

Impressed Current Cathodic Protection Systems

How ICCP systems operate

The most important feature of an ICCP system is that it automatically detects the electrical potential at the hull/seawater interface and raises or lowers the output to the anodes accordingly. In this way, the ship receives the optimum level of protection at all times.

The electrical 'potential' is monitored by reference cells which are fitted port and starboard between the anodes where the lowest 'potential' is likely to occur. This reading is fed back to the control panel which automatically adjusts the anode output.

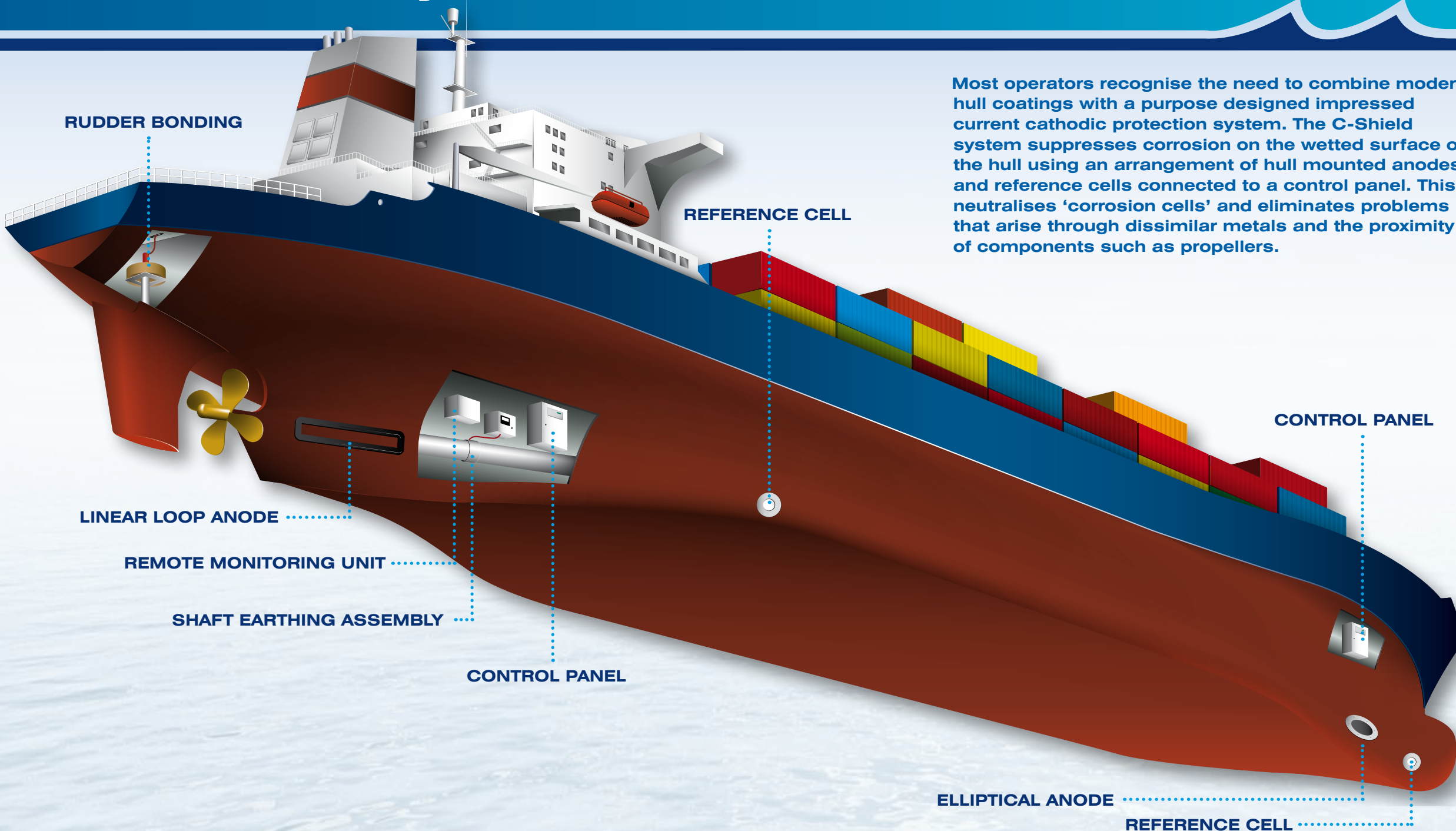
On larger installations, above 350 amps, thyristor control panels are generally used which provide a low voltage controlled and rectified d.c. power source to the anodes. On smaller installations, Cathelco provide modular control panels with computerised electronics with the advantages of space and weight savings.

The hull anodes have faces made from platinised titanium or mixed metal oxide to emit current efficiently and reduce wear. Linear loop, elliptical and circular designs are available to suit different hull profiles. The recessed designs mean that the hull remains streamlined with very little additional weight or drag, particularly in comparison with traditional sacrificial anodes.

Diver change anodes, another innovation from Cathelco, are designed for vessels such as FPSOs which have long intervals between dry docking. The anodes can be changed from the outside of the hull by a diver, simplifying replacement. This is achieved by using an installation 'insert' which is embodied in the anode resin during manufacture and takes the place of conventional wiring. In addition, a watertight sealing plate and sealing ring system has been designed to enable the transfer to take place.

It is also essential to bring the shaft and rudder within the scope of the system using shaft earthing and rudder bonding equipment.

Most operators recognise the need to combine modern hull coatings with a purpose designed impressed current cathodic protection system. The C-Shield system suppresses corrosion on the wetted surface of the hull using an arrangement of hull mounted anodes and reference cells connected to a control panel. This neutralises 'corrosion cells' and eliminates problems that arise through dissimilar metals and the proximity of components such as propellers.



Linear Loop Anodes

Produce a powerful output from a relatively small surface area. Lightweight and easy to install.



Elliptical Anodes

The elliptical shape enhances current distribution. Provides the flexibility to fit into complex hull profiles.



Diver Change Anodes

Can be changed from the outside of the hull by a diver. Ideal for FPSOs and vessels with long intervals between drydocking.



Reference Cell

Designed to measure the electrical 'potential' at the seawater/hull interface.



Thyristor Control Panels

Cost effective and reliable for systems of up to 1,000 amps, incorporating computerised output displays, alarms and information systems.



Modular Control Panels

Compact and lightweight for systems of up to 350 amps. Interchangeable modules provide flexibility and reliability.

Pipework anti-fouling systems for seawater lift pumps

Offshore structures are often situated in relatively shallow water where marine organisms breed more prolifically. This makes seawater pipework particularly vulnerable to blockages which can have serious consequences for the efficiency of seawater cooling and fire fighting equipment.



Pump unit construction

Cathelco pump protection anti-fouling units are designed to be mounted at the bottom of pumps, often inside the stilling tube or caisson. They consist of special copper and aluminium anodes housed within a steel framework and fed with an electrical current from a transformer/rectifier. The anode mounting frame acts as the cathode, creating a completely self contained unit which is electrically isolated from the pump using a specially designed isolation kit.

Controlled dosing

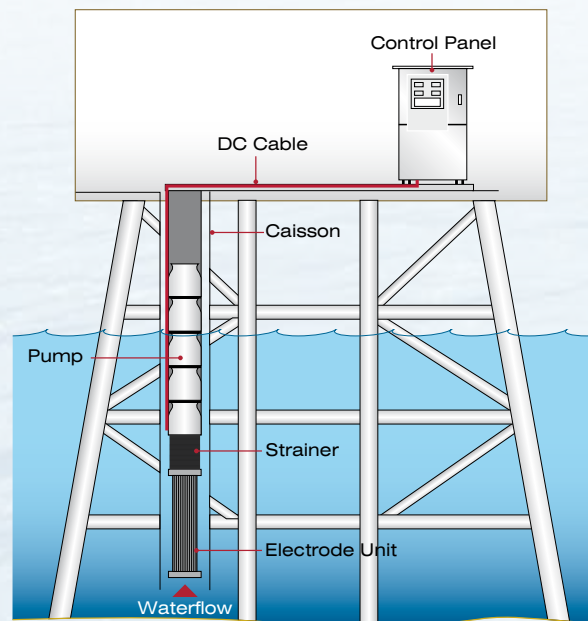
Although the seawater is dosed to higher concentrations than sea-going vessels, this is sufficient to prevent marine growth and suppress corrosion within the pipework. The Cathelco unit is automatically activated when the pump is switched on, however, a low dosage is maintained at all times to keep the bottom of the pump and strainer area free from bio-fouling.

Anode life

The life of the anodes is calculated to coincide with the scheduled maintenance period for the pumps, typically at intervals of between 2 and 5 years.

Deck mounted and tank systems

In some cases it is not practical to fit anode units within stilling tubes due to lack of space or unusually high dosage requirements. An alternative is to provide a deck mounted electrolysis tank with a pipework system to distribute the dosed seawater to the bottom of each pump where it is carried throughout the pipework by the seawater flow.



ICCP systems for semi-submersibles



Control Panels

Cathelco offer a choice of modular or thyristor control panels. Modular panels can be used on systems of up to 350 amps and have the advantage of being lightweight and compact. Thyristor panels can be used on systems of up to 1,000 amps and combine cost effectiveness with rugged reliability. Both types of panels incorporate computerised output displays, alarms and information systems.



Reference Electrodes

Reference electrodes measure the electrical potential at the hull/seawater interface and feed a signal back to the control panel. They have zinc elements and are 'diver changeable' enabling them to be replaced from the outside of the hull by a diver.



Anodes

A range of anode designs are available for offshore applications. These include rod anodes, flush mounted disc anodes and linear loop anodes which emit a powerful current from a relatively small surface area. All of the anodes are 'diver changeable', simplifying replacement.

