most pleasure boats and many fishing/working boats use zinc alloy anodes for this purpose, my single screw 36' Motorsailor will dissipate about a pound of zinc anode material a month, larger twin screw trawler hull vessels use much more. Divers who specialize in cleaning hull bottoms are typically employed to replace underwater anodes, and replacing anodes is an important source of income. Few divers (or boat owners for that matter) understand the complex electrochemistry involved and as such are unable or just not interested in evaluating the effectiveness of protection thus to "play it safe" there is a tendency to replace anodes long before they are fully consumed. *Contrary to popular belief in most applications a quality Mil.-Spec. anode properly installed will continue to protect the more noble underwater metal parts until the anode is completely consumed.* And it is relatively easy to determine if your anodes are working requiring only an inexpensive digital multimeter and a silver reference cell. Most full service marine dealers offer these meters, reference cells and how-to books.

In too many instances anodes are replaced when they are only a third to half used and then they are often just dropped into the water further increasing the contamination. Adding to this milieu are those anodes of lesser quality that quickly crumble in salt water and anodes that are not correctly installed, that quickly loosen and/or not bonded to the host through failure to properly clean the contact points, these anodes just dissolve away providing no protection whatsoever.

The toxicity of zinc alloys is a concern for seawater environments, the Canadian Government Ministry of Water, Land and Air has recommended guidelines for zinc for marine life: 10 ppb ( $\mu\text{g/L}$ ) is acceptable with 55 ppb considered acute. I do not know if there are any similar U.S. Federal or State guidelines. But the fact is that a great many boats remain in their slips unused for months on end dissipating potentially toxic elements into the usually quiet shallow waters of the marina, these activities suggest that our marinas and ports are virtual zinc sink-holes and these contaminated waters eventually find their way to the outer ocean....

Over the past ten years boat owners in many countries have replaced, where appropriate, zinc anodes with aluminum anodes, this aluminum alloy (Mil A 24779 SH) is said to be more ocean-friendly than zinc, provides the same degree of protection and they last about 30 to 50% longer. Boaters in the U.S. have been slow to replace zinc with aluminum, most likely because few boaters know about them and little effort has been devoted by manufactures, distributors, dealers and divers in promotion, possibly for economic reasons, like why promote a product that will reduce income potential?

I do not know of any studies have been conducted as to the effect of zinc in U.S. ports and marinas or if in fact there is a zinc problem or if aluminum would be less polluting, but my gut feeling is that a bit of aluminum is better than a lot of zinc so I will replace the big heavy DiversDream zinc on my Motorsailor with the equivalent flyweight aluminum version and monitor the results.....

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