



TYPICAL CHLOROPAC® SYSTEM SHIPBOARD INSTALLATION

INTRODUCTION

A small amount of sea water, 2m³/hr (9 GPM) is taken from a sea water line which remains constantly under pressure. The water passes - at high velocity - through the electrolytic cells where part of the salt is converted to sodium hypochlorite. This is then returned to the sea chest and mixes with the incoming sea water. The cooling water will now contain a trace residual sufficient to prevent the attachment and growth of marine organisms, thus keeping all circuits - from intake to discharge - free from fouling.

Sea water circulating pumps can be interconnected with the Chloropac system to ensure the output of sodium hypochlorite generated is automatically adjusted to suit the flow rates on board.

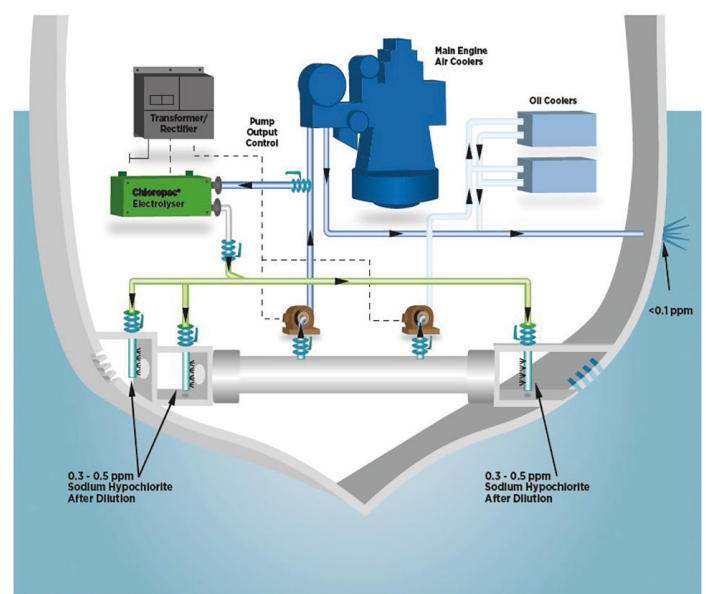
THE CHLOROPAC® SYSTEM SHIPBOARD RANGE

Suitable Chloropac systems are available from our extensive shipboard range to treat all sea water flowrates.

Installations include:

- Tankers
- Cruise Liners
- Offshore Supply Vessels
- Drilling Rigs
- Navy Vessels
- Fishing Boats
- Tug Boats
- Ferries
- LNG Carriers
- Reefers

The Chloropac sodium hypochlorite generating system is designed to prevent marine growth in the sea water piping, heat exchangers, sea chests and coolers. Thousands of systems have been installed and is the preferred method of ship owners and operators. Low level continuous hypochlorination has been shown to be more effective than other types of marine growth prevention systems.



Typical Chloropac system

CHLOROPAC® SYSTEM INFORMATION

MODEL	NOMINAL RATED KG/HR (LB/HR)	INPUT POWER KVA	OUTPUT DC VOLT	OUTPUT DC AMP	CONCEN- TRATION PPM	MIN FLOW REQ'D M3/ HR	S.W. TREATED TO 0.5 PPM M3/ HR (GPM)	PRESS. DROP	POWER SUPPLY				GENERATOR			
									DIMENSIONS			WEIGHT	DIMENSIONS			WEIGHT
									H mm (inch)	L mm (inch)	D mm (inch)	NET Kg (lbs)	H mm (inch)	L mm (inch)	D mm (inch)	NET Kg (lbs)
SB50	0.05 (0.11)	0.5	15	25	25	2.0 (8.8)	100 (440)	1.5	600 (24)	737 (29)	300 (12)	70 (154)	210 (9)	780 (32)	170 (7)	8 (17)
SB100	0.1 (0.22)	1	15	50	50	2.0 (8.8)	200 (880)	2	835 (33)	737 (29)	510 (21)	85 (187)	220 (9)	1080 (44)	170 (7)	11 (24)
SB200	0.2 (0.44)	2	15	100	100	2.0 (8.8)	400 (1760)	4	835 (33)	737 (29)	510 (21)	95 (209)	220 (9)	1290 (52)	206 (9)	17 (38)

* note that all data above is expressed in nominal

COMPARISON TO OTHER METHODS OF MARINE GROWTH PREVENTION

CHLOROPAC® SYSTEM

With a low continuous dose of 0.5 ppm or less. The Chloropac electrochlorination system is able to control Micro as well as Macro fouling organisms.
Micro = Slime, algae and weed.
Macro = Barnacles, mussels, clams, hydroids, etc.

The Chloropac system utilises platinum on titanium electrolytic cells (anodes) to produce the sodium hypochlorite from sea water. Chloropac cells are warranted for five years. Although in most common conditions normal cell life is approximately seven years

Chloropac system controllers can be adjusted manually or automatically to control the amount of hypochlorite being produced depending on the demand. The overboard discharge can be controlled to zero or near zero residual.

As the Sodium Hypochlorite is produced in situ using only the ambient sea water, no biocides or precursor chemicals are required to be stored on board the vessel. All produced Sodium Hypochlorite is also injected directly into the sea chests. This simplifies purchasing storage, handling and chemical logistics on board

ALTERNATIVE

In comparison, manufacturers of copper ion-type systems suggest a dose rate of 1 ppb will be sufficient to control all marine growth. Experience has shown that a dose rate of ~20 ppb is required to control Macro fouling. Additionally, continuous dissolution of copper and aluminium is not effective against micro fouling.

Copper based systems use "sacrificial anodes" that dissolve rapidly and need to be replaced every 12-24 months at a very high cost. Thus ongoing the consumable and maintenance costs for the operator are lower with a Chloropac system.

Copper anodes are dissolved continuously and thus copper is discharged overboard, adding heavy metal pollutants to the ocean

Chemical injection systems require the purchase storage and handling of highly corrosive and toxic chemicals. This creates an additional potential storage and safety hazard on board



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