NORGLASS

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INFORMATION GUIDE

STEEL

Introduction

Protecting a steel vessel from corrosion, requires **absolute dedication** to preparation procedures if the selected system is to have **any** chance at all of succeeding. To get good adhesion the surface must be cleaned to white metal and then prime coated immediately. The most successful way to achieve this is sandblasting, which not only cleans large areas quickly, but leaves an uncontaminated, and slightly roughened profile for the primer to bond to.

The sandblasting procedure is a professional job and should only be carried out by qualified applicators. These people are experienced in achieving the required (standard) of clean metal states, and can produce the level specified by the paint manufacturer. Usually the minimum requirement is S.A. 2 1/ 2 near white metal, or S.A.3 white metal. Alternatively, A.S. 1627.4 should be considered as the minimum level. The white metal state is seen as a uniform white metal surface without patches of grey. Once this state is achieved, it is essential that the primer coat be applied immediately, to seal off the steel from atmospheric moisture (which will start the corrosion process all over again). Co-ordination of the blasting and painting will require careful planning and optimum weather conditions being available.

SELECTING A PAINT SYSTEM – EXTERNAL SURFACES

This can be confusing and needs some careful evaluation of: **a.** The areas to be coated, **b.** The type of use the surface will be put to, **c.** What degree of finish will be required, **d.** What maintenance cycles are contemplated and **e.** What geographical environment will be involved.

Single Pack Paint systems

These offer the simplicity of easy recoating and generally are more tolerant of application temperatures. On the other hand, they are usually solvent sensitive and not as abrasive resistant. They can only be used successfully as above water coatings because they are only water resistant, **not** waterproof, and will swell up and blister under constant immersion.

2 - Pack Paint systems

They offer higher film build protection on a coat for coat basis, but can give inter-coat adhesion problems if incorrectly applied. Recoating also requires more preparation to obtain a satisfactory bond, but provides considerably less maintenance.

To compound the problem of paint selection, each area on a steel boat usually has a different performance requirement. This requires close analysis of the coatings ability to provide value for money, in the longer term. For example, a yacht may require considerable freeboard fairing with epoxies to eliminate hollows in plate welding whereas a commercial steel trawler will ignore variations in hull smoothness and paint the area in a low sheen finish to mask the surface irregularities.

DECKS AND SUPERSTRUCTURE

As this surface has the highest heat absorption, the coatings should be capable of distorting to a similar co-efficient of expansion to that of the steel. If the paint fails to flex in a similar manner, it will crack and allow corrosion to develop.

If the paint is too soft, it will not withstand traffic. Therefore, it should be hard enough to withstand abrasion but still be sufficiently flexible to cope with the steel distortion.

TOPSIDES

Although the distortion factor will be less than the deck area, the colour, quantity of fairing filler to be used, and abrasion resistance will also dictate the selected finish.

BELOW WATERLINE

The use of an anti-fouling paint over the protective primers and undercoats also provides another dimension due to the fact that these metals will cause an electrical current to flow through the Electrolyte (seawater) causing the dissolution of one of the metals (unless adequately insulated). To overcome this problem cathodic protection principles are employed to maintain the integrity of the hull, and this requires professional advice to obtain the best results.

The basic principles of corrosion and cathodic protection are listed below for your consideration.

CATHODIC PROTECTION

When two different metals are in contact and immersed in an electrolyte (i.e. an electrically conducting solution such as seawater), an electric current flows from one metal to the other through the electrolyte. Associated with this flow of current is the dissolution of one of the metals. This phenomenon we recognise as **corrosion**.

The composition of the electrolyte plays only a minor part and consequently it is possible to arrange metals in a table such that for any pair, the one higher in the table will corrode in preference to the other.

Because this is an electrical phenomenon, a certain voltage or potential difference exits between any pair of metals. If one metal is taken as a reference standard for the scale, it is then possible to ascribe a specific voltage to each metal in the table. In practice, hydrogen is taken as zero and after standardising a number of variables, the 'electro-chemical series of metals' has been evolved. The following have been extracted from that table.

1. Magnesium - 2.38 volts
2. Aluminium - 1.66 volts
3. Zinc - 0.76 volts
4. Iron - 0.44 volts
5. Lead - 0.12 volts
6. Hydrogen 0
7. Copper + 0.34 volts
8. Silver + 0.80 volts
9. Gold + 1.36 volts

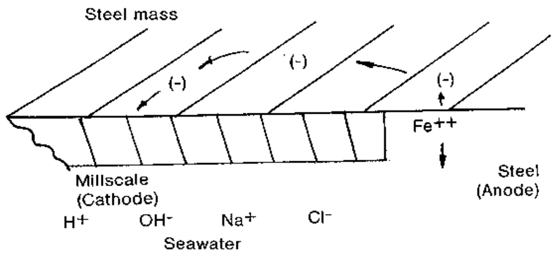
Taking iron and copper as an example, the iron being higher in the table will corrode at the expense of the copper. The potential of the iron relative to the copper is: - 0.44V - (+0.34)v = -0.78V or minus 780 millivolts. This latter figure will vary somewhat in practice depending on the nature of the electrolyte and its temperature.

So far, consideration has been given only to pairs of quite different metals. It happens that there are frequently minor potential differences over the surface of a single metal, steel for example, and hence it will corrode in the absence of a second metal. A great deal of work has been carried out on steel and millscale and the potential of the former to be approximately -450mV, a quite substantial value.

When corrosion occurs, the flow of electric current is accompanied by chemical reactions. The phenomenon is therefore more than an electrical one, it is electro-chemical and some of the terms that are used have been borrowed from that science. The words anode and cathode are applied to the two metals of a cell. The metal which corrodes or has the lower potential or is nearer the top of the above table is the anode, the other is the cathode.

The electro-chemical process of corrosion.

In the simple case of steel sheet partially covered with millscale and immersed in seawater, iron ions carrying two positive charges (Fe++) pass into solution at the anodic areas and electrons (-) migrate within the steel from the anodic to the cathodic areas thereby establishing an electric current.
(see following diagram).



PREPARATION PRINCIPLES

EXTERIOR Unpainted Surfaces

1. Remove surface contamination (grease, oil etc.) with **NORGLASS WAX & GREASE REMOVER**, and hose off salt deposits.
2. Abrasive blast clean to AS1627.4 or S.A. Class 21/2 to 3 (near white or white metal). Remove all sand and dust, and apply the first coat within 6 hours or as soon as possible. If the surface is contaminated by rain, spray or mist, reblasting will be necessary.

INTERIOR Unpainted Surfaces

1. As above where possible.
2. If abrasive blast cleaning is not carried out, power sanding to a clean metal state may be acceptable as an alternative. Remove all dust and apply the first coat within 6 hours or as soon as possible.

Previously Painted Surfaces (in good condition)

1. Remove grease and oil with **NORGLASS WAX & GREASE REMOVER** and wash with fresh water to remove salt deposits.
   Allow to dry.
2. Sand to a smooth, flat surface and remove dust.

Previously Painted Surfaces (in poor condition)

1. Where the adhesion of previous coats is poor, removal by blast cleaning is recommended. If the bare steel has not been penetrated, then scraping, wire brushing, and sanding, should be sufficient.
2. Sand to a smooth flat surface and remove dust.

PRIMING

HULL EXTERIOR: (Above and Below waterline)
Apply a minimum 2 coats of **NORGLASS EPOXY TAR** as directed on the Data sheet and label instructions.

HULL EXTERIOR: (Alternative **above** waterline system. (From the top of the boot-topping line). Immediately after sandblasting, apply 3 coats of **NORGLASS NoRUST** Primer as directed. After the final coat allow 2 hours to cure and re-mask (with 7 day tape) the waterline from the top of the boot-topping. Below waterline areas require **NORGLASS EPOXY TAR** where constant immersion occurs.

DECKS/SUPER-STRUCTURE: Same **NoRUST** recommendation as for above waterline area.

INTERIOR: As per Decks/Superstructure, continue using **NoRUST** as specified.

UNDERCOATING

HULL EXTERIOR: **(**Above and below the waterline)
Apply a minimum 2 coats of **NORGLASS SHIPSHAPE PRIMER UNDERCOAT.**

DECKS/SUPER-STRUCTURES: As per Hull exterior undercoating above. Where impractical the use of **WEATHERFAST UNDERCOAT** can be used as an alternative to **SHIPSHAPE.**

INTERIOR: (Bilge area to waterline). Use only **SHIPSHAPE PRIMER-UNDERCOAT.**

INTERIOR: (Above waterline)
Apply 2 coasts of **NORGLASS WEATHERFAST UNDERCOAT.**

FAIRING

HULL EXTERIOR: (Above waterline area)
Where required **NORGLASS NORFLEX EPOXY FILLER** can be applied by trowel or rubber squeegee. Mixing ratio 2:1 by volume. Note: Additional coats of **NORGLASS SHIPSHAPE** will be required to cover the **NORFLEX FILLER** after fairing and sanding has been completed.

DECKS/SUPER-STRUCTURE: As above.

FINISHING

HULL EXTERIOR: (Below waterline and including boot-topping).
Apply 2 coats of **NORGLASS TOPFLIGHT ANTI-FOULING** as directed on Data sheet and label instructions.

HULL EXTERIOR: (Above waterline options)
(a) Apply 2 coats of **WEATHERFAST GLOSS ENAMEL.**
(b) Apply 2 coats of **WEATHERFAST SATIN FINISH** white.
(c) Apply 2-3 coats of **NORTHANE** Gloss, (where Shipshape has been used as the undercoat).

DECKS: Apply 2 coats of **WEATHERFAST DECK PAINT.** Note: Where smooth perimeters are desired pre-coat these areas first with **WEATHERFAST ENAMEL** then mask out the SLIP RESISTANT areas with 7 day tape.

SUPERSTRUCTURE: Apply 2 coats of **WEATHERFAST MARINE GLOSS ENAMEL** or **WEATHERFAST SATIN WHITE**.

INTERIOR: (Bilge area) No further treatment required. **SHIPSHAPE** can be left as a finish coat.

INTERIOR: (Above waterline).
Apply 2 coats of **WEATHERFAST GLOSS ENAMEL** or **WEATHERFAST SATIN WHITE**.

ALLOY MASTS & SPARS: Refer to the NORGLASS guide on **Painting Aluminium** for options.

BRIGHTWORK: Refer to the NORGLASS Data sheets on **WEATHERFAST POLY CLEAR** or **WEATHERFAST MARINE VARNISH** for options. Additional information can be obtained on our website, entitled "The Good Oil on Clear Coatings".

ESTIMATING MATERIAL REQUIRE-MENTS: All coverage rates expressed are theoretical and do not allow for losses or spillage.

Where a 2 pack product expresses a coverage rate this relates to the **mixed product.** Do not include spraying thinners in these calculations and remember to multiply areas by the recommended number of coats to be applied.

SPECIFIC INFORMATION

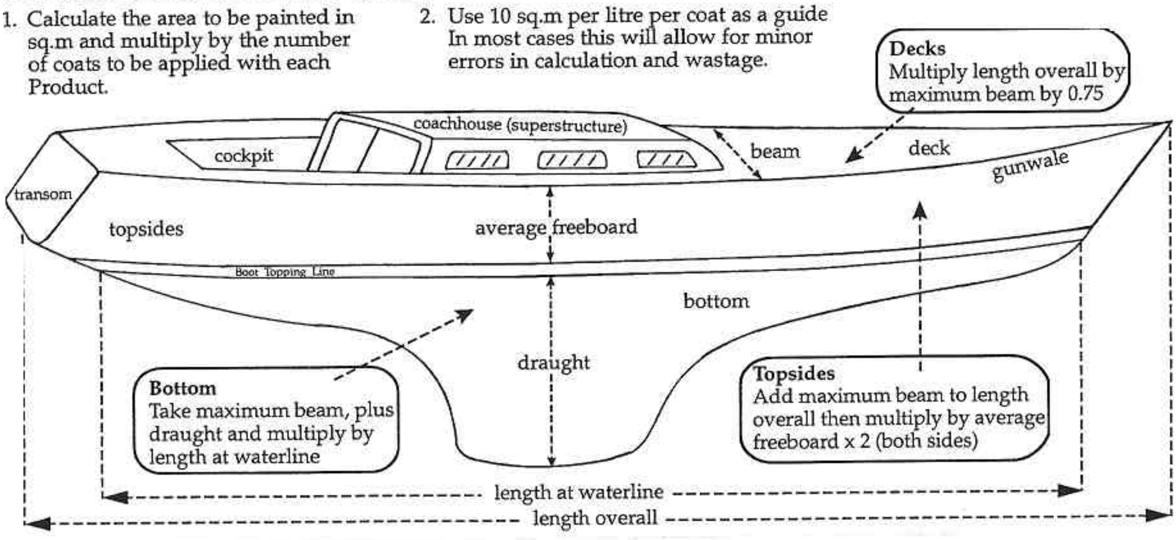
Norglass, provides information data sheets on all products for your assistance.

These can be accessed via our website, email or fax, if your local stockist is unable to provide them.

ESTIMATING PAINT QUANTITIES (Power or sail)

To establish volumes use the following formulae:

1. Calculate the area to be painted in sq.m and multiply by the number of coats to be applied with each Product.
2. Use 10 sq.m per litre per coat as a guide In most cases this will allow for minor errors in calculation and wastage.



Consult your supplier for data sheets on the NORGLASS products mentioned herein or contact:

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