Australian Made NORGLASS Specialty Finishes Australian Owned

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INFORMATION GUIDE

UNDERSTANDING ANTI-FOULING

What is anti-fouling Paint?
In salt water there are teeming thousands upon thousands of small creatures swimming along or carried by currents upon spawning. In the food chain size is important. The larger the organism the smaller the number of predators. However nature also provides some animals with the ability to feed while they are stationary, like mussels, oysters and barnacles for example. They feed by ingesting passing particles carried by currents and wave action. To resist the turbulence these animals have developed a highly sophisticated cementaceous adhesive which they use to **anchor** themselves to **any** surface. Just like the vacuum created by a rubber suction cup, but with a powerful glue. Once attached, these animals grow and propagate, creating colonies or clusters which in turn captures more passing food… and so on.

On a boat that is constantly in the water this creates a significant problem, because left untreated the rudder, propellers, prop shaft and other moving parts will quickly become so **encrusted** with growth that they will seize up and become inoperable. This growth also creates significant **drag** to a vessels movement, adding to fuel costs and restricting hull speed.

The solution (?)
Produce a paint coating that **repels** these organisms by creating a constantly toxic boundary layer of water next to the hull surface. These paints were designed to prevent the **"fouling"** of the surface by marine growth, hence the name anti-fouling paint. Although simple in principle, it proved extremely complex to perfect, because of the variations of conditions and toxin release rates. In cold climates toxin release rates were sluggish but so was the growth rate. Conversely in warmer waters the release rate increased, but so did the propagation of growth, meaning that the anti-fouling paint exhausted its potency much sooner than planned. Once depleted the growth explodes into being. The answer was to produce an **optimum** "middle of the road" product that would cover both cold and warm water conditions.

Adding to this complexity the environment also creates a pot-pourri of other intangibles. Rainfall, water temperature, salinity, tidal flows, localised pollution, effluent outflows, land mass phosphates/fertilisers… **all** contributing to this aquatic "soup". Then we have photosynthesis which creates the slime, algae and grasses not repelled by the normal toxins. Although confined to the sunlight zone, this development also causes havoc with hull speed and visual ascetics… and the problems do not end there.

Other creatures like Teredo Worm **love** the **cellulose** of wood. These animals will burrow into timber (when not repelled) and leave an entry point of a millimetre hole. Once inside they eat out the wood by "honeycombing" the entire plank and growing to a length in excess of a metre and as thick as a mans thumb. Next time you are down at a jetty, look at the timber piles and you will see the effect of Teredo Worm.

ANTIFOULING PAINT
There are 2 basic types of anti-fouling paints, hard and soft. Those that allow the release of the toxins **through** the paint film, and those that **shed** part of the paint binder/toxins in layers through friction. The latter are referred to as "soft" or "erodible" coatings. The "hard" or "contact leaching" types leave a spent coating of resin binder behind (like holey Swiss cheese) at the time of repainting. This means that the re-coating process builds on top of the existing film. Although this may result in some stripping of the paint layers in 12-15 years time it also helps to enhance annual repainting because there is normally a "reservoir" of remaining toxin in the old coat to enhance the performance of the new one.

Soft, or erodible coatings, were designed to give commercial vessels an economy of scale. If a boat had to undergo frequent slipping's for routine survey inspections, then it was prudent to use an anti-fouling paint that did not last as long, but was easily washed off and replaced with a new coat……. eliminating build-up. Because this type works on **friction** it was necessary to impose a speed limit of less then 10 knots.

Exceeding that speed simply tore the paint film off too quickly leaving nothing remaining when the vessel stopped. Although technology has now produced high speed versions of these coatings they still rely on the shedding process.

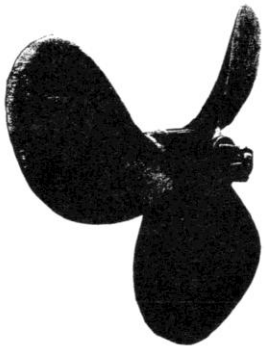
Erodible anti-fouling's were developed for the international shipping market where **continuous** hull friction created a "smoother" underwater profile by wearing away the high spots and as a consequence creating substantial fuel savings. This type of product has **no advantage** for a recreational vessel sitting on a mooring 6 days out of 7.

SELECTION

Here lies a minefield of controversy. Put 10 boating people together and raise the topic of anti-fouling and there will be 10 "expert" opinions on which product is best (and which ones are "rubbish"). Then there will be application advice on brush versus roller usage and what "brews" can be made to improve performance…….. chilli powder – sump oil – antibiotics – anti-fungal additives and so on. These **do not** enhance the performance of these paints and **will** affect the controlled release rate of the toxins.

The **essential** thing with all anti-fouling applications is to **not exceed** the prescribed coverage rate specified by the manufacturer. The correct film thickness (evenly applied) means that the **toxic boundary layer** of water will be uniform, and the performance likewise. Cutting corners by inadequate preparation, thinning the paint, or ignoring relaunch time minimums (drying times) will only lead to poor performance and increased costs later on.

Painting propellers require special attention because the vortex created, at speed tears the paint from the leading edges and then continues to work back to towards the shaft. When stationary, the areas without anti-fouling will attract growth and eventually the whole propeller will become fouled and restrict movement. Only the "hard" types of anti-fouling (like Topflight) should be used. Several coats with emphasis on getting more paint on the outer edge is desirable. (see diagram 1) Allowing additional drying time is also worthwhile. Painting the propellers **first** will enable more coats to be applied and provide the longest drying times.



Brush towards the outer edges of the blades to deposit extra paint where it is needed, **NOT** as shown here →

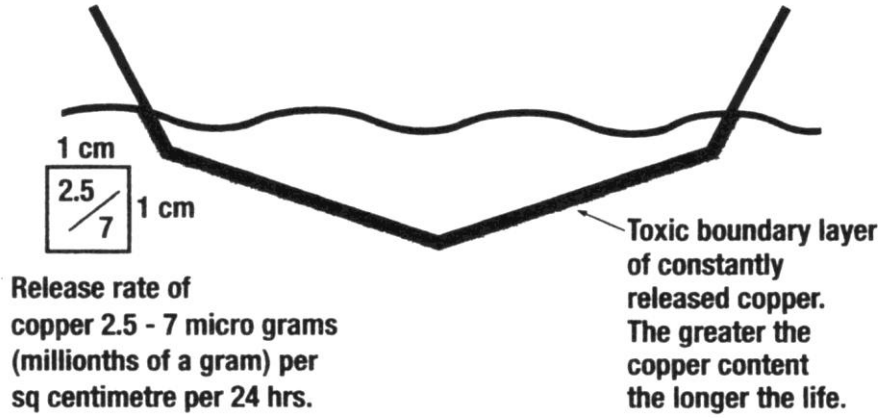
(1)



What are the Toxins?

All anti-fouling paints contain copper as the main repellent. There are 2 forms of copper: Copper (cuprous oxide) and copper (cuprous thyocianate). The latter is **less** corrosive to aluminium than the full blown cuprous oxide is but corrosive **nonetheless**. Other additives to control slime/weed only play a minor role. The main problem is caused by barnacles, tubeworm, teredo worm and only copper is a satisfactory deterrent.

This copper is released into the water by a controlled leaching process called hydrolysing. This rate is 2.5 to 7 micrograms (millionths of a gram) per square centimetre per 24 hours. (see diagram 2) Within this range the paint will remain active for as long as the copper is being released. When exhausted, the marine growth will start to re-established within hours. The higher the copper content of the paint the **longer** it will take to be released, which translates into longer periods between slipping.



(2)

Limitations to colour range

The cuprous oxide levels in NORGLASS ANTI-FOULINGS dictate what colours can be made. By using a low tint strength copper colours such as blue, black and green can be created. Obtaining other colours are only possible by using the less effective copper thiocyanate.

Selection

- **Any vessel doing 10 knots or over should** not **use Soft Copper anti-fouling's.**
- Boats made of aluminium, or those with stern drives or sail drives **must not** use **NORGLASS ANTI-FOULINGS**. Select a brand containing copper Thiocyanate and follow the manufacturers instructions to the letter.
- Boats doing **less** than 10 knots should **seriously** consider upgrading to the hard (contact leaching) anti-fouling's as value for money is obvious. (TOPFLIGHT RED, BLACK or BLUE)
- Craft that use a travel-lift or crane for haul-out should **not** use Soft Copper anti-fouling's because the slings will tear the paint off upon re-entry. The paint is too soft.
- Soft copper anti-fouling's can **only** have more **Soft Copper** paint applied over them (brand irrelevant). To use a hard type, the old soft copper must be totally removed.
- Hard type anti-fouling's are generally compatible brand to brand and, given normal preparation, not a problem.
- Active constituents of **all** anti-fouling's must, by law be stated on the main panel of the label. Comparing the price and the stated grams per litre (g/l) can influence the choice of product.

Removing old Antifouling

On surfaces such as steel, aluminium or wood the most practical ways are either by NORGLASS ORANGE-PEEL paint stripper – Soda blasting - wet sandblasting – or a "poultice" technique which uses a paper over a coated solution and then gets peeled off. Last option is to wet sandpaper the surface.

Because the toxins are potentially hazardous, dry sanding is not an option. **Any** removal of old anti-fouling paint must be done responsibly, so that **all** of the removed material is contained, or captured before it has the opportunity to reach the water.

Removal of anti-fouling paint from fibreglass can cause some additional headaches because the use of chemical paint strippers can affect the integrity of the gel coat. If a slow reacting paint stripper, such as NORGLASS ORANGE-PEEL is used, only small areas should be coated at any time so that the paint/residue can be removed before the stripper has time to react with the gel coat surface.

Considering that there are only a small number of manufacturers of anti-fouling paints (world wide), and with a **vast** tonnage of product used every year, (More than a **million litres** of anti-fouling on commercial shipping vessels sitting off Singapore harbour……..any day of the week) illustrates the magnitude of the problem. Globally, scientists have tried Silicones, Teflon, Lanolin, synthetic compounds and an assortment of other ideas to resolve the problem of fouling…….without success. With a lead time of 7 years (minimum) to produce a new anti-fouling paint, plus the investment in R & D……..to make a better mousetrap is a **hard ask**. Consider this aquatic soup. Rainfall variations, land mass development run-off, temperature variables, salinity levels, topography, tidal flows, effluent outflows, fertilisers and so on……..plus human pollutants, all have a contributing role on how successful the coating will be.

Storage

Anti-fouling paints are normally very dense (heavy). A can of Topflight Red for example weighs-in at **more than 2kg per litre**. As a result the copper settles in the can faster than other paint products. In order to keep the copper in suspension, the tins should be turned upside down **once a month** to prevent compacting of the contents. Meticulous stirring is also essential, right up to the time of applying. If all of the toxin is not totally integrated within the volume a patchy result can occur.

Consider this: If a tin of anti-fouling has been sitting on a shelf for a few weeks, the weight of the copper will want to sink lower in the can. Therefore, if the tin is opened and just painted on, the first 20% of this product will have a **lower** copper ratio. Then as the residue arrives at the surface, it will be disproportionate with a copper sludge, and less formulated material, to provide the correct rate of dissolving.

If this happens there is **no way** of providing an overall controlled release rate of toxins. Some areas may begin growth within days/weeks.

In a nut shell

- **Make sure the surface is properly prepared and dry.**
- Read and follow all of the manufacturer's instructions to the letter.
- Calculate the area to be painted and divide by the coverage rate per square metre to determine how much anti-fouling paint is to be applied. **Do not exceed this rate**. Any left over anti-fouling is best used up by coating turbulent areas such as the stem, propellers, planing strakes and around the waterline.
- Observe the launch time so that adequate drying time occurs.
- Avoid using the motor until the paint is well set and hard. The vortex created by the propellers can strip off uncured anti-fouling very easily.
- Stir **thoroughly** before use and do not **thin** or add anything to the paint.
- Do not allow any anti-fouling scrapings to enter the waterway and respect the environment by correct disposal of empty cans and used equipment.
- **DO NOT** use NORGLASS ANTI-FOULINGS ON ALUMINIUM AS SEVERE CORROSION WILL RESULT.
- Finally – ignore "**expert**" advice around the waterfront, and ask advice from your supplier or the manufacturer.

