

Seawater pipework anti-fouling systems

Impressed current cathodic protection systems



Cathelco 

 **JOTUN**



World leading technology for the offshore oil industry

A single source solution for semi-submersibles, FPSOs and FSOs

Cathelco and Jotun have combined forces to provide a unique protection package for semi-submersibles, FPSOs and FSOs. The strategic alliance provides a truly comprehensive service for customers in the offshore market worldwide.

Together, the companies provide a single source solution which can combine ICCP hull corrosion protection with a high performance coatings package. If required, it can also include the provision of seawater pipework anti-fouling systems to protect seawater lift pumps.

Through Cathelco you can have one point of contact for the entire project backed by world leading expertise. On one hand, this draws on Cathelco's record of experience spanning 50 years and over 20,000 installations on ships and offshore structures. On the other, it provides world leading expertise in coatings technology based on Jotun's record of quality and innovation.

Beyond this are the combined resources of two highly experienced agent networks bringing sales and technical advice close to hand wherever you are in the world.

Cathelco and Jotun – working together to bring you a single source solution combining cost-effectiveness, quality and long lasting reliability.



Seawater pipework anti-fouling systems

Cathelco seawater pipework anti-fouling systems are designed to prevent blockages caused by the growth of barnacles and mussels in seawater lines. These can be expensive and time consuming to remove, particularly in rigorous offshore applications.

The Cathelco system is based on the electrolytic principle and consists of a transformer/rectifier which feeds an electrical current to copper and aluminium anodes. In operation the anodes produce ions which are carried throughout the pipework system creating an environment in which barnacles and mussels cannot settle or breed. The action is assisted by aluminium hydroxide created by the aluminium anodes which flocculates the released copper. The highly gelatinous copper aluminium hydroxide floc is carried throughout the system, spreading into the slower moving areas close to the pipe surface where marine growth larvae are most likely to settle. At the same time, a cupro-aluminium film is built up on the internal surfaces of pipes to suppress corrosion

- Offshore platforms – seawater lift pumps protected using specially designed anode units.
- Semi-submersibles – anodes mounted in strainers or specially designed electrolysis tanks.
- FPSOs – anodes can either be mounted in seachests, strainers or electrolysis tanks according to the requirements of the vessel.



Impressed current cathodic protection systems

In most cases, impressed current cathodic protection (ICCP) systems are used in conjunction with specialised coatings to protect the submerged surfaces of semi-submersibles and FPSOs against corrosion. Cathelco are in a unique position to offer advice on how these systems can be combined for maximum effectiveness.

ICCP systems consist of a control panel/rectifier connected to an arrangement of anodes and reference electrodes. In operation, the reference electrodes measure the electrical potential at the hull/seawater interface and a signal is fed back to the control panel which raises or lowers the anode output accordingly. In this way, the optimum level of corrosion protection is provided at all times.

- Semi-submersibles – Specially designed ICCP systems or hybrid systems using a combination of ICCP equipment and sacrificial anodes.
- FPSOs – ICCP systems for FPSOs using diver change reference electrodes and anodes.
- Jack-Up Rigs – Economical Minitex ICCP systems to protect jack-up rigs when they are in transit.

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

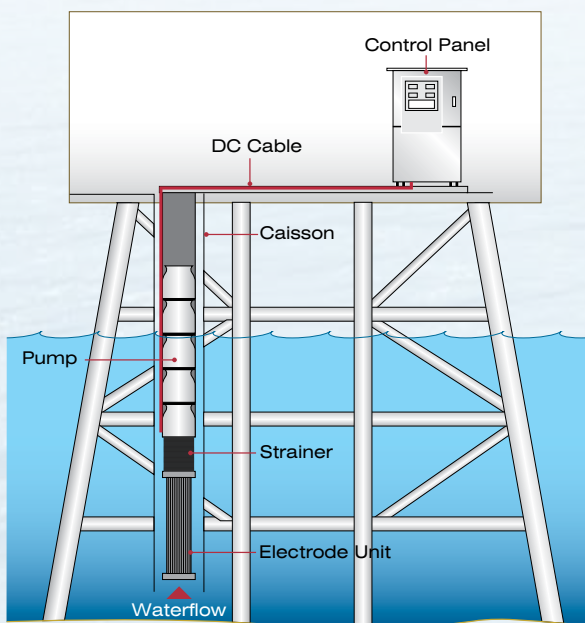
Although the seawater is dosed to higher concentrations than sea-going vessels, this is sufficient to prevent marine growth and suppress corrosion within the pipework. The Cathelco unit is automatically activated when the pump is switched on, however, a low dosage is maintained at all times to keep the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



Diver change reference electrode



Diver change rod anodes



Diver change disc anodes

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.

Marine pipework anti-fouling systems for FPSOs

FPSOs generally have numerous seawater intakes serving engine cooling, product processing, fire fighting and a range of auxiliary services which can include the provision of a potable water supply. It is essential that all of these functions are protected by an effective and reliable seawater pipework anti-fouling system.

Seachest mounted anodes

Copper and aluminium anodes can be mounted in seachests if the scheduled drydocking period for the FPSO is less than 5 years, assuming there is sufficient space availability.

Strainer mounted anodes

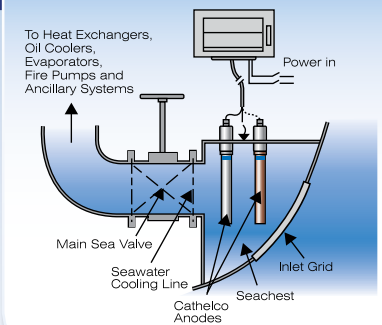
The advantage of strainer mounted systems is that the anodes can be changed at any time without the need for drydocking. In these circumstances, Cathelco recommend that some of the treated water is fed back to the seachests to ensure that they are kept free from fouling.

Electrolysis tank systems

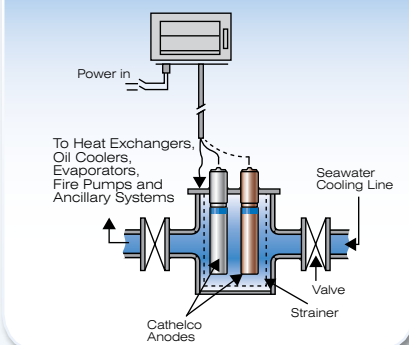
If the drydocking interval is greater than 5 years, an electrolysis tank system may be the most practical option. In this case, a feed is taken from one of the seachests and pumped to the electrolysis tank housing the copper and aluminium anodes. The seawater is treated at a high dosage rate and then distributed via pipework to multiple seachests where it is diluted by the incoming flow and achieves a normal dosage rate to protect against bio-fouling.

- Effective and reliable anti-fouling protection.
- Automatic – requires minimal attention.
- Does not involve the use of chemicals.
- Environmentally friendly.

TYPICAL SEACHEST ANODE ARRANGEMENT



TYPICAL STRAINER ANODE ARRANGEMENT





ICCP hull protection systems for FPSOs and FSOs

FPSOs require specially designed ICCP hull corrosion protection systems because periods between drydocking are significantly longer than normal vessels. Other factors such as 'current creep' on anchor chains also have to be taken into consideration.

On a conventional ship there may be a 15% paint loss over a 5 year period, but on an FPSO paint loss may exceed 80% after a 20 year operational period at sea. Therefore, the skill in designing an ICCP system for an FPSO relies on understanding these differences and using equipment which meets the demand for long lasting reliability.

Cathelco systems use 'diver change' anodes and reference electrodes which can be changed from the outside of the hull, simplifying replacement. There is also the option of using Jotun 'diver change' circular anodes and reference electrodes which are designed with vulcanised rubber coatings to create a watertight seal with the cofferdam for easy installation and replacement.

As FPSOs are stationary in the field they are fitted with forward and aft systems, providing a 50/50 current output, unlike conventional vessels which have higher current demand around the stern.

As with all offshore facilities demanding the highest levels of performance, reliability and safety, Cathelco hull protection systems have a minimum 1.5 times redundancy factor built into the design, subject to specification.

Through a comprehensive understanding of cathodic protection and technical innovation in equipment design, Cathelco are maintaining their position as leaders in hull protection for this fast developing area of offshore production.



Diver change rod anodes



Diver change linear loop anode



Systems for offshore vessels

Cathelco seawater pipework anti-fouling systems have been fitted to numerous offshore supply vessels, tugs and fire fighting craft throughout the world. On smaller vessels, space saving control panels and a range of anode designs simplify installation. ICCP hull corrosion protection systems are also available for offshore vessels, offering reliable, long term protection at an economical cost.

Subsea pipeline corrosion protection surveys

Corrintec, a division of Cathelco, specialises in subsea pipeline corrosion protection surveys using 'trailing wire' and ROV techniques. They gather and analyse data concerning the status of cathodic protection systems enabling clients to make informed decisions about maintenance.

Jotun Marine Coatings

In more than 50 countries, Jotun Marine Coatings, assists and advises customers on the most effective solutions to the prevention of corrosion and fouling.

Jotun is active in every aspect of coating technology. This expertise is built on investment, innovation and the practical knowledge earned in the protection of more than 15,000 vessels and offshore platforms throughout the world.

Worldwide Service Network

Our worldwide network of sales and service centres can provide immediate advice and assistance on the complete range of Cathelco products. Agents' contacts details are available on our website: www.cathelco.com

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Belgium	Malaysia
Brazil	Mexico
Bulgaria	New Zealand
Canada (<i>East & West Coast</i>)	Norway
Chile	Philippines
China (<i>Dalian, Guangzhou, Shanghai, Hong Kong</i>)	Poland (<i>Gdansk & Szczecin</i>)
Croatia	Portugal
Cyprus	Romania
Denmark	Russia
Egypt	Singapore
Finland	South Africa (<i>Durban & Cape Town</i>)
France (<i>Atlantic & Mediterranean Coasts</i>)	Spain
Germany	Sweden
Greece	Taiwan (<i>Kaohsiung & Taipei</i>)
Holland	Thailand
Iceland	Turkey
India	United Arab Emirates
Indonesia	USA (<i>East, West & Gulf Coasts</i>)
Iran	Vietnam
Ireland	Venezuela



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