

CHALLENGER DRILLING, INC.

Specialty Products

CDI-AFS

Challenger Drilling, Inc / Anti-Fouling System



Marine bio-fouling is a problem that exists in sea water pump and piping systems on all ocean going vessels, offshore structures, mobile offshore drilling units & shoreline installations.



Pump system operational problems are accelerated in sea water pumps, piping manifolds and downstream equipment from bio-fouling

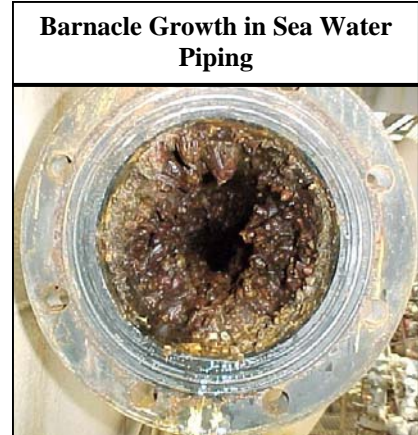
- Pump performance and pump life is reduced due to restrictions in suction screens and piping creating turbulent flow of water entering the pump or complete starvation of water supply
- Downstream equipment that relies on a pre-determined steady supply of water is forced to operate with reduced fluid capacities and/or pressure
- The corrosion process accelerates due to barnacles compromising internal coatings of pumps and piping systems

Challenger Drilling Inc.'s specialty products division offers the CDI-AFS. Our copper ionization anti-fouling process is recognized worldwide as a cost effective, safe and precise method to prevent marine bio-fouling.



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Various types of marine fouling exist, ranging from bacteria and fungi, to free swimming animal larvae. Once the larvae is allowed to enter and adhere to the interior walls of the sea water system, they begin to grow and colonize. If this natural process goes unchecked, a partial or complete blockage in the sea water piping is inevitable.



How the System Works

The [CDI-AFS](#) delivers an impressed DC current from an automated power converting controller panel to copper anodes strategically placed in sea chests, strainers, pump intakes, caisson inlets, etc. The introduction of DC current to the anodes causes a release of copper ions into the flow of sea water, at a pre-determined rate. The copper ions (maximum of 24ppb concentration) inhibit the entry and growth of fouling organisms downstream from the anodes or downstream from the treated water introduction point. Upon their return to the open sea, the copper ions disperse and dilute. Their potency is then reduced to levels that are not harmful to sea life.

Some installations utilize aluminum anodes in conjunction with the copper anodes. The aluminum anodes dissolve simultaneously with the copper anodes, and create a protective film on ferrous sea water systems to inhibit corrosion.

The power converting controller panels are manufactured to function in a wide variety of applications. The DC current output regulates the concentration of copper released into the water flow. The current output is adjustable to optimize the efficiency of the system, thus allowing for proper water treatment and maximum anode life.

Alternative methods are available to combat marine growth fouling. Chlorination is the most commonly used method in the offshore Oil & Gas Industry. Typical ways to introduce chlorine into the sea water system are Chlorine Gas Injection, Hypochlorite Injection, and In-Situ production of Hypochlorite by electrolysis of sea water. The [CDI-AFS](#) is an effective solution to preventing marine growth fouling without the high capital, operating and maintenance costs of chlorination. Furthermore, the toxicity, corrosiveness, and safety hazards associated with chlorine treatment are eliminated with the [CDI-AFS](#).



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The versatility of the **CDI-AFS** allows for custom adaptation to virtually any type of seawater pumping system.

The **In-Line CDI-AFS** is designed to treat the produced sea water by mounting anodes in the sea water header, thus eliminating marine growth downstream of the treatment point. This type of system is popular on Jack-up type MODU applications. Anodes are easily replaceable since they are mounted in the top side sea water header.

Electric Submersible Deep-well Pumps can be fitted with a **CDI-AFS Motor Clamp Assembly** that attaches to the submersible motor housing. The water is treated in the pump caisson as it enters the pump suction. The entire sea water piping system is treated downstream of the pump suction. Power supply and earth return cables run from the submersed anode to the topside mounted controller panel. This type of system requires pulling of the pump/motor assembly from the caisson when anodes require replacement.

CDI-AFS with strainer mounted anodes are ideal for seawater pump systems that draw suction through sea chest strainers. Special adapters fit the anodes to the strainer lids for easy replacement. This type of system is well suited for semi-submersible MODU's, drill ships, FPSO's, and any other ocean going vessel that draws high volumes of sea water from sea chests.

The **CDI-AFS Injection System** is designed to treat a small portion of the produced sea water at a highly concentrated dosage. The sea water is supplied to the electrolysis tank via a side stream from the sea water header. The treated water is then released at the inlet area of the pump caisson at a dosage commensurate to the pump flow rate. Multiple pump caisson inlets can be treated with water from a common tank and controller. This type of system is well suited for high capacity pumps and/or multiple pumps operating in parallel.

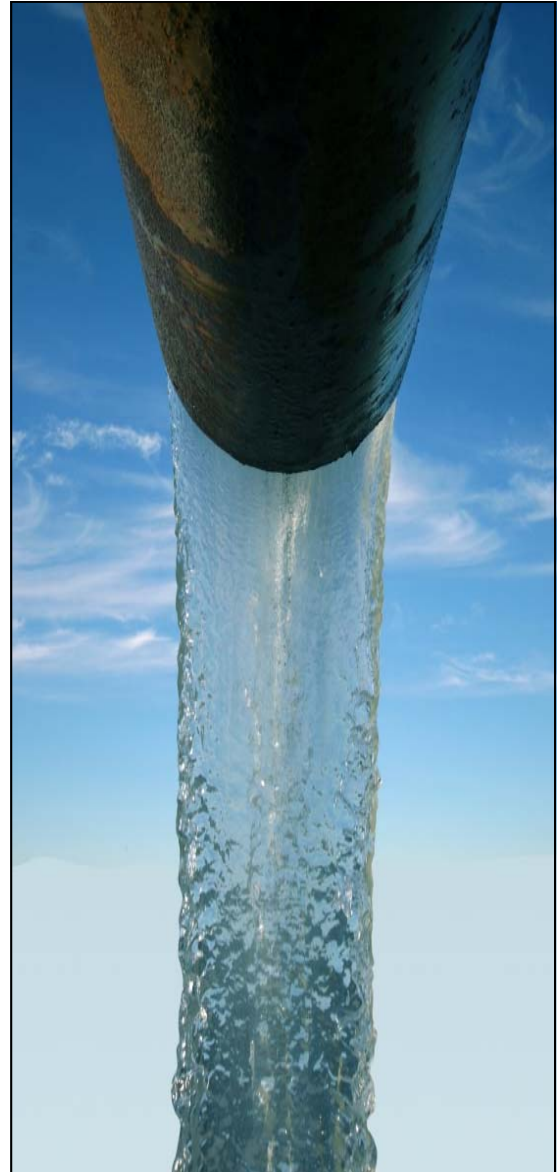


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The [CDI-AFS](#) offers significant advantages over alternative anti-fouling systems.

- Automatic operation
- Minimal maintenance
- Excellent fouling prevention
- Pre-calculated anode life
- Fully adjustable output
- Environmentally safe
- Low initial cost
- Low operating cost
- Replaceable anodes
- Minimal space requirement
- Versatile design
- User friendly

The end result of installing the [CDI-AFS](#) is an efficiently operating sea water supply system designed to maximize equipment life and minimize total cost of ownership, not only for the sea water pumping equipment, but for all downstream equipment that relies on the steady, un-interrupted supply of sea water.....



18706 Rosehill Road
Tomball, Texas 77377 USA
Tel: 281-290-8335
Fax: 281-290-8336
www.challengerdrilling.com