

# Corrosion protection in sea water and marine environments

In seawater and marine environments C-steel needs corrosion protection. The most common methods are organic and/or metallic coatings, cathodic protection and chemical treatment of the sea water (inhibition / oxygen removal).

## Protection methods

### Organic coating

Constructions and ships submersed in seawater are normally protected by a combination of coating and cathodic protection (CP). The coating is applied to decrease the amount of anodes, to reduce marine growth and reduce drag forces, in addition to visual effects. Coatings not resistant to CP may suffer from cathodic disbonding (Figure 1) and selection of the right coating is important.



Figure 1. Cathodic disbonding of ship hull coating

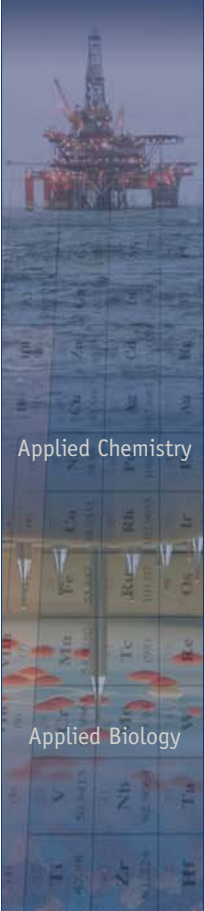
In marine atmosphere C-steel is protected in nearly all cases by an organic coating. Selecting the right coating system, depending on the local environment, is important in order to minimise coating degradation (Figure 2).

### Cathodic protection (CP)

CP can be used if the object is surrounded by a conductive electrolyte. Anodes in a less noble material (Zinc or Aluminium) corrodes instead of the steel and thereby protects it. The number and placement of anodes must be specified.



Figure 2. Flaking of a top coating. The primer coat was of wrong type



## Chemical treatment

This type of corrosion protection is used in closed systems, e.g. cooling loops. Corrosion inhibitors, oxygen scavenger and pH stabilizing chemicals are most common. Selection of the right chemical must be made by specialists.

## Metallic coatings

Metallic coatings used in seawater and marine environments are hot dip zinc, thermally sprayed zinc and aluminium (Figure 3). Such coatings are less noble than steel and protect by CP. The self corrosion of the coating depends of the actual condition.



Figure 3. Thermally sprayed Al exposed 2 years in seawater.



Areas and components where material selection and/or corrosion protection is important:

- Sea water systems:
  - Pipes, heat exchangers, pumps, valves and sensors
- Mooring and submerged systems:
  - Hulls, deck equipment, propels and gear systems.



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