NORGLASS

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INFORMATION GUIDE

TIMBER

Introduction

Due to the vast variety of timbers available and methods of treatment there is no simple universal coating system for this substrate. Grain densities, oil/sap/resin absorption values and so on will all play a part in dictating what type of treatment is best.
The selection of a protective system is also compounded by the elements the timber is subjected to. A cool damp environment can be equally as destructive on a paint system as a hot dry location in outback Australia – but for different reasons.
With modern changes in technology came improvements to adhesive compounds (glues) and equipment to prepare timber better. The results were plywood, particle board, MDF, copper impregnated pine, and scores of other processes, all designed with different strengths, textures and characteristics.

BOAT CONSTRUCTION

In boatbuilding there are 2 main types of timber used. Planks and plywood. Originally planks of wood were fastened to a skeleton of timber ribs held in place by long battens called “stringers”. These were nailed on with copper nails (and later with screws). The cracks between the planks then had to be filled with something called oakum (a resin) and cotton (hemp) to create a tight seam. This form of boatbuilding was called carvel construction or more commonly referred to as a “planked hull”.

The problems associated with carvel boats were many… If the planks dried out too much the vessel would take in water and could sink. If the nails worked loose, the plank movement then became exaggerated causing the paints to crack. When this happened, bare timber became exposed and became subject to attack from a salt water worm called Teredo. Once inside a plank a Teredo worm would devour the wood in a honeycombing fashion going up and down the full length of the plank and growing to the length of more than a metre and as thick as a man’s thumb. At no stage would the worm break the outer surfaces until the plank finally collapsed. Many a vessel has gone to Davey Jones Locker through Teredo worm attack.
In more recent times planks of wood are still used but they are fastened together with waterproof glues and layered in different directions similar to plywood. This is called cold moulded construction.

The other popular boatbuilding medium is plywood, where thin veneers of timber are glued together at alternate 90 degrees until a “sandwich” of 3-5-7 or 9 layers are formed. The adhesive used to bond these layers is a waterproof material called Resorcinol Formaldehyde. When finished, plywood is a very tough material (weight for weight as strong as steel). However, the Achilles heel of plywood is the end grain. If left exposed, the inner alternate layers create a “wicking” environment for moisture intake (just the same way a tree sucks up water). Once the moisture laden interior is warmed up and reaches a threshold of 25% moisture content the ever-present mould spores become active and devour the woods cellulose to create the condition commonly called “Dry Rot”. At that point the strength of the plywood is compromised and has to be cut out and replaced. However if the end grain is totally sealed off with a waterproof coating in the beginning, plywood is a very durable substrate.
Externally the exposed plywood consists of only a couple of millimetres before a waterproof glue line is encountered. By definition “Marine Ply” means that the outer layers of the timber have a 100% covering of the waterproof glue so that any moisture cannot penetrate into the inner cores from the face. Theoretically this should safeguard the timber from breakdown but with insufficient attention to the end grain the whole surface becomes vulnerable.
The commonly held idea of fibreglassing over ply with polyester resin and glass has had disastrous consequences for the boating industry. By adding a rigid reinforced polyester membrane to the 2mm timber veneer the resulting failure is a foregone conclusion. The shear strength of the reinforced matrix is always going to be **significantly** greater than that of the timber. This means that as tension/stress forces are applied, the timber must separate from the rigid layer.

Alternatively, other reinforcing systems based on more flexible epoxy resins and glass cloth (as opposed to chopped matt) can provide a more harmonious relationship and be less inclined to failure. However care and research into the structural suitability is most important because the shear strength of the epoxy/glass membrane is always going to be greater than the wood. The optimum reinforcement for wood is DYNEL cloth and Norglass Laminating epoxy resins. (See Dynel & Epoxy reinforcing Information Guide).

PREPARATION

Sealing timber

The first consideration of any timber surface paint job is to stabilise the moisture level within the Wood. Once sealed off, the surface will remain constant enabling a cosmetic coating process to be truly effective. For example, painting a door without sealing the top and bottom edges will still allow the door to buckle and warp. In summer it opens freely, because the timber contracts with the evaporation of moisture and in winter takes in moisture causing the door to swell and stick. This distortion also stresses the paint layers causing splits and cracking to occur, resulting in paint breakdown. The common belief of not coating all sides of timber to allow it to "breathe" is a myth. The dimensional stability of wood that has been encapsulated completely by petrification is the classic illustration of preservation.

To achieve this state **NORSEAL EPOXY WOOD PRESERVER**, applied liberally to all bare timber surfaces will seal it off and prevent moisture ingress. **NORSEAL** is a "water-thin" epoxy solution designed to penetrate into the wood where it then cures gluing fibre to fibre, **below the surface.**
This process should be carried out **after** gluing and filling with **NORSTIK EPOXY GLUE** and **NORFILL EPOXY FILLER**. The reason for this is to ensure that the maximum bond strength of glue and filler, is to the wood **rather** than to a coating of **NORSEAL.** Any screws or other fastenings added **after** the **NORSEAL** application must be countersunk and filled with **NORFILL** (White, Teak or Mahogany) or alternatively recoated with **NORSEAL**. Screwing through **NORSEAL** treated timber and leaving the head exposed can allow moisture to track down the thread into unsealed territory.

PRIMING/UNDERCOATING

If a clear finish is desired over **NORSEAL, PLEASE NOTE:** This is **only suitable** for areas that are screened away from direct sunlight because **NORSEAL** (and all clear epoxies) have poor U/V resistance and will degrade quickly beneath varnishes and clears. Once they begin to oxidise the clear coatings will crack and delaminate causing a total failure of the system. However if used internally or covered up **NORSEAL** does not require any further treatment. On internal panelling clear polyurethanes or varnishes are suitable finishes over **NORSEAL.**

The selection of a primer should be determined by the finish paint. For example if **NORTHANE** (2 pack polyurethane) is the desired finish because of its tough chemical and abrasion resistance, then **SHIPSHAPE PRIMER-UNDERCOAT** will be needed to prepare the surface. This product is balanced in favour of the **resins** rather than the pigments, making it suitable as both a primer **and** an undercoat. Because it is chemically cured, it will not be reactive to the strong solvents that are used in **NORTHANE,** where as other air dried primers or undercoats would be. With **SHIPSHAPE** applied over the **NORSEAL,** the surface is now inert and either single or 2 pack finishes can be applied. This system usually only relates to the outer surfaces of boats or flat, easy to sand areas because 2 pack finishes such as **NORTHANE** are not normally used internally. The reason being, that when **NORTHANE** eventually needs recoating, the entire surface has to be sanded to a flat non shiny state to enable the next coat to adhere properly. In its gloss state **NORTHANE** is not only chemically resistant to most things, it is also resistant to itself. Consider the degree of difficulty in trying to sand between ribs and stringers, hence the need to sand. In these areas a more user friendly air dried paint system is preferred because of easier recoating.
This product would be **WEATHERFAST GREY PRIMER or NoRUST ALL SURFACE PRIMER.**

PRIMERS versus UNDERCOATS.

Primers are constructed with leafing pigments and special resins so that maximum adhesion is achieved. If these coatings fail the whole paint system is lost. In addition to adhesion, pigment density is also very important to shield the substrate from oxidising or water ingress.

Undercoats on the other hand, usually only have one function and that is to fill the substrate profile with a paste of coarse pigments in a slurry of resin. Undercoats are usually balanced in favour of the pigments to create easy sanding and do not have any self-levelling characteristics as that would be counter productive to the filling function.

In general, undercoats have less adhesion than primers and are only used where surface filling is required. Painting a metal surface normally needs a primer then finish coats … **no** filling, **no** undercoat.

Where filling **is** necessary to obliterate the timber grain several coats or layers of undercoat will need to be applied. If applied by brush or roller a light sanding between coats will cut back the high spots and make for easier filling. If this is not done, the next coat builds on the high spots as well as the hollows, which means the contour or surface profile remains the same. This is not helped by the brush and roller marks which build on each other as the task progresses. Where the undercoat is sprayed on, a more even distribution of paint will leave a less corrugated surface which translates into less sanding.

When the main body of undercoat has been applied, the fairing (or smoothing of the surface) should be considered as two separate phases. 1. The initial sanding will cut back the most obvious defects. 2. The final sanding needs to be done at a later stage so that film shrinkage is factored into the equation. It is not uncommon for undercoats to shrink considerably within a **2 week period after painting.** This means any final sanding carried out before that time will result in further settling or shrinkage and mirror these defects in the final gloss. This is commonly experienced with reinforcing layups. Even some months later the weave texture of the reinforcing can show up as the cosmetic filling contracts … or the timber shrinks as the moisture level is reduced.

FINISH COATS

Interior areas are normally treated with **WEATHERFAST ENAMEL** except for showers, chart tables and eating surfaces where **NORTHANE** affords more waterproofing and heat resistance.

Externally **NORTHANE** is the preferred finish where maximum durability is desired (given all practical considerations). For example: A **NORTHANE** finish on a 3 metre dinghy is probably “overkill” and not cost effective relative to the investment. However, a 5 metre half-cabin boat will benefit substantially from a **NORTHANE** finish in resale value. Where spraying is not possible, **WEATHERFAST ENAMEL** is the preferred option.

Both products will produce the same high gloss mirror finish except that **NORTHANE** will outlast **WEATHERFAST ENAMEL** up to double the time, and provide better chemical and abrasion resistance during the process.

On other areas, **WEATHERFAST DECK PAINT** and **WEATHERFAST** clear coatings are the preferred products as described in the appropriate data sheets.

MAINTENANCE HINTS

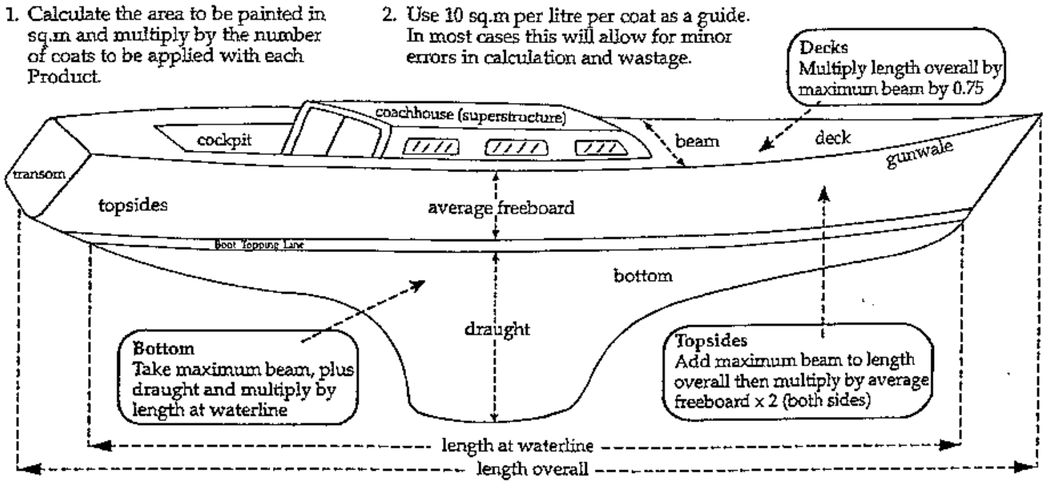
With all NORGLASS coloured finishes the best colourfast pigments are selected to maximise the durability. When fading does eventually occur the recommended treatment is to wash down with detergent and warm water. Using a polish over an oxidised paint film is only a temporary measure and should be avoided. This is the time to resurface the area with a new coat of paint. If a polish **is** chosen make sure that it does **not** contain any silicone, as this will create enormous problems for future repainting programmes.

To maximise the lasting properties of a wooden boat paint system the answer is to radius all internal corners with **NORFILL EPOXY FILLER** at the commencement stage. However it can also be done in a repair/repainting operation providing that 20mm each side of the internal corner is sanded back to show a predominance of bare wood. Once this area is coved out and painted, water can not lay there and as a bonus both pieces of wood are strengthened by the **NORFILL** which in turn will prevent cracking of the paint layers - the major cause of paint deterioration.

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.



USEFUL METRIC CONVERSIONS

Conversion Factors (Approximate)

	Imperial to Metric Units	Metric Unit
LENGTH	1 in=25.4mm	millimetre (mm)
	1 ft=30.5cm	centimetre (cm)
	1 yd=0.914m	metre (m)
	1 fur=201m	metre (m)
	1 mile=1.61km	kilometre (km)
int nautical mile	1 n mile=1852m	metre (m)
MASS	1 oz=28.3g	gram (g)
	1 lb=454g	gram (g)
	1 stone=6.35kg	kilogram (kg)
	ton=1.02t	tonne (t)

	Imperial to Metric Units	Metric Unit
AREA	1 in^2=6.45cm^2	square centimetre (cm^2)
	1 ft^2=929cm^2	square centimetre (cm^2)
	1 yd^2=0.836m^2	square metre (m^2)
	1 p=25.3m^2	square metre (m^2)
	1 rd=0.101ha	hectare (ha)
	1 ac=0.405ha	hectare (ha)
	1 square mile=2.59 km^2	square kilometre (km^2)

	Imperial to Metric Units	Metric Unit
VOLUME	1 in^3=16.4cm^3	cubic centimetre (cm^3)
	1 ft^3=0.0283m^3	cubic metre (m^3)
	1 yd^3=0.765m^3	cubic metre (m^3)
	1 bus=0.0364m^3	cubic metre (m^3)
VOLUME (fluids)	1 fl oz=28.4ml	millilitre (ml)
	1 pt=568ml	millilitre (ml)
	1 gal=4.55 litre	litre (l)

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

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