

Introduction

In this document the different steps involved in a ship's docking with regards to the coating of the underwater-hull area are described. This will generally involve inspection, cleaning and surface preparation before application and drying/curing before re-floating of the vessel.

At several points during the process it may be required to adjust plans (and coating specifications) if the condition of the vessel deviate from the expectation at the time of specifying.

Additional information about surface preparation (standards) and paint application can be found on the documents section of our website Transocean-Coatings.com.

Contents

1 Access	Page 1
2 Inspection – fouling	Page 2
3 High pressure fresh water cleaning	Page 3
4 Inspection – corrosion	Page 4
5 Surface preparation	Page 4
6 Paint application	Page 5
7 Trouble shooting	Page 7
8 Conclusion	Page 8

Disclaimer

This document is by no means intended to be complete or aimed to be used as a working procedure by itself. The parties involved in a dry docking should prepare and agree working procedures based on the work to be done and requirements of the processes and products involved. Health and safety aspects of the work should be considered but are not part of this document. No rights can be derived from this document.

1. Access.

In drydock there should be ample space to manoeuvre safely with surface preparation and application equipment.

A situation as shown in Picture 1 on the right should be avoided.

Pictures 2 and 3 below show more favourable situations: both under the vessel and on the side there is space to work.

In addition, visibility is clearly better too.

Altogether a better paint job can be expected when labour conditions are more pleasant.



Photo 1: tight space between vessel and dock wall

Guidance to procedures in drydock

Introduction to the steps in underwater hull coating maintenance



Photo 2: ample space beside vessel



Photo 3: reasonable space below flat bottom

2. Inspection – fouling.

Fouling can be any organism present in the world seas. In biological terms fouling can be divided into three categories.

Slime

The general term slime is used for bacteria, diatoms and algae spores. Achnantes is a diatom type that can be found in all world seas and on most ships too.

Algae

When algae grow out to their filamentous stage one speaks of algae fouling and two types are widely known by seafarers.



Photo 4: A slime layer on a ship is always present but not always visible



Photo 5: Enteromorpha also known as 'grass'



Photo 6: Ectocarpus or 'brown algae'

Strong adhered algae fouling is a sign that the Antifouling has reached the end of its service life. It could also be that the wrong type of antifouling was selected for a vessel.

Animal fouling.

Animal fouling may be present in many forms but well-known are mussels, tubeworms and barnacles. The Acorn type is the more common type of barnacle (Picture 7) and is widespread all over the world seas. The Gooseneck barnacle (right) is only present in certain areas such as the Mediterranean sea.



Photo 7: Acorn barnacles



Photo 8: Gooseneck barnacle

The presence of animal fouling on a ship is again a sign that the paint has reached the end of its service life. In contrast with algae fouling, animal fouling is more difficult to remove by high pressure fresh water cleaning and in some case scraping might be necessary to remove all fouling.

As indicated for both algae and animal or “hard” fouling, there are several reasons this may occur on a vessel that was coated with an anti-fouling coating, they may include:

- End of service life (nearly polished through?)
- Wrong coating specified (consider what should be applied in this docking)
- Longer idle time than allowed for the used anti-fouling (also check for fouling on propeller)
- Contamination of the anti-fouling by polluted waters sealing the surface from leaching biocides and polishing to generate a fresh surface

3. High pressure fresh water cleaning

Fresh water cleaning is always necessary to remove salts, fouling, any loose paint and other contaminants.

Usually, fresh water cleaning is done immediately after in-docking as any fouling more easily removed when it is has not dried up completely. Hard fouling may require mechanical means to remove.



Photo 9: fresh water cleaning

Guidance to procedures in drydock

Introduction to the steps in underwater hull coating maintenance

4. Inspection –corrosion.

After fresh water cleaning the coating condition can be judged. Dependent on the amount of corrosion and customer's intention, a spot blast or full blast operation is advised. Pitting corrosion should receive more attention, as especially deep pits cannot be cleaned from salts and other contaminants. Welding or even steel replacement may then be the only options.

The inspector will usually point out damages done to the coating system by external factors.



Scraping anchor chains



Fender damage



Grounding

The condition of the paint system has to be checked as well, not only to determine the existing adhesive strength of the system but also to locate any defects.



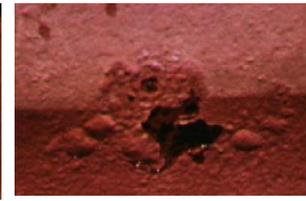
Adhesion check



Delamination



Cracking



Blistering

5 Surface preparation.



Abrasive blasting is used in most shipyards. High pressure water-jetting is becoming more popular, especially in countries where the disposal of dry dock waste is expensive and/or heavily regulated. Usually blasting to ISO-Sa 2½ is specified for rusted areas (spot) or the entire area to be coated (full).

Power tool cleaning is in general suitable for spot repair. Suitable power tools are wire brushes and sanding disks.

Both methods should be used properly as too extensive cleaning of a single spot can only polish the steel instead of roughening it.

With certain power-tools like the so called bristle blaster, it is possible to generate profile in bare metal. Alternatively a vacuum blast set-up can be considered.

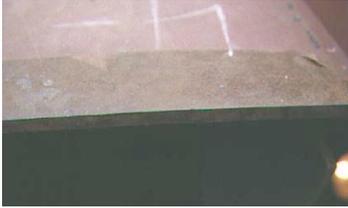


Guidance to procedures in drydock

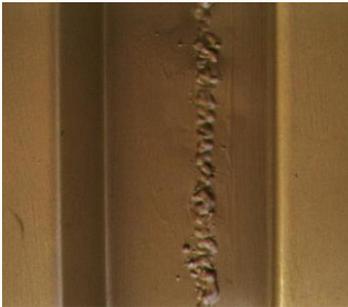
Introduction to the steps in underwater hull coating maintenance

Details

It is important to pay attention to weld seams and edges, as neglecting of these areas will result in preliminary coating breakdown.



Sharp edges should be rounded off



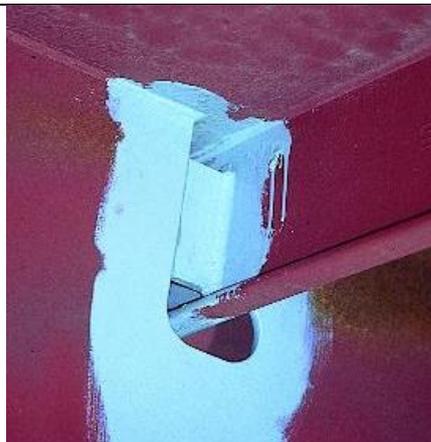
Weld splatter must be removed before coating (left) and weld-seams smoothed (right)



6 Paint Application.

Mix the paint thoroughly, in case of multi-component products the pigmented components should first be mixed individually before adding the components, preferable with a mechanical stirrer.

More detailed advice can be found in the application guidance document on our website Transocean-Coatings.com



Especially in complex steel structures such as water ballast tanks, stiffeners, weld seams, corners and edges must be stripe coated prior to a full-coat application.

When painting the outside hull, it is important to block hull outlets with so-called scupper plugs (see left picture) or using an extended hose.

Run downs of water etc. can ruin a fresh applied paint layer and lead to premature fouling.



Guidance to procedures in drydock

Introduction to the steps in underwater hull coating maintenance

Attention should be given to the following during spray application:

- the right angle
- the right distance
- condition
- a consistent pattern

Do avoid:



Spraying under windy conditions



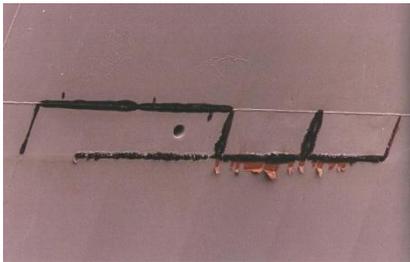
Dry spray



Runs and sags

7 Trouble-shooting.

Even when the final coat has been perfectly applied on the hull, mistakes can still occur.



Back-burn caused by welding in the ballast tanks. Proper planning can avoid these situations



Wrinkling can be caused by the wrong selection of thinner or excessive paint application



Cold flow occurs when a one-pack paint system has been applied in a rush and the ship has been launched too soon: paint layers are still soft and mingle with each other (under pressure of water)

Guidance to procedures in drydock

Introduction to the steps in underwater hull coating maintenance

8 Conclusion

In this document we focussed on the special requirements of the under-water area and boot-top parts of the hull where the anti-fouling coatings are applied. For the topside, deck, superstructure, tanks, holds, fittings, engine-room and other parts of the vessel the general requirements for cleaning, surface preparation and application are similar and the general documents on our website can be used for information in combination with product datasheets.

With good painting practice, cooperation between parties and an eye for detail, good results can be obtained in dry-dock.



This speaks for itself when the maintenance of the vessel is under the watchful eye and support of your local Transocean Coatings representative.