



Cathelco

Seawater Pipework Anti-fouling Systems



Cathelco... world leaders in seawater pipework anti-fouling systems



Cathelco is the world's largest designer and manufacturer of marine pipework anti-fouling systems.

With a record of 20,000 installations over a period of more than 50 years, the company has amassed considerable experience in the problems associated with marine pipework bio-fouling and developed the expertise to solve them effectively.

Our customers include some of the largest cruise and commercial vessel operators in the world and our systems are used on the ships of over 40 navies.

As the result of continued expansion, Cathelco recently moved into new, purpose built premises in Chesterfield, United Kingdom. This has enabled production facilities to be streamlined and additional space to be devoted to the company's research and development facilities. As a result, we are able to provide a faster response to customers' needs.



Cathelco's major strength is its international network of agents/installers based in ports throughout the world. In response to increasing demand, Cathelco have established strategic stocks of equipment in Brazil, Canada, China, Dubai, Germany, Iceland, Korea, Singapore and South Africa.

By continuously developing the product range, Cathelco can provide an exceptionally wide choice of anodes and control panels spanning the requirements of large vessels and the needs of smaller craft such as fishing vessels, workboats and luxury yachts.

Quality is at the forefront of all of our activities and is maintained through our in-house monitoring systems and adherence to Lloyd's Register Quality Assurance ISO 9001.

All of these factors contribute to providing customers with cost effective pipework anti-fouling systems, specifically designed for their application and combined with the highest levels of customer support.



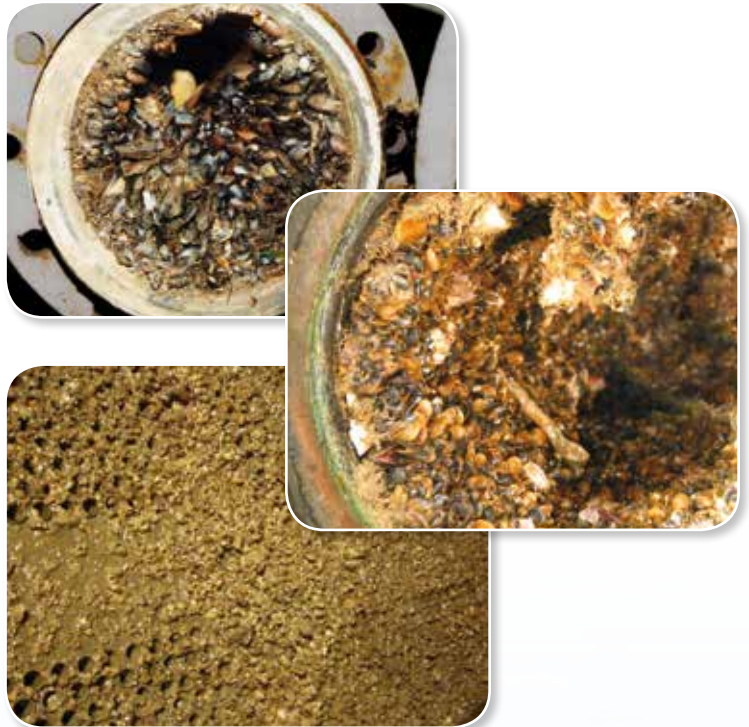
The problem of bio-fouling in pipework

The purpose of the Cathelco system is to prevent blockages in seawater cooling systems caused by various forms of marine growth, primarily barnacles and mussels.

Blockages are expensive and time consuming to remove, particularly when whole sections of pipework need to be cleaned or replaced.

There is also the risk that seawater valves and other important items of equipment are affected – jeopardising the operational capability and safety of the vessel.

Even partial blockages can have serious consequences, making engines run at abnormally high temperatures and significantly increasing fuel usage. This has a direct bearing on the cost of vessel operation and profitability.



Key benefits of the Cathelco system



With its long record of effectiveness and reliability, the Cathelco system has become the most widely used seawater pipework anti-fouling system in the world. This success is the result of a combination of factors.

- Based on the electrolytic principle, providing continuous and reliable protection without the use of chemicals.
- A dual system combining pipework anti-fouling and corrosion suppression.
- A range of control panels and anodes to suit vessels of every size.
- Every system custom designed for its particular application ensuring greater effectiveness.
- Automatic operation – requires minimal attention and makes very little demands on crew time.
- Easy installation – anodes can be installed in seachests or strainers at newbuilding or retrofit.
- Environmentally benign – does not involve the use of chlorine based chemicals or other biocides.
- Approved by classification societies.
- Saves maintenance costs by eliminating pipework cleaning.
- Does not interfere with the production of fresh water using reverse osmosis desalination systems.

How the Cathelco system operates



The Cathelco system has proved to be an extremely effective and versatile system for eliminating blockages in seawater pipework caused by bio-fouling.

The system is based on the electrolytic principle and usually consists of pairs of copper and aluminium anodes which are mounted in seachests

or strainers and wired to a control panel. In the case of cupro-nickel pipework, a ferrous anode is used instead of the aluminium anode.

In operation, the copper anode produces ions which are carried by the flow of seawater, creating an environment in which barnacles and mussels will not settle or multiply.

Preventing settlement

During the settlement period, which lasts up to 8 hours, barnacle and mussel larvae are particularly sensitive to the presence of copper.

By introducing copper ions in very small concentrations, around 2 parts per billion, the Cathelco system interrupts the settlement sequence. Instead of adhering to the surface of seachests, strainers and pipework, the larvae pass harmlessly through the cooling water system to the point of discharge.

Without anti-fouling protection, pipes become encrusted with organisms leading to partial or total blockages which reduce the efficiency of the seawater cooling system.

A dual action system

The action of the copper ions is assisted by aluminium hydroxide created by aluminium anodes which flocculate the released copper ions.

This highly gelatinous copper-aluminium hydroxide floc is carried throughout the system and tends to spread out into the slow moving areas closer to the pipe surfaces where marine larvae are most likely to settle.

As a result, marine growth larvae do not settle, instead passing direct to discharge. At the same time, a cupro-aluminium film is built up on the internal surfaces of pipes to suppress corrosion.

In this way, the system has a dual action protecting seawater pipework against bio-fouling and corrosion.

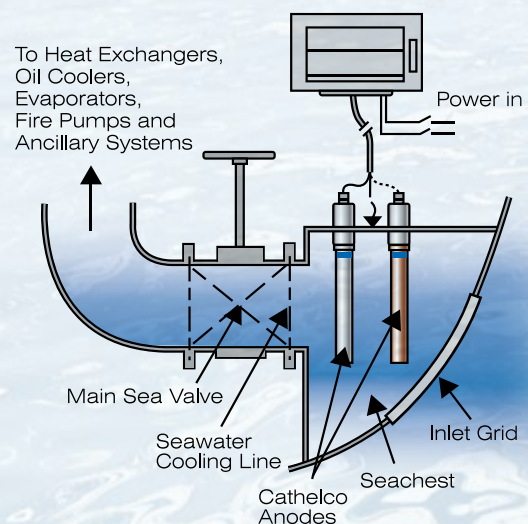
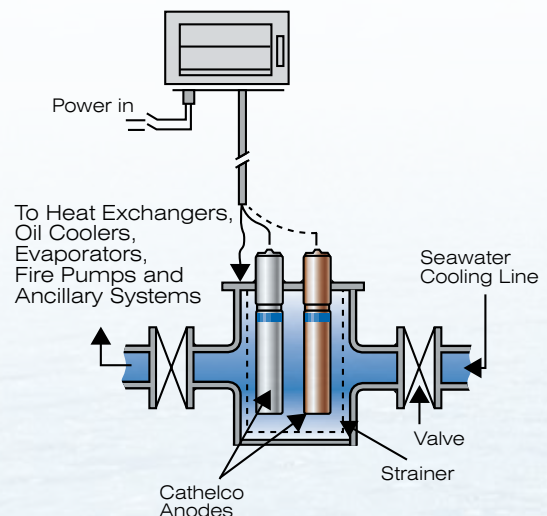
Seachest or strainer mounted anodes

When systems are installed at newbuilding, anodes are generally fitted in the seachests using special sleeves or flange mountings.

Alternatively, if systems need to be installed prior to scheduled drydocking, the anodes can be mounted in the seawater strainers. This also simplifies replacement when anode renewal becomes necessary.

In special cases, where the Cathelco system supersedes existing chemical based anti-fouling equipment, the anodes can be mounted in treatment (electrolysis) tanks in order to economise on the installation costs by utilising existing pipework.

- Steel pipework – protected by copper and aluminium anodes.
- Cupro-nickel pipework – protected by copper and ferrous anodes.
- Seachest mounted anodes – generally installed at newbuilding and are replaced at drydocking.
- Strainer mounted anodes – can be replaced at any time when the vessel is alongside.
- Electrolysis tanks – can be used to replace chemical systems or in specialised applications.
- Environmentally friendly – does not use chemicals. Operates with copper concentrations of just 2 parts per billion.



A range of control panels

Modular control panels (RS/DD)

A new range of control panels offering significant savings in size and weight. This is because the cabinet size can be varied to suit the number of modules which are required.

- Modular design for easy installation and replacement
- Compact and lightweight
- Up to 16 anode outputs
- Clear digital output displays
- Individual alarm LEDs
- Alarm relays to control deck
- Strongly constructed – IP66 Rating



Mini Control Panels (EB/CC)

These control panels have been designed for smaller craft such as fishing vessels and workboats where space is at a premium. Although compact, they have clear digital displays and alarm features.

- Dimensions: 2 anode outputs 200 x 300 x 120mm (5kg)
- Dimensions: 4 anode outputs 300 x 300 x 120mm (8kg)
- Output 2 amps maximum per anode
- Alarm relays to control deck
- Strongly constructed – IP65 Rating



Nano Control Panels (EB/NS)

Ultra compact for small craft and luxury yachts, these panels will fit comfortably in confined spaces, whilst offering advanced features and excellent reliability.

- Dimensions: 2 anode outputs 200 x 200 x 80mm (2.5kg)
- Dimensions: 4 anode outputs 200 x 300 x 80mm (3kg)
- Input 12/24v DC
- Output 0.5amp maximum
- Robust design – IP65 Rating



Types of anodes and mounting arrangements

Cathelco has developed a range of anodes with mountings which enable them to be installed in the seachests or strainers of almost any type of vessel.

The size of the anodes is determined by the flow rates and their anticipated design life, taking into consideration the scheduled dry docking period.

Detailed drawings are supplied for every ship to assist in installation and ensure that the anodes are positioned for maximum effectiveness in the seawater flow.

The anodes can be installed using a number of mounting arrangements including steel flanges, steel sleeves, nylon mountings, cofferdams and pipe upstands.

Copper anodes

These are used in the majority of installations to protect steel pipework against bio-fouling through the creation of copper ions. Standard sizes range from 60mm to 120mm in diameter and 100mm to over 1,000mm in length and miniaturised anodes are available for smaller vessels. The photograph shows the anode fitted with a flange mounting arrangement.



Aluminium anodes

The purpose of aluminium anodes is to assist in anti-fouling process through the production of aluminium hydroxides when protecting steel pipework. They also produce a cupro-aluminium film which acts as an anti-corrosive layer on the internal surfaces of pipes. The anode is shown with a weld-in mounting sleeve.

Dual purpose anodes

In cases where there is a requirement for anti-fouling and corrosion suppression, but only space to fit one anode in a strainer, this dual purpose design provides an effective solution. Dual purpose anodes can be produced with either copper/aluminium or copper/ferrous elements in a single assembly. It is shown here with a nylon mounting which simplifies installation.



Ferrous anodes

These are used to protect cupro-nickel pipework which is commonly found on naval vessels. By producing ferrous ions, the 'soft iron' anode helps to maintain a protective oxide layer on the internal surfaces of pipes to suppress corrosion. The anode is shown with a cofferdam arrangement.



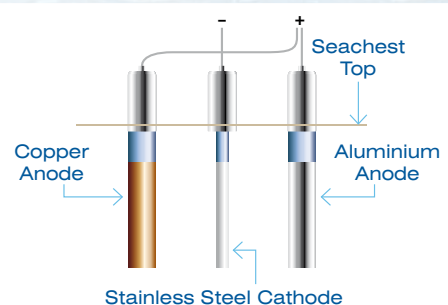
Omni anodes

Small and versatile, Omni anodes have been developed for fitting in the smaller types of strainers found on workboats and luxury yachts. Designed with integral cathodes, they can be installed in plastic strainers, pipes and areas where a cathode does not exist.

Cathodes

In some cases, when using standard anodes, it may be beneficial to have a dedicated cathode to avoid any problems resulting from stray current corrosion. This particularly applies where strainer bodies are internally lined and the strainer basket is isolated. It is also advisable in situations where seachests are well painted and do not contain sacrificial anodes or where there is the need to avoid any interference with impressed current cathodic protection systems (ICCP). The cathode can be either isolated (dedicated) or connected to the ship's earth.

Dedicated Cathode Arrangement



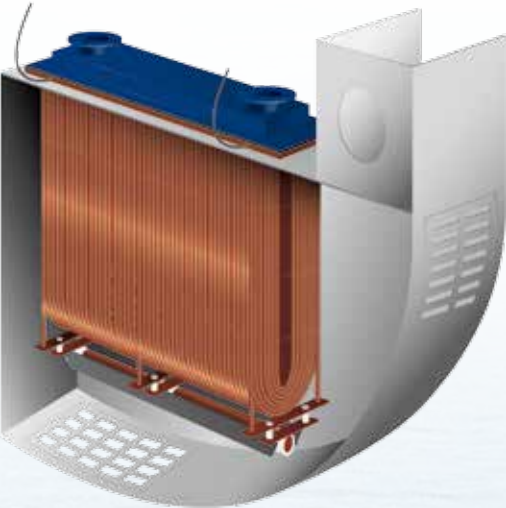
The anode and the cathode are isolated from the hull

Anti-fouling systems for box coolers

Seachest mounted system



Frame mounted system



Blokland
non-ferro bv



Cathelco have formed an alliance with Blokland Non-Ferro, Europe's leading manufacturer of box cooler systems, to develop a range of anti-fouling systems which are specifically designed to provide the maximum level of effectiveness.

In operation, copper ions are delivered directly beneath the cooling tubes where they prevent mussel larvae from settling and growing.

Seachest mounted systems. A steel cathode plate, running parallel to the anode, ensures an even distribution of current flow, producing a uniform wear pattern along the length of the anode.

This is an important advance on original box cooler installations where the anode was inserted through the seachest plate. The new system means fewer seachest penetrations and less installation work, whilst ensuring effective and reliable protection against bio-fouling.

One of the advantages of the collaboration with Blokland has been the design of special mounting arrangements which simplify the installation process.

Frame mounted systems. In the case of frame mounted anode arrangements, the anti-fouling anode is attached to the base of the box cooler on a framework. This enables the box cooler and anti-fouling system to be fitted as a complete unit, resulting in faster, easier installation involving less time for the yard.

Alternatively, the anode can be mounted on the side of the seachest, directly below the cooling tubes.

Anode replacement intervals can be designed to coincide with the vessel's drydocking schedule or the service period of the box coolers up to a maximum duration of 5 years.

- Even distribution of copper ions along the length of the box cooler for greater effectiveness.
- Cathode plate ensures a uniform wear pattern along the length of the anode.
- Can be supplied as complete unit involving less installation work.
- Systems designed around dry docking schedule or box cooler service intervals.
- Cathelco can adapt anti-fouling systems to suit any size or shape of box cooler from any manufacturer.



Systems for commercial and cruise vessels

Commercial vessels

Cathelco's reputation has been built on providing seawater pipework anti-fouling systems for some of the largest fleets of commercial vessels in the world.

With the ability to treat high volumes of sea water, the system is ideally suited to the requirements of the VLCCs, container ships, LNG carriers and numerous other types of ocean going vessels.

For this reason, it continues to be chosen by major operators, reflecting both the effectiveness of the system and the on-going support which is provided to customers.

In operation, the system is automatic and makes very little demands on crew time apart from periodically monitoring the anode outputs. A log sheet monitoring service provided by Cathelco ensures that systems continue to perform effectively.

Cruise ships

Cruise ships use very high volumes of seawater with flow rates often exceeding 10,000 cubic metres per hour.

The Cathelco system has the ability to treat these volumes effectively, whilst providing a number of other benefits. Systems are generally designed with multiple anode installations to protect high and low sea chests serving the engines and ancillary systems. These may include air conditioning systems, refrigeration systems and fire fighting pumps – all essential to the safe and efficient operation of the vessel.

Operating with copper concentrations of just 2 parts per billion, the system can be used to protect the inlets for desalination plants, coming well within the safe requirement of 100 parts per billion.

As no chemicals are involved, the system is also environmentally friendly and helps to meet the 'green' standards of modern cruise vessels.



Reflecting the trend of longer intervals between drydocking for cruise ships, anode replacement can be timed at 5 years.

- Multiple anode installations can be used to treat large flow rates effectively.
- Complete protection for engine cooling systems and ancillary services.
- Dual action – pipework anti-fouling and corrosion suppression.
- Automatic system – makes little demand on crew time.
- Safe - no chemicals are involved for better crew and passenger safety.
- Environmentally friendly.



Systems for naval vessels



Cathelco seawater pipework anti-fouling systems are installed on the ships of more than 40 navies around the world. With their durable construction, Cathelco control panels are ideally suited to rigorous demands of the naval sector. This is combined with a range of anodes to serve the needs of both surface craft and submarines.

Fast patrol craft

Cathelco have considerable experience in the design of pipework anti-fouling systems for fast patrol craft where space is at a premium. These vessels generally have a number of small inlets which can be protected with compact dual purpose anodes, consisting of copper/aluminium or ferrous elements in a single assembly. Alternatively, miniaturised Nano anodes can be fitted in strainers. The Cathelco Mini and Nano control panels ensure that systems can be installed in the tightest areas within engine rooms.



Frigates

Systems on frigates usually involve a combination of seachest and strainer mounted anodes. As with most military vessels, the pipework is predominantly cupro-nickel and therefore pairs of copper and ferrous anodes are used to provide effective anti-fouling and corrosion suppression. Standard Cathelco control panels can be used as they meet the levels of shock and vibration resistance required by naval authorities. Recent contracts for frigates and warships include equipment for the BAM project in Spain, PVO and BVL projects in Venezuela and the FREMM project involving the Italian and French Navy.



Submarines

The Cathelco system was originally designed for use on submarines and the company regularly supplies anti-fouling equipment for some of the world's leading builders of submarines including Kockums, HDW, TNSW and the Australian Submarine Corporation. Because of space restrictions within strainers, installations are usually based on compact dual purpose anodes. Systems are often specially designed to meet the exact requirements of particular classes of submarines.



Aircraft carriers

These installations involve the treatment of large volumes of seawater using multi-anode installations serving numerous inlets covering the requirements of engine cooling water systems, refrigeration, air conditioning and fire fighting systems. Cathelco have supplied equipment for the HMS Queen Elizabeth and HMS Prince of Wales, the Royal Navy's two new 65,000 tonne aircraft carriers.

Systems for smaller vessels

By miniaturising control panels and anodes, Cathelco have brought the benefits of pipework anti-fouling technology to a wide variety of smaller craft including offshore supply vessels, workboats, small ferries and tugs.

Many of these vessels operate continuously within in-shore waters where there is a much higher risk of bio-fouling. By fitting a Cathelco system and eliminating problems of blockages in seawater lines serving engine cooling systems, considerable savings can be made in fuel usage and maintenance costs.



Mini systems

These systems are ideal for the protection of small to medium sized vessels where space is limited.

The units can be fitted solely to provide anti-fouling protection or as dual purpose systems offering the advantages of corrosion suppression in pipework.

Although the control panels are only a fraction of the size and weight of standard models, they incorporate many features including digital displays and built in alarms.

A complete range of seachest and strainer mounted anode types is available to protect steel and cupro-nickel pipework. There are also special dual purpose anodes – copper/aluminium or copper/ferrous which can be fitted directly within pipework.

- Compact, lightweight control panels for ease of installation.
- Anodes are available for use with plastic strainers.
- Control panel to protect 1 seachest or strainer 300mm (height) x 200mm (width) x 120mm (depth). Weight 5 kgs.
- Control panel to protect 2 seachests or strainers 300mm (height) x 300mm (width) x 120mm (depth). Weight 8kgs.
- Anodes with minimum dimensions of 62mm diameter x 108mm length.



Nano Systems

This system represents the ultimate in miniaturisation with a control panel designed to fit into the tightest areas on patrol craft, workboats and luxury yachts.

Now fitted to hundreds of small craft, Nano systems provide effective and reliable protection using a range of very compact anodes which can be fitted in strainers or small seachests.

In addition to small copper and ferrous anodes to protect steel or cupro-nickel pipework, special anodes with integral cathodes are available which can be fitted within plastic strainers.

- Ultra-compact system to protect seawater lines and ancillary equipment.
- Anodes available with integral cathodes for use with plastic strainers and any type of pipework.
- Can be powered from the craft's battery supply.
- Control panel for anodes in 1 or 2 strainers measures 200mm (height) x 200 (width) x 80mm depth. Weight 2.5 kgs.
- Control panel for anodes in 3 or 4 strainers measures 300mm (height) x 200 (width) x 80mm (depth). Weight 3kgs.
- Anode sizes from 25mm diameter to 75mm length



Omni Anodes

Small and versatile, Omni anodes are proving their value in applications where space is limited and other factors may prohibit the use of standard anodes.

They are designed with integral cathodes providing a dedicated earth return and avoiding the risk of 'stray current' corrosion.

Suitable for applications on work boats, fishing vessels and luxury yachts they combine a number of advantages.

- Can be fitted within plastic strainers.
- Can be fitted within pipe upstands.
- Overcomes space restrictions in numerous small craft applications.



ICCP hull corrosion protection systems



Cathelco are maintaining their position as technological leaders in the design and production of impressed current cathodic protection (ICCP) systems for ships.

A new generation of anodes and control panels ensures that the optimum level of corrosion protection is achieved on vessels ranging from VLCCs and container ships to ferries and cruise ships. This also includes the supply of sophisticated ICCP systems for warships and other naval vessels.

A range of hull mounted anodes are available to suit all hull configurations and customers have the choice of thyristor or modular control panels incorporating the latest information systems.

Cathelco Seafresh reverse osmosis desalinators

Cathelco has recently acquired Seafresh Desalinators, a company with over 30 years of experience in the design and manufacture of desalination systems for commercial vessels, naval vessels and luxury yachts.

With a reputation for quality, durability and ease of installation, the company has installed systems on over 1,800 craft around the world. Their success combines engineering expertise with the use of high quality components.



Now a division of Cathelco, Seafresh benefits from an international sales and service network putting the advice and experience of fully trained personnel at your disposal for installation and servicing.

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' contact details are available on our website: www.cathelco.com

Algeria	Holland	Romania
Argentina	Iceland	Russia <i>(St Petersburg, Murmansk, Vladivostok)</i>
Australia	India	Saudi Arabia
Belgium	Indonesia	Scotland
Brazil	Iran	Singapore
Canada <i>(East & West Coast)</i>	Ireland	South Africa
Chile	Israel	Spain
China <i>(Dalian, Guangzhou, Shanghai, Hong Kong)</i>	Italy	Sweden
Croatia	Japan	Switzerland
Cyprus	Korea	Taiwan
Denmark	Malaysia	Thailand
Dubai	Malta	Turkey
Egypt	Mexico	United Arab Emirates
Finland	Monaco	United Kingdom
France <i>(Atlantic & Mediterranean Coasts)</i>	New Zealand	USA <i>(East, West and Gulf Coasts)</i>
Germany	Norway	Venezuela
Greece	Peru	Vietnam
	Philippines	
	Poland	
	Portugal	

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