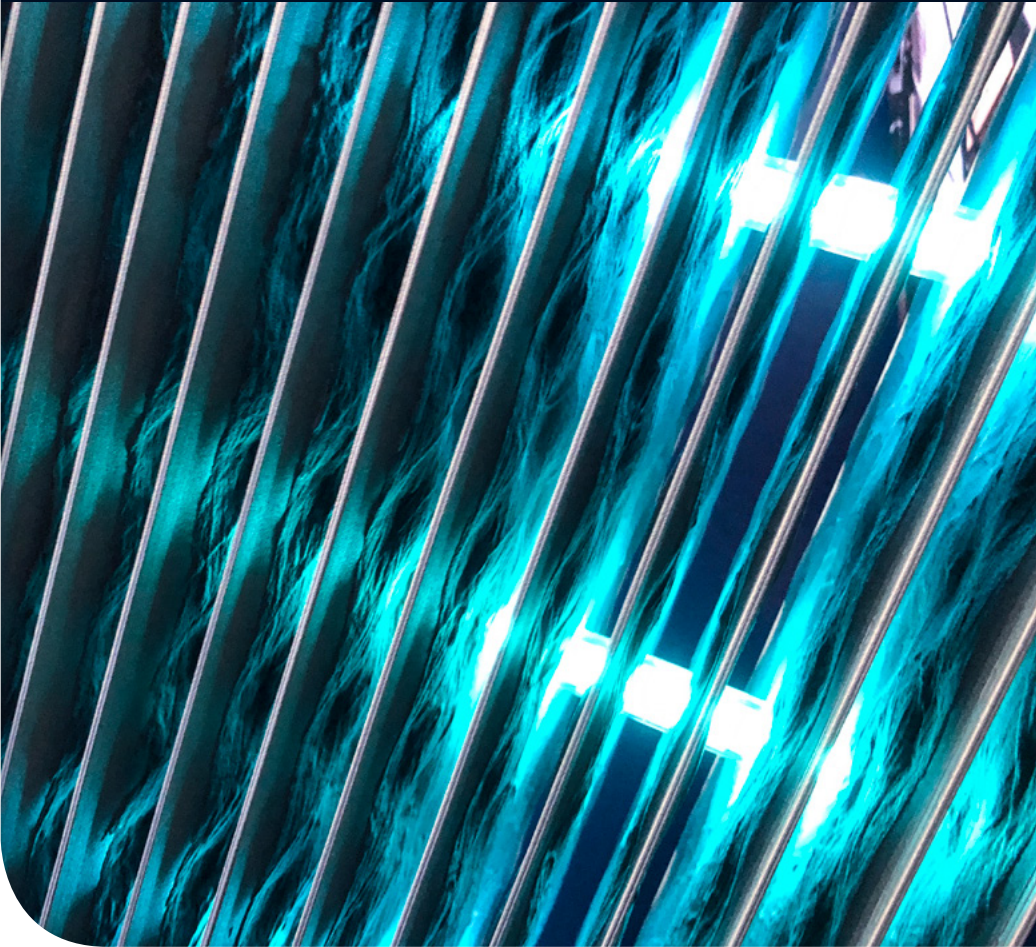


CORROSION

STEEL GOING STRONG

UV-C Cooler



UV-C Cooler

CORROSION's revolutionary, environmentally friendly marine growth prevention solution

In an exclusive cooperation with high-end partners like Philips, we've developed a non-chemical alternative solution for the prevention of marine growth. We're proud to introduce our UV-C Cooler: A highly efficient cooler that's protected against fouling through the use of UV-C light.



In 2017, CORROSION began tests using UV light as a marine growth protection mechanism. The results of our work are extraordinary and far-reaching. We have used 'pillow plate' technology to achieve this goal. The result is that two existing and proven technologies have been combined in one product. The UV-C technique to prevent fouling and the pillow plate technique to provide cooling. The result is a ground-breaking innovation, patented by Philips.

Benefits:

- Environmentally friendly
- Higher heat transfer efficiency due to pillow plate technology
- Robust construction
- 24/7 protection when at sea and for laid-up vessels
- No risk of galvanic corrosion due to the use of mild steel
- Backwards compatibility with existing box coolers



UV-C light

Ultraviolet light in its C spectrum is a green way of protecting the cooler against all types of marine growth. And what's more, it is highly effective in virtually all circumstances. The bulb itself is mounted in a quartz tube that can endure high pressure. This ensures that the risk of breakage is minimal.

**'An innovation that fits today's
need for sustainable solutions'**

Felipe Leon Morales, Manager Laboratory

The UV-C light used in this system breaks down the cell structure and DNA of all the different types of fouling which tend to settle on pillow plates or in the direct surroundings of pillow plates. But because the UV-C coolers are mounted inside the sea chests, they are safe for the other sea life. In addition, the sea chest areas within the range of the UV-C light also remain free of fouling!

Pillow plate UV-C Cooler

The UV-C pillow plate cooler can endure rough circumstances at sea. The coolers are installed in the sea chests with an inlet and outlet grid. When the vessel is sailing, seawater enters through the inlet grid and passes through the pillow plates. Here the cooling takes place and the heated seawater then exits the sea chest through the outlet grids. When the vessel is stationary, cooling is achieved by a natural convection flow due to the sea water close to the pillow plates increasing in temperature. The heat transfer is achieved by a controlled flow of cooling liquid through the pillow shaped plates. The pillow plate heat transfer technique has a higher efficiency than the currently used tube technique. This pillow plate technique is proven technology which has been used for decades in other industries.



UV-C Cooler construction materials

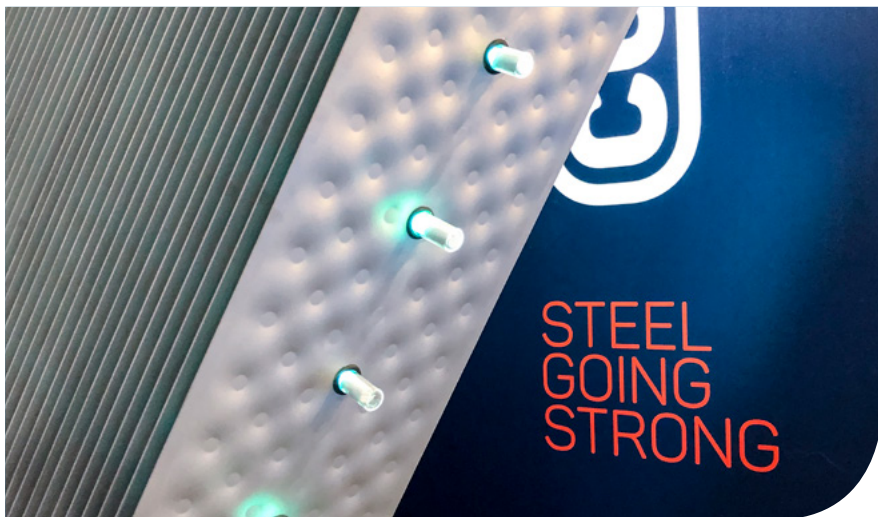
The cooler is made of carbon steel and coated with a UV-resistant 2 component epoxy paint. This combination, together with the use of sacrificial anodes, ensures that no galvanic corrosion will occur, even if impact occurs and the coating is damaged.

Retrofit

The UV-C Coolers are not only the best solution for new building vessels but are also interchangeable with traditional box coolers. Due to their higher efficiency, the dimensions of the UV-C Coolers will fit in the existing available space. The in- and outlets on top of the cooler are tailor-made to fit the original piping without needing major adjustments.

Finally, this UV-C Cooler also offers a solution against fouling for vessels that are laid up for extended periods of time.

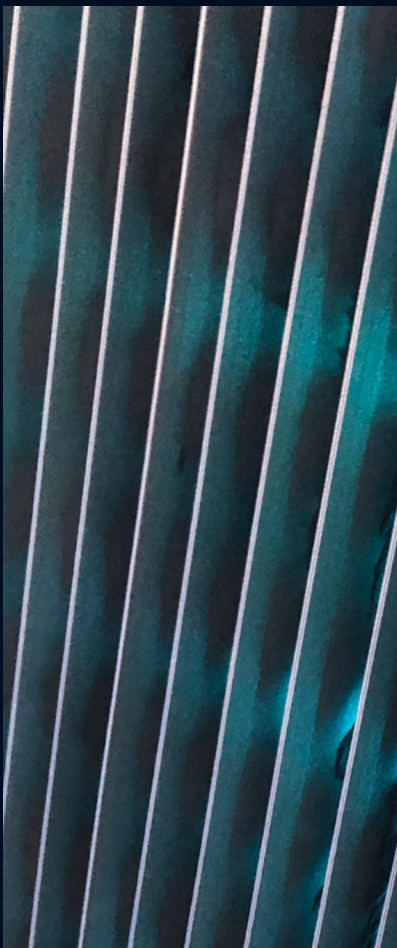
We're proud to introduce this new and innovative marine growth prevention solution. Now available at CORROSION. For more information, please visit www.corrosion.nl or call directly +31 (0)79 593 1295





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ICAF - MGPS

Impressed Current Anti-Fouling



ICAF - MGPS

Optimum protection against all types of marine fouling.

CORROSION has been in the business of protecting offshore constructions and vessels since 1993. We know the field and the players. Our Impressed Current Anti-fouling Systems (ICAF) and other Marine Growth Prevention Systems (MGPS), guarantee optimum protection against all types of marine fouling on just about anything located in (sea)water. Box coolers, seawater inlet systems, submerged pump units, and various industrial applications as well.

High quality anti-fouling prevention systems prove their worth, especially over time. They keep your assets working at their fullest potential and keep you at an advantage in the move towards sustainable solutions. Both of these aspects are important in today's world and bring financial benefits with them as well.



CORROSION is a fully licensed producer and supplier of Cu-anodes and biocidal products

Certification

Getting certification is a definite advantage nowadays. Vessel owners, operators, and shipyards who purchase systems, equipment, and spare parts that comply with the increasingly strict regulations*, will greatly benefit, especially as time goes on. The EU, and other parts of the world, will continue clamping down on the use of biocidals, the chemicals used to control organisms. Good maintenance and the use of compliant systems have their pay-off now. And will even more so in the (near) future.

*IMPORTANT NOTICE! New legislation has been implemented, affecting the current and future maritime market. Since 1 September 2015, ECHA (European Chemical Agency) Article 95 Regulation no. 528/2012 (EU Biocides Regulation) forbids the sale and use of biocidal products in the EU unless they are provided by a licensed product supplier from the approved Article 95 list. CORROSION Maritime is licensed under this regulation to both produce and supply Cu-anodes as biocidal products.

Advantages of the ICAF power control unit

- Automatic correct installation check including alarm function
- Touch screen operation in all main languages
- Remaining service life indication of the anodes (+alarm function)
- Interactive with seawater pumps via several digital inputs to save anode material
- Connected through internet
- Constant connectivity with intelligent anodes.
- History of all data in years
- Low voltage/short circuit including alarm function
- Polarity check for anode identification including alarm function
- Connectable to the Ship Management System via RS485 and RS232 (optional)
- Service code for optimum system performance, traceability, system protection and service



The **operating** principle

CORROSION's anti-fouling systems rely on the effect of dissolved copper on early life stages of fouling organisms. The free hydrated copper ion, which is the most active anti-fouling fraction of dissolved copper, blocks uptake sites for micro-nutrients that are critical for the survival and growth of fouling organisms. Surfaces are kept clean because fouling precursors are unable to colonize and grow on the target surfaces.

The operating principle of ICAF systems is based on an artificially triggered voltage difference between copper anodes and integrated steel plate cathodes. The ICAF power control unit ensures that the copper anodes add precisely the correct number of copper particles required to the seawater. The best protection is guaranteed and the amount of copper dissolved is minimized. This prolongs the service life of the anodes.

As experts, CORROSION can ensure long-term, optimized system operation. In addition, all data can be downloaded to an external computer and transferred through the Internet. Easy to check. Easy to adjust. Our smart anodes are then able to communicate with the control unit, making sure they're always in the right position with the right amount of current.

CORROSION has been in the business of protecting sea water constructions and vessels since 1993.





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ICCP

Impressed Current Cathodic Protection



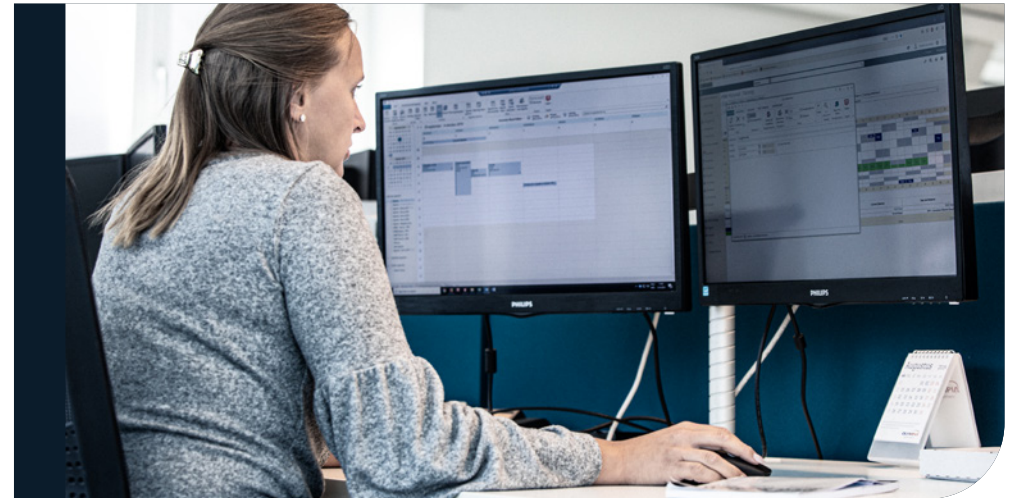


ICCP

Impressed Current Cathodic Protection

Galvanic corrosion is the number one enemy to steel assets exposed to sea water or any other environment with an electrolyte. Here at CORROSION we have years of experience in protecting these kinds of maritime structures. Our state-of-the-art Impressed Current Cathodic Protection (ICCP) systems will safeguard your properties continually and in a sustainable manner.

CORROSION Maritime ICCP systems are SMART and tailor-made solutions for all types of vessels. Commercial, cruise, naval, fishing, and even luxury yachts can all benefit from our specifically designed ICCP systems. Your asset will be optimally protected in all the diverse circumstances of our oceans and rivers. This ICCP system adapts to constantly provide exactly what is needed, even when water conditions change rapidly.



Environmentally Friendly

ICCP system technology is currently the most environmentally-friendly solution available in the battle against galvanic corrosion. It's extremely effective and does its job without dissolving heavy toxic metals, like aluminium and zinc, into the water. This, on top of all the other benefits it brings, makes the ICCP system the best choice for the client, the construction, and the environment.

Installation and Adaptation of Existing Systems

We can get you started with this premium ICCP system with a single installation. Or we can simply replace your current anodes. That can even happen without welding. Not having to weld the CP system prevents heat damage to the inner wall of the ship, a place which is susceptible to corrosion. Therefore, adapting existing systems is not a problem and brings no added risk of corrosion damage.

Please contact us if you've got questions or would like more information.

CORROSION. Steel going strong.

Connected through Technology

Nowadays technology makes things easier for all of us. Also when it comes to protecting your vessel. Our ICCP system is highly sophisticated to make things easier for our clients. We remain in constant connection through our unique ship management control box. This innovation is simple to install. It keeps a running log of the vessel's data and performance, which you can download and send to us. We're then able to assist, even from a distance, keeping you on your proper course. Saving time and money.

Advantages of our ICCP power unit

- Touch screen operation in all main languages
- "Off potential" controlled
- Coating condition indicator
- Propeller shaft monitoring (+ alarm function)
- Automatic system scan
- Connected through internet
- Automatic / Manual mode
- History of all data in years
- 3 points temperature check of the cabinet (+ alarm function)
- Connectable to a vessel Management System via ethernet / RS485 and RS232 (optional)



Due to the use of very inert ICCP anode materials the impact to the environment is nihil in comparison to sacrificial zinc or aluminium anodes.

Other ICCP Advantages

ICCP systems have multiple advantages over traditional sacrificial anode systems. For one, the ICCP system is actually more economical, both at the time of purchase as well as over time. It has a long service life – 25 years-- and it's practically maintenance free. ICCP anodes are fully recessed into the ship's hull, which saves on fuel consumption. What's more, they don't harm the environment. This is a major benefit over sacrificial zinc and aluminium anodes, which release enormous amounts of heavy metals into the surrounding environment as they dissolve.

An ICCP system is one of the most effective and environmentally-friendly solutions available to protect valuable assets like ships, wind turbines, and oil platforms against galvanic corrosion. This system significantly increases the life span of these constructions, while keeping the costs for product purchase, labor, and maintenance at a minimum.





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Spares



Spares

Keeping your precious assets running at their best, for as long as possible, is important to us at CORROSION.

We not only manufacture and supply the best anti-fouling and anti-corrosion systems in the industry, but we are certified specialists you can call on for maintenance and replacement parts. Spares is here for state-of-the-art replacement parts, software, and service, designed to work together to give you continual solutions and ensure optimum performance.

We have everything you need for ICAF and ICCP systems and our service-oriented team of experts can be counted on to ensure that problems are avoided, unburdening you and saving you money.

CORROSION goes a step further to give you the best value for your money. All of our parts come with OEM mounting materials, making the work faster and easier. And, in addition to the mounting materials, CORROSION also provides new inserts for the glands.

Some of the parts we service include:

ICAF

- Copper anodes
- Aluminium anodes
- Iron anodes

ICCP

- Zinc reference cells, Ag/AgCl calibrated
- Titanium MMO coated anodes
- Sacrificials

Shaft grounding

- Silver Brushes
 - Original, finest quality OEM brushes
 - 80% silver and 20% carbon
- Slip rings
 - Silverplated

A CORROSION specialist is always available to ensure the best fit for your particular needs



CORROSION is a class apart

CORROSION stands out because of our dedication to excellence. Our Spares department embodies this in quite a few ways. What sets us apart?

- OEM parts manufacturer & supplier
- International type approvals
- ISO certification
- Official ECHA certified dealer & manufacturer
- Remote monitoring options & assistance
- Experts available around the world
- Fast delivery

Make sure you are ECHA compliant!

Article 95 List

CORROSION is proud to be on the ECHA list of approved substance and product manufacturers and suppliers. With us, you'll be sure you're complying to the increasingly strict regulations in the EU and other international waters.

The EU Biocidal Products Regulation (EU BPR 528/2012) legislates how chemicals can be used to control organisms (biocidal) within the European Union and its waters. Certain substances are completely prohibited and others are subject to strict regulations. Marine Growth Prevention systems (MGPS) which use chemicals or chemical reaction processes fall under these regulations. For example, Impressed Current Anti-Fouling systems (ICAF), which use copper anodes (including replacement anodes) need to comply by using parts from the approved ECHA list.



Consequences

This means vessel owners, operators, shipyards (new build and repair/conversion) have to get their EU BPR products or spare parts from a manufacturer/supplier that is on this Article 95 list. Failure to comply is violating EU regulations and you risk getting fines and/or penalties from the relevant supervising authorities.

This regulation applies as soon as a vessel enters EU waters. CORROSION would be happy to fill you in if you'd like to know more.

Remote Monitoring and Assistance Options

Highly Efficient Trouble-Shooting

Preventing a problem before it creates a hindrance is always the best choice. CORROSION's power units and software keep track of the vessel's data and performance. This keeps you ahead of potential problems with monthly reviews and analyses. You can simply download the information and email it to us. We maintain highly detailed records for our clients and our specialists are here to make things easier for you. Your asset, systems, products, parts, service history, etc, are all in one place. Maintenance can be advised or performed, even from a distance. The vessel doesn't have to stop. It can continue working for you, wherever you need it.

Maintenance Program or Single Purchase

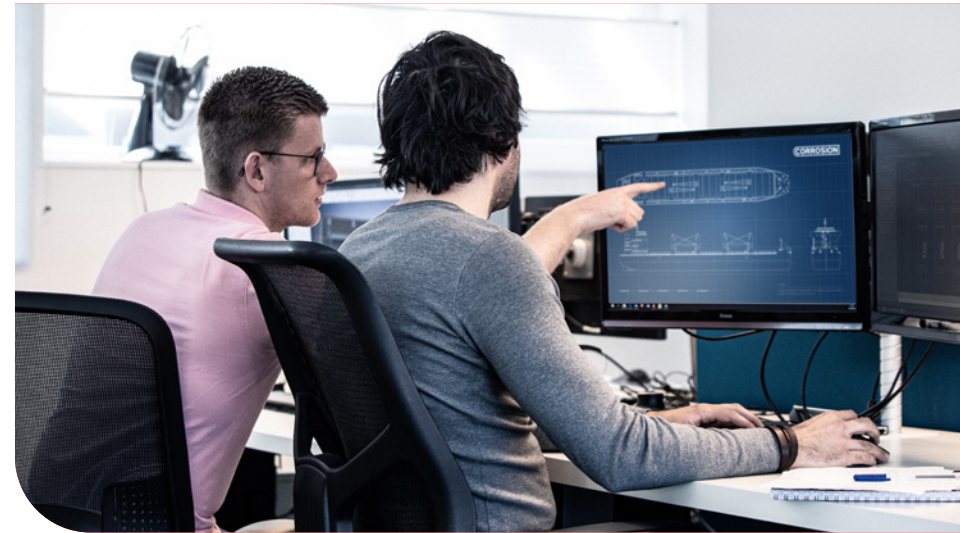
Whatever your maintenance need, please feel free to contact us. Our Spares specialists are here to assist. Keeping your assets protected and running at their highest capacity is our goal. Now and in the future.

CORROSION. Steel going strong.

Original Equipment Manufacturer (OEM) Parts

CORROSION manufactures and supplies OEM (replacement) parts, or Spares. OEM parts are necessary when it comes to your warranty protection. Investing in them ensures that you'll always be covered and we'll be there to make sure. Quality matters and with these parts, we can guarantee effective protection and service. No rust. No fouling. No hassle.

CORROSION can provide a single, simple part or a complete tailor-made package, specially created to unburden you. These packages are combinations of high-quality spares + our unique software + our expert engineers and service representatives. CORROSION technology and expertise provide the highest quality product-service combinations available.



Type Approval

CORROSION has a variety of type approvals from around the world. This means we've been evaluated by independent, 3rd party organizations who provide an objective verification of our products. You can be confident that our products conform to recognized industry quality standards and international conventions and regulations.

Our type approvals include:

- LR: Lloyd's register
- RINA: Registro Italiano Navale
- RS: Russian Maritime Register of Shipping
- CCS: China Classification System
- BV: Bureau Veritas

Former legislative approval:

- DNV GL



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