

WHAT'S THE TRUTH ABOUT ALUMINUM SACRIFICIAL ANODES?

A NEW SACRIFICIAL ANODE MATERIAL IS APPEARING ON THE SCENE – AN ALLOY OF ALUMINUM, ZINC AND INDIUM. IS IT AN IMPROVEMENT ON THE OLD TRIED AND TESTED ZINC?

First, what do sacrificial anodes do?

Sacrificial anodes "sacrifice" themselves by wasting away instead of the propeller, the propeller shaft, rudder, engine or other metal parts in or connected to the water being "eaten" away or wasting away due to the electrochemical process of corrosion.

Sacrificial anodes are relatively cheap pieces of metal. They are designed specifically to corrode instead of the more expensive metal parts of your boat corroding. Sacrificial Anodes, which are known as "active" metals, are chosen for this task.

Traditionally sacrificial anodes were usually made of Zinc, hence the name "zincs" but they can also be made from magnesium or a special alloy of aluminum. Anodes are very important, indeed essential, even when you trailer your boat, and will help to prevent very expensive damage to the metal parts of your boat that are underwater.

Sacrificial anodes come in all shapes and sizes but they all perform the same task. They have to be connected "electrically" - usually metal to metal - to the valuable metal parts on your boat that need protecting. Thus you will see these gray pieces of metal attached to rudders, outboard motors, propeller shafts etc.

The sacrificial anode forms the negative terminal of a battery and is connected electrically to the metal to be protected. Because the metal of the sacrificial anode is more active electrically, i.e. it wastes away, it forms the negative terminal (anode) of the battery in the electrolyte which is, for example, sea water. The anode is the terminal that will always corrode with its metal literally dissolving into the water. The positive terminal of this "battery" is of course the metal (cathode) that is being protected, e.g. the propeller shaft, propeller, engine etc. This whole process is known as galvanic corrosion. The saltier or more polluted the water, the more it will conduct electricity and the faster the sacrificial anode will be corroded.

You may hear the term "electrolysis", which is often used to describe "galvanic corrosion" or "stray current" corrosion. This is an inappropriate use of the term, and has no relevance in the marine industry.

What metals are used in sacrificial anodes?

The three most active materials used in sacrificial anodes are zinc, aluminium and magnesium. They have different properties and uses.

The first property to consider is their *electrical potential*. All metals generate a negative voltage (as compared to a reference electrode) when immersed in water. The lower - the more negative - the voltage, the more active the metal is considered to be, for example:

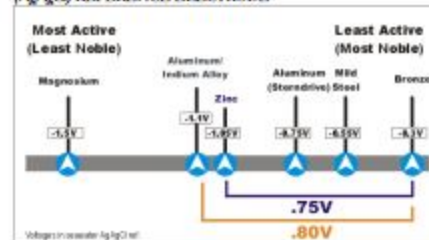
Magnesium generates -1.6 Volts, i.e. negative 1.6 volts.
Aluminum sacrificial anode alloy generates -1.1Volts
Zinc, -1.05 Volts

Now compare these voltages, by comparison, to metals commonly used in marine use:-

Bronze generates -0.3 Volts
Steel, -0.6 Volts
Aluminum, such as that used in hulls, sterndrives or outboard motors generates -0.75 Volts.

VOLTAGES IN SEAWATER OF MARINE-USE METALS

WITH REFERENCE TO A SILVER-SILVER-CHLORIDE (-Ag/AgCl) REFERENCE ELECTRODE



In order to provide protection, the highest practicable voltage difference possible is required between the sacrificial anode and the metal to be protected.