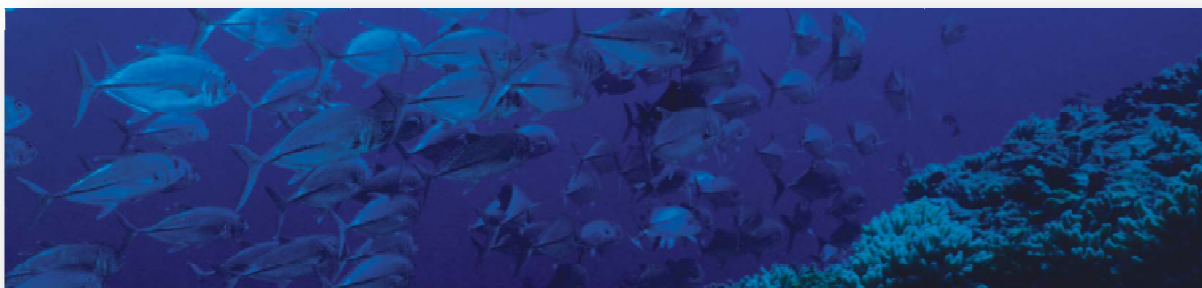


# CUPRION™ ELECTROLYTIC ANTI FOULING



## AN OVERVIEW

CLEARLY THE BEST  
PROTECTION FOR YOUR  
INVESTMENT

## THE PROBLEM

Hard fouling is the generic name given to the accumulation of the hydroid classification of invertebrate. Examples include Barnacles, Limpets, Mussels and Tubeworms. A typical example can be seen in the photograph which shows mussel colonisation of a marine pump.

Mussels in particular are prolific breeders which attach themselves to almost any submerged surface (rocks, boats, piers, pipes and to each other) by secreting horny sticky threads. Egg fertilisation and production occurs within hours of the water temperature rising above 12°C. After hatching and as long as the water temperature stays between 14°C and 24°C the free swimming larvae will appear in plankton and be dispersed by water currents. Spores can settle out if the circulation velocities are low enough – under 1-1.5m/sec. Once the shell grows too heavy it will attach itself to a suitable substrate by means of its threads. By the end of the first growing season the female mussel can produce 30,000 to 40,000 eggs. Population growth is therefore rapid and will spread quickly through a seawater system where the flow of water ensures a good food supply.

Marine Growth is therefore a problem in most oceans of the world, including colder environments such as the North Sea. The consequences are of particular concern for submerged pumps and water intakes. Initially resulting in reduced flows and pressure, untreated marine growth can lead to complete blockage of pumps and pipe work. Fire pumps are particularly at risk due to their infrequent operation



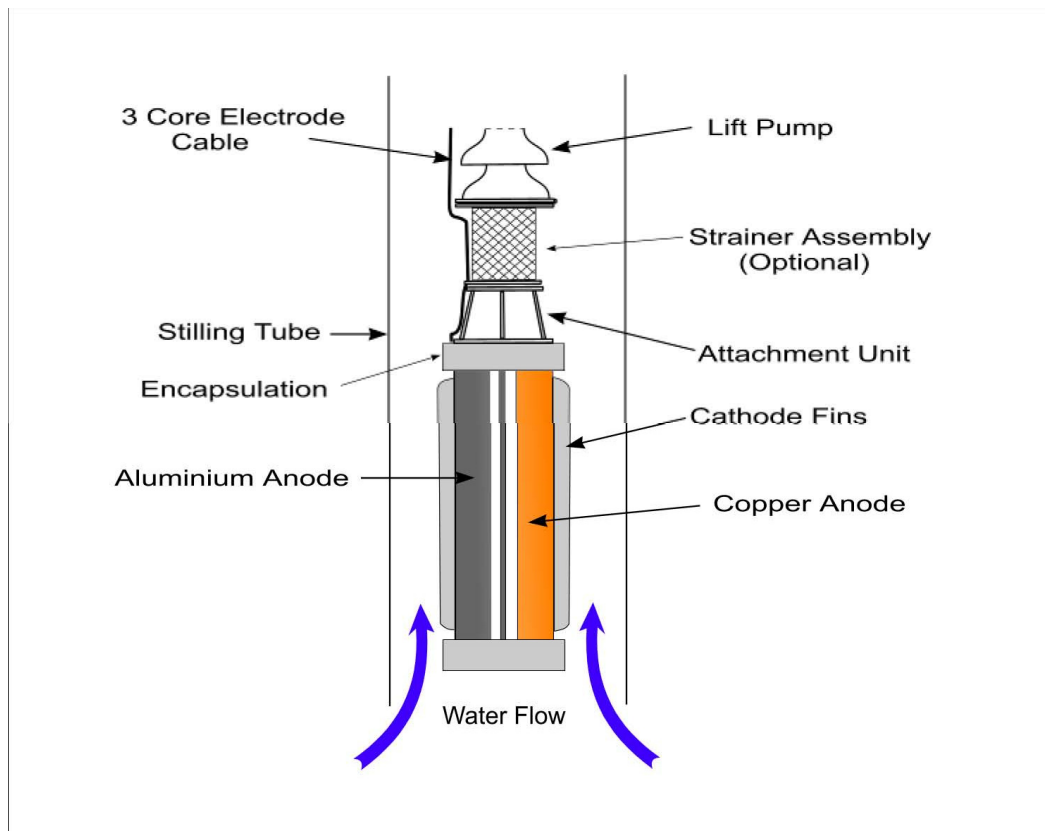
Picture shows typical example of hard fouling

## THE SOLUTION

The effectiveness of copper as a deterrent for marine growth has been well known for centuries. Hulls of wooden sailing ships were clad in copper sheeting to maintain them free from growth. Copper is a naturally occurring element in sea water and one which is necessary for marine life. However by locally increasing the concentration of copper, an environment is created which discourages marine growth. This environment is not toxic to marine life, but does prevent settlement of the larvae and colonisation.

The Cuprion™ system uses an automatic control system to produce the copper ions from a solid anode. Passing a low voltage DC current between the copper 'anode' and steel 'cathode' results in the release of copper ions from the anode. By regulating the current, the level of copper dosing is tailored accurately to each application.

A typical Cuprion™ installation for a submerged sea water pump is shown below



The Cuprion™ electrode is mounted on the pump intake using a custom designed attachment unit. Water being drawn into the pump passes over the Cuprion™ unit and 'collects' copper ions which are being produced by the anode assembly. The treated water is then carried through the pump and pipe work, preventing marine growth throughout the system.

The system automatically adjusts the output of copper ions to suit pump running conditions so that the pump is constantly protected, even in standby mode.

Electrode life is usually matched to pump overhaul intervals, typically 5 years.



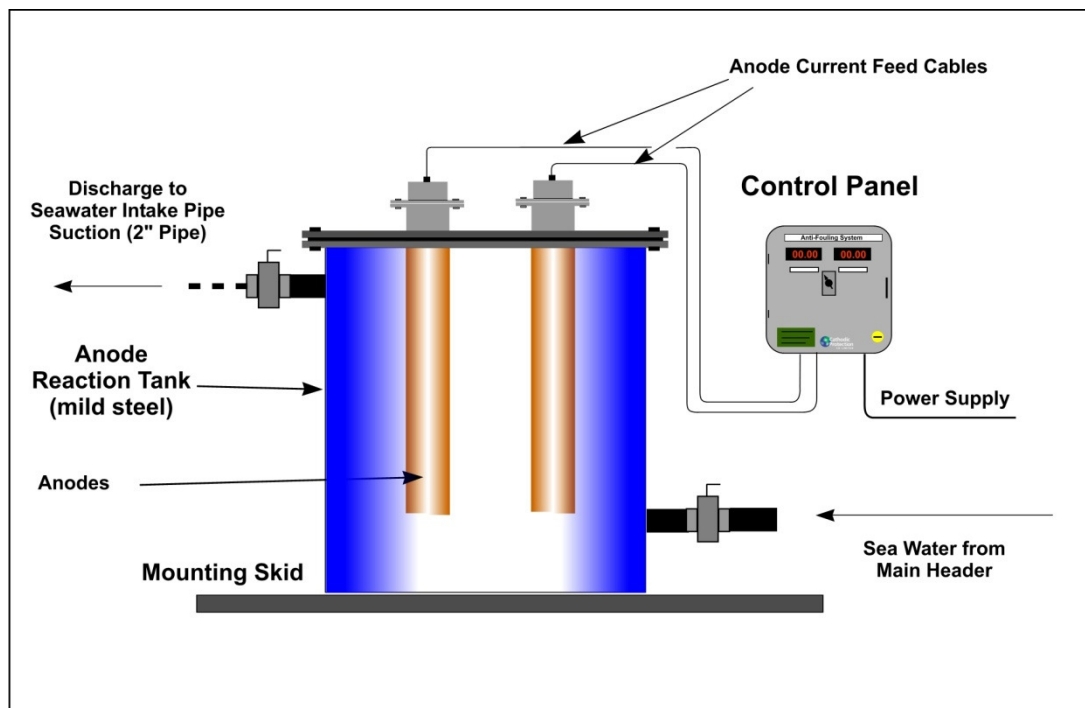
**Typical examples of pump mounted Cuprion™ Anti Fouling Electrodes**

To assist with the distribution of the copper ions, the Cuprion™ system also features aluminium anodes. A second electrical circuit is used to produce aluminium ions and these react with the sea water to form hydrated aluminium oxide. This in turn combines with the copper ions to produce a 'floc' of aluminium hydroxide. The floc maintains the copper ions in suspension so that they are carried with the water as it is pumped through the system. Data from Cuprion™ installations show that this technology allows copper ions to be carried over many kilometres of pipe work, so protecting it from fouling.

### PUMP MOUNTED OR TANK SYSTEM?

Pump mounted Cuprion™ electrodes can be provided to suit the majority of marine pump configurations. An alternative system has been developed for customers to suit multiple pump applications, or where there is insufficient space to fit a conventional electrode to the pump intake. The Cuprion™ tank system has electrodes which are contained in a remote tank through which a constant flow of water is passed, and then fed to the pump intake. The water becomes treated with copper/aluminium ions in the tank, and the discharge of this treated water gives anti fouling protection to the pump(s).

A typical tank system is shown below:



The Cuprion™ tank system was developed with the maintenance engineer in mind and contains design features to ensure reliability and a low maintenance burden:

- Constant water flow through tank
- No motorised control valves
- System output is electronically regulated by varying anode currents
- No moving parts for single pump system
- Simple solenoid valves for flow control in multiple pump applications
- Simple anode replacement (~30 mins)
- Self contained package – all equipment on skid



### ALTERNATIVE METHODS OF MARINE GROWTH CONTROL

Chlorine based systems are the traditional method used for marine growth control. Chlorine is a highly effective anti fouling agent, but has high toxicity and is corrosive to marine equipment when dosing is not accurately controlled. Manual dosing with chlorine based products is notoriously unreliable due to the human factors involved, and storage and shipping of chemicals are problematic and costly. These issues mean that overdosing and corrosion problems are commonplace. Periodic 'shock dosing' with chlorine may also result in the release of marine growth that has accumulated between treatments, causing downstream filters and equipment to become blocked or contaminated.

More sophisticated chlorine based systems generate chlorine (hyperchlorite) from sea water. This equipment is contained in a 'package' or 'skid' which is mounted on the deck of the platform. These systems feature high power consumption and a high level of mechanical complexity, with pumps, motorised valves, mixers etc. It eliminates the hazards of transporting and storing chemicals. These systems generate the anti fouling agent and then mix it with water which is then piped to the pump intake.

Cuprion™ has a number of advantages over chlorine based systems:

- Cuprion™ cannot cause corrosion.
- High reliability
- No chemicals to handle or store
- Automatic operation to suit pump duty
- 24/7 continuous protection
- No routine maintenance
- Low power consumption (~1kW)

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## accreditations



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