

**Seawater pipework anti-fouling systems  
ICCP hull corrosion protection systems**

# **Specialised protection for military vessels**



**Cathelco** 

# Seawater pipework anti-fouling systems

The effectiveness of Cathelco seawater pipework anti-fouling systems has been proved on the ships of more than 40 navies worldwide. With the advantages of easy installation, safety and minimum attention in operation, the system eliminates blockages caused by bio-fouling in seawater lines.



## 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.

## 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 are proud to have supplied equipment for the HMS Queen Elizabeth and HMS Prince of Wales, the Royal Navy's two new 65,000 tonne aircraft carriers.

## 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.

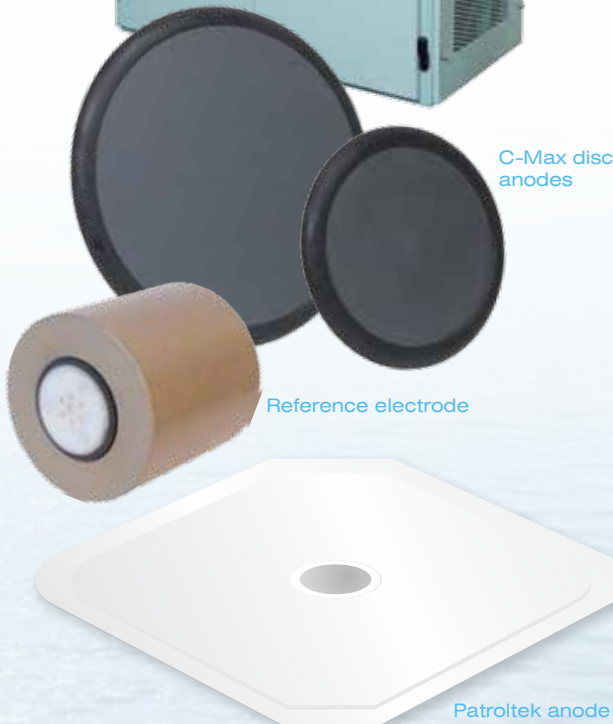
## Submarines

The Cathelco system was originally designed for use on submarines and the company regularly supplies anti-fouling equipment to 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.



# ICCP hull corrosion protection systems

The combined resources of Cathelco and Corrintec Marine enable all types of naval vessels to be protected from corrosion. Both steel and aluminium hulls can be protected using ICCP systems which are carefully controlled to optimise the level of output.



C-Max disc anodes

Reference electrode

Patroltek anode

## I-Shield – the intelligent ICCP system

Cathelco has made a major advance in ICCP technology with the development of I-Shield, the intelligent system for naval vessels. Warships require specialised ICCP systems which prevent hull corrosion, but do not interfere with the electrical war-fighting capability of the ship. The I-Shield system is specifically designed to meet the stringent requirements of EMC/EFI, shock, vibration, low maintenance and flexibility of operation in the military environment.

- Multi-zoned system for optimum corrosion protection.
- Low electro magnetic signature with ultra low ripple power supply.
- Driven by mathematical model for greater effectiveness.
- Accurate control with ability to maintain controlling reference electrode with  $\pm 5\text{mV}$  of set mV point.

## Patroltek ICCP systems for fast patrol craft

Due to their operational characteristics, fast patrol craft create high levels of turbulence in the stern area. This raises the level of oxygen in the water which leads to increased corrosion rates. Patroltek automatically compensates for the variations in operational conditions, ensuring the hull receives the optimum level of protection from corrosion at all times.

- Recessed anodes and reference cells maintain a smooth hull profile.
- System provides optimum protection at any speed.
- Shaft grounding assemblies available to earth propeller to hull – prevents bearings from pitting.
- Built to AQAP1 and NATO quality assurance procedures for military applications.
- In-built anti-shock and anti-vibration mounts to withstand operating conditions of a high speed craft.
- Master and slave power unit arrangement is available.



## Bespoke solutions for military vessels

Cathelco can supply bespoke ICCP systems for naval vessels with sophisticated data logging and the ability to control multiple units from one location.

The C-Nexus controller has numerous features which ensure that corrosion protection is precisely controlled on steel hulls, aluminium hulls and waterjet units and can be used in conjunction with Thyristor, Minitek, Alutek, Jettek systems.

- Advanced controlling and monitoring features for complex anode/reference electrode arrangements.
- Comprehensive information systems.
- Data logging of alarm conditions.
- Ability to export data to bridge information systems.
- Enables system to be remotely monitored via Ethernet connection



## Alutek Systems

Compact and versatile, these systems are used to protect aluminium hulled craft against corrosion. Used in multiple units they are also ideal for corrosion protection on catamarans. In addition, Alutek systems provide the solution to waterjet corrosion problems.



# Naval Reference List

## ALGERIA

8 Fast Patrol Craft  
2 Landing/Logistics Ships  
1 Corvette

## ARGENTINA

3 'Salta' Class Type 209  
2 Type 42 Destroyers  
Submarines

## AUSTRALIA

4 'Oberon' Class Submarines  
6 Collins Class Submarines

## BELGIUM

4 Frigates

## BRAZIL

6 MK 10 Frigates  
2 209 Type Submarines  
3 Offshore Patrol Vessels

## CANADA

3 Coast Guard Patrol Vessels  
4 Coast Guard Icebreakers  
1 Coast Guard Survey Vessel  
2 Training Vessels  
1 Nav Aids Vessel  
5 Frigates  
3 Minesweepers  
1 Destroyer  
4 Type 1100s  
1 Type 1050, NPB

## CHILE

2 Leander Class Frigates  
4 Type 22 Frigates  
3 Type 23 Frigates  
3 M Class Frigates  
2 'Oberon' Class Submarines  
1 Support Vessel

## CHINA

12 Police/Customs Patrol Vessels

## COLOMBIA

2 Type 209 Submarines  
4 Corvettes

## DENMARK

3 Support Ships

## EGYPT

6 Fast Patrol Boats

## FRANCE

11 Multi-Mission Frigates  
1 Support Ship  
1 Mistral Class Multi-Role Vessel  
Barracuda Class Submarines

## GERMANY

4 Corvettes  
2 Frigates  
6 Submarines

## GREECE

8 'Glavkos' Type 1,000 Ton  
Submarines  
4 Water Carriers  
3 HDW Submarines

## INDIA

4 HDW Type 209 Submarines  
3 Frigates  
4 Corvettes  
2 Survey Vessels

## INDONESIA

2 Type 209 Submarines  
4 Corvettes

## IRAN

4 Mk 5 Destroyers  
4 Logistic Support Vessels

## IRELAND

1 Patrol Vessel

## ITALY

6 Anti-Submarine Frigates  
2 Maestrale Class Frigates  
1 Survey Vessel  
1 Helicopter Carrying thru Deck  
1 Cruiser  
2 Destroyers

## KENYA

5 Fast Patrol Boats

## KOREA

4 Type 209 Submarines

## LIBYA

1 Mk 7 Frigate

## MALAYSIA

14 Fast Patrol Boats  
4 Corvettes  
2 209 Type Submarines

## MALTA

1 Coastal Patrol Boat

## MEXICO

31 Fast Patrol Boats

## MOROCCO

1 Multi-Mission Frigate

## NETHERLANDS

2 'M' Class Frigates  
1 Fleet Auxiliary (AOR)  
4 LCF Frigates  
4 Walrus Class Submarines  
1 Hospital/Troop Carrier

## NEW ZEALAND

2 Leander Class Frigates  
1 Survey Vessel

## OMAN

10 Fast Patrol Boats  
2 Logistics Support Vessels  
3 Offshore Patrol Vessels

## PAKISTAN

Patrol Vessels

## PERU

4 Type 209 Submarines

## PHILIPPINES

2 Patrol Craft

## QATAR

4 Fast Patrol Boats

## ROYAL NAVY

10 Polaris Carrying Nuclear Submarines  
3 'Porpoise' Class Conventional  
Submarines  
3 Through Deck Cruisers  
11 Type 42 Destroyers  
16 Leander Class Frigates  
20 Type 21 Frigates  
4 Type 22 Frigates  
17 Type 23 Frigates

2 Assault Ships  
1 Air Training Ship  
2 Special Operations Ships  
1 Helicopter Support Ship  
9 Survey Ships  
1 Minelayer  
10 Replenishment Ships  
6 Logistic Support Ships  
1 Replenishment Tanker  
2 Survey Vessels  
HMS Queen Elizabeth (Aircraft Carrier)  
HMS Prince of Wales (Aircraft Carrier)

## RUSSIA

2 Mistral Class Multi-Role Vessels

## SINGAPORE

2 Type VGD Submarines

## SOUTH AFRICA

3 HDW Submarines  
1 Survey Vessel

## SPAIN

4 Support Vessels  
4 BAM Frigates

## SWEDEN

1 Submarine  
4 Riken Type Submarines

## TAIWAN

4 Fast Patrol Craft

## THAILAND

3 Corvettes

## TURKEY

4 Type 209 Submarines  
4 HDW Submarines

## USA

Diligence (MSC)  
Cape Decision (MSC)  
Catawaba (MSC)  
Narangasset (MSC)  
Mohawk (MSC)  
Observation Island (MSC)  
Kiska (MSC)  
Sioux (MSC)  
Navajo (MSC)  
USCGC Haddock  
USCGC Tern  
USCGC Shrike  
USCGC Coho  
USCGC Amberjack  
USCGC Cobia  
USCGC Chinook  
USCGC Marlin  
USCGC Harry Claiborne (Buoy Tender)  
4 Research Vessels  
X Craft (Seafighter)  
2 Mobile Landing Platform Vessels  
2 Littoral Combat Vessels  
4 Joint High Speed Vessels

## VENEZUELA

2 209 Type Submarines  
4 Corvettes  
2 Frigates  
3 Littoral Support Vessels  
3 Offshore Patrol Vessels

## MISCELLANEOUS

1 British Antarctic Survey Vessel



Cathelco Ltd, Marine House, Dunston Road, Chesterfield S41 8NY United Kingdom

Telephone: +44 (0) 1246 457900 Fax: +44 (0) 1246 457901

Email: sales@cathelco.com Web: www.cathelco.com