

Seawater Treatment for Coolers

The cause and consequences of the fouling of the seawater systems.

The type of organism responsible for the fouling of sea water cooling systems are principally mollusc (e.g. mussels), crustacean (e.g. barnacles), bacteria and plant life.

The implementation of local and international control measurements for prevention of pollution has resulted in a substantial increase in problems associated with fouling. This is due to reduced toxic effluent from industry and marine traffic, which has greatly encouraged growth in rivers, estuaries and coastal waters.

Seawater antifoulants like Caretreat 5 Seawater are used to prevent seacoolingwatersystems (flow-through and boxcoolers), ballast tanks and firefightingsystems from growth of **mollucs** (e.g. mussels), **crustacean** (e.g. barnacles), **bacteria** and plant life.

Caretreat 5 Seawater contains natural produced amines (for example from coconuts), which have a filming action. By dosing the product regularly, the amine layer will be maintained. Growth has no

capability to get attached to the amine layer. The amine layer will cut off the essential oxygen supply which causes the organism to die. Antifoulants are meant to keep the systems clean, they have nearly no capabilities to clean systems. Other components such as dispersants and tensides will protect the system from sediments.

Especially the heat producing components in a coolingwatersystem suffer from fouling. The marine growth attaches to the warmest surface. The environment here is ideal, it's nice and warm and food will pass 24 hours a day. Because of these excellent conditions for marine growth they will breed very fast and cause fouling rapidly.

It is of tremendous importance to start dosing the antifoulant as soon as the vessel is launched (before the vessel is taken into service). The box coolers have to be kept clean from the first moment, whilst in ports and in shallow waters where the growth rate during these circumstances is the highest.

Corrosion protection

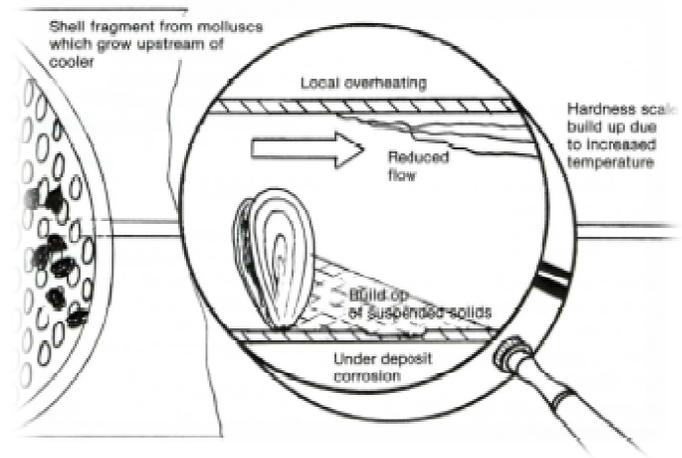
It is essential that metal surfaces are kept clean of both organic and inorganic deposits, since deposition corrosion can occur.

The presence of organic material, whether alive or dead, on metal surfaces not only reduces flow and heat transfer efficiency, but will also encourage corrosion.

Scaling

The build up of water scale in heat exchangers is often caused by shell fragments. In most cases, pieces of shell, capable of partially choking a tube, can only have come from mollusc and crustacean growing upstream in the system. The seawater inlet strainers are usually too fine for them to come from outside. Only the tiny "embryo" can be drawn in during spawning, whilst a vessel is in coastal areas. It is worth noting that one adult mussel releases thousands of eggs!

The ones that develop in the ideal environment of the seawater system, are those which cause partial blockage of tubes. This is closely followed by further build ups of particles such as sand. At the same time, local overheating occurs and scale starts to build up rapidly.



What can be done against fouling?

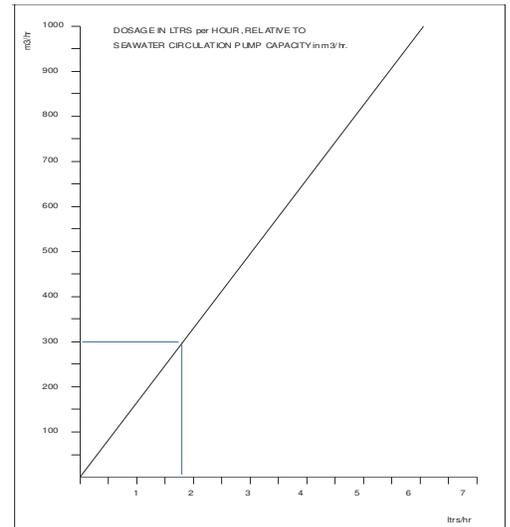
The use of a suitable product to provide protection against all types of marine fouling scaling and associated corrosion. Caretreat 5 Seawater, a di-amine based product, has the following advantages:

- effectiveness against large marine animals such as mollusc, crustacean and marine worms
- broad biocidal activity against bacteria and similar small organism
- ability to disperse organics and other deposits
- compatibility with materials of circuit construction
- environmentally safe
- economic dosing requirements
- protects against corrosion
- prevents fouling of the entire seawater system
- prevents scaling of heat exchangers
- excellent dispersant
- easily applied liquid

Dosage of Caretreat 5 Seawater

DEEP SEA VESSELS

Caretreat 5 Seawater should be metered into the suction boxes or strainers at the rate of 6 ml/m³ of seawater flow over a period of an hour every forty-eight hours.



COASTAL VESSELS

Caretreat 5 Seawater should be metered into the suction boxes or strainers at the rate of 6 ml/m³ of seawater flow over a period of an hour every twenty-four hours.

Depending of the contents of the Seawater cooling water system, the dosing frequency or dosing time can be altered for the specific vessel. At port operation the cooling water flow will be much increased, so the dosing rate has to be increased. On request, this action can be automated. Although fouling is less active in colder waters or during colder periods dosing should be continued to prevent fouling build up in the system.



Box coolers treated with Caretreat 5 Seawater for 2 and 3 years of operation.



Without treatment 2 years operation

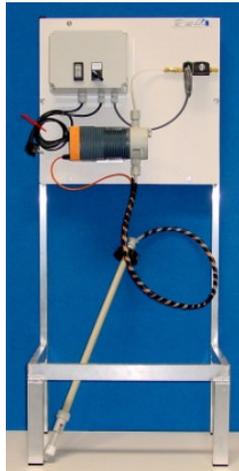
SWT (seawater treatment) - Dosing Equipment

Marine Care supplies SWT dosing equipment for use on board. As well manual, semi- automatic and automatic operated systems. As a standard the dosing systems are equipped with 1, 2 or 3 outlets for the dosage of the product on the seawater chests.

On request custom build systems, with up to five (5) outlets can be supplied.



Manual operated
SWT Logo



Semi-automatic
operated
SWT Automatic



Automatic operated
SWT Automatic plus

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