NanoPhos

Marine Pioneering Nanotechnology

Yachting Manual 2016

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Nanotechnology

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INTRODUCTION

NanoPhos

Marine Pioneering
Nanotechnology

Tune the NanoWorld to serve the MacroWorld. Of the Seas...

NanoPhos was founded in 2005 with a vision to transfer innovation from the laboratory into everyday life, utilizing the power of nanotechnology. The products of NanoPhos are the outcome of the company's in-house research team, and can be found to more than 25 countries in Europe, Middle East, Asia and America.

NanoPhos Marine constitutes the backbone of NanoPhos' marine activities and it has transferred the experience from oceangoing vessels to the particular needs of yachting. Having successfully dealt with problems from oceans around the world, the yachting products focus on the special requirements of near coastal and closed seas.

NanoPhos developed a range of products to solve problems such as, but not limited to, the adhesion of microorganisms (marine fouling) on the hull of the yacht, corrosion caused by the seawater, the heat due to the incident solar radiation and the accumulation of salts.

Antifouling paints, insulating and self-cleaning coatings are just some of the products that can respond to the long-term requirements and maintenance of the yachting market.

Our products meet strict quality standards and are developed according to the most demanding performance and functionality criteria. Additionally, they meet all environmental and legislative requirements so as to protect vessels and, simultaneously, respect the marine environment.

The range of products available, fully covers the protection, care and maintenance of yachts. Our audience is the yachting professionals, but also individuals who simply love the sea and yachting world.

We wish you Happy Sailing!

NANOPHOS MARINE PRODUCTS

Cleaning
Maintenance & Care
R^3: Renovation, Rejuvenation, Refreshment
Primers & Sealers
AntiFouling Paints
Thinners

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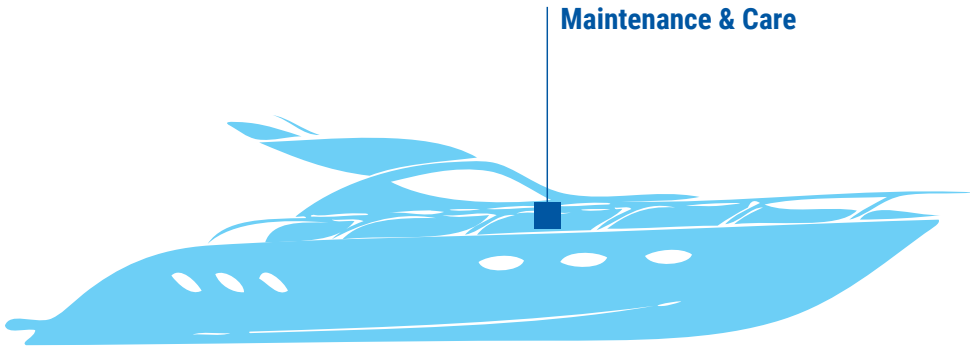
Maintenance before sailing is necessary because:

- It prevents adhesion of salt deposits
- It preserves the appearance of the yacht
- It eliminates odours and maintains the surface clean
- It effectively emulsifies the oil and grease residues
- It effectively removes the rust from surfaces
- It preserves the yacht's sailing features
- It ensures the quality and the performance of coatings

Product Categories:

- Cleaning
- Protection
- R^3: Renovation, Rejuvenation, Refreshment
- Maintenance



CLEANING

▶ HBG Bilge Cleaner

Product description

HBG Bilge Cleaner formulation is a biodegradable, water-based, heavy-duty bilge cleaner. It is used for easy and fast cleaning of difficult residues, grime and dirt in the bilge and engine room. It effectively removes residues from greases, oils, fuels, waxes, silicones, oil and fungi. It is suitable for the general cleaning of the engine room and the bilge / engine itself. It leaves the bilge odour-free.

Key features

- Biodegradable & non-toxic
- Multi-purpose: Empty fuel tanks, bilges, engine rooms.
- Sanitizes while cleaning.
- Non-corrosive to metal surfaces or engine parts.
- Deodorizing

Application

Apply on surface, let stand for 5 minutes (longer time needed for heavy build up dirt and stains), agitate with a brush if needed, and rinse with fresh or seawater. Enclosed bilges and tanks: Apply 2-10L for each cubic meter of enclosed bilge or tank, let stand for 24 hours, drain and rinse tank. Engine vibrations reduce the let stand down time interval. In cases where gasoline or diesel have entered into the water system follow enclosed tank directions with a triple rinse. Apply proper disposal directions of the emulsified yield.

Available packaging

1L, 4L and 30L plastic canisters.

▶ HMD Heavy Duty Marine Degreaser

Product description

Biodegradable water-based cleaner that emulsifies and removes oil, grease and grime. Cleans and dissolves heavy oil residues on inboard & outboard motors, engine, machinery and dock equipment.

Recommended use

Ideal for removing grease, oil and sludge from the engine parts, tools, mechanical brakes, clutches, chains, cables, moldings, components, bearings, generators and compressors.

Key features

- Not Flammable. Significantly reduces the risk of fire caused by incidental contact with live electrical equipment or solvents trapped by insulating materials.
- Fast Evaporation. Minimizes downtime associated with "clean-in-place" cleaning methods.
- Non-toxic Biodegradable.

Application

Spray liberally and allow running off. Use extension tube for hard-to-reach areas. Allow cleaned equipment to fully dry and vent before using or turning on. A dry, absorbent cloth can accelerate drying time. Do not use the product on plastics surfaces such as acrylic, ABS and polycarbonate. If uncertain, check with the manufacturer or test on a small area before using. Not for use on sensitive. Do not use while equipment is energized/turned on.

Available packaging

1L, 4L and 30L canisters.

▶ ARC Gel Rust Remover

Product description
ARC is a rust remover in GEL form. Despite the acidic character, it does not contain hydrochloric acid. ARC Gel effectively removes the rust off the surfaces to prepare them for modification (primer and paint application). It also contains flash rust inhibitors to protect early corrosion effects.

Recommended use
Metal surfaces cleaner for rust and hard water deposits. Ideal for use with salty water and easy to use. It can be easily applied on vertical surfaces and rails because of its gel form.

Application
ARC Gel can be applied by brush on a vertical surface without sagging. Let stand for 5 minutes (longer time needed for intense accumulation of stains), rub with a brush or cloth if needed, and rinse with fresh water. Once rust or deposits have been removed, it is important to treat metal with a protective coating.

Available packaging
1Kg, 5Kg and 15Kg plastic pails.

MAINTENACE & CARE

▶ HDO Deck Oil

Product description

Unlike conventional teak oil, HDO is a binder stabilized, deep penetrating protecting formulation, ideal for marine hardwood surfaces, like decks, with excellent UV protection. It's deep penetrating formula feeds wood, restoring the natural oils lost through weathering. It penetrates the wood leaving a glossy sheen that lasts longer than other conventional oils.

Recommended use

Deep penetrating, deck protecting formulation, ideal for wooden surfaces with excellent UV protection that provides a natural finish and high abrasive resistance. It creates an easy to clean protected surface. Suitable for any hard-wood, interior or exterior surface. It provides a durable long life finish. Suitable for wood with large contraction and expansion properties. Coverage Rate 12-15m^2/L.

Properties

Type	Oil Alkyd Resin	**Touch Dry Time**	1h @ 20°C
Components	One component	**Dry Through Time**	2h @ 20°C
Colour	Transparent	**Full Curing**	24h @ 20°C
Thinner/Cleaning Solvent	NanoPhos Thinner B	**Min. Recoat Interval**	7h @ 20°C
Mixing Ratio	One component	**Water Resistance**	Very Good
		Abrasion Resistance	Very Good

Application

The application of HDO can be done through conventional sprayers, airless sprayers and roller or brush. These are indicative methods of application and it is to the judgement of each person which method will be applied. Substrate temperature should be minimum 5°C above the environmental temperature and at least 3°C above air dew point. Good ventilation is required to ensure proper drying.

Available packaging

1L, 2.5L, 5L and 20L metal canisters.

▶ WRS Water Repelling Shine Protection

Product description

WRS is a nano-engineered product for preserving the shine of polished yachting hulls. It prevents the adhesion of salt deposits by repelling seawater. Thus, the deteriorating action of salts is eliminated and the shiny appearance of the hull is preserved for longer.

Recommended use

Ideal for polishing of blemished and worn surfaces. It creates a tough, abrasion resistant and glossy surface. Suitable for gelcoat or fiberglass surfaces.

Key features

- Long-lasting shine of white or even dark-shaded surfaces.
- Does not leave residues.
- Water repelling action prevents accumulation of water droplets and sea-salt deposits.
- Provides protection against Ultra-Violet (UV) radiation that causes fading, drying and cracking.

Application

Apply evenly with a soft cloth to avoid streaking. Wipe off excess to avoid residues on painted surfaces and non-painted plastic panels.

Available packaging

375mL, 750mL plastic canisters.

▶ SurfaPaint Wood Stain

Product description

SurfaPaint Wood Stain is a water-based impregnating varnish ideal for colouring and protecting interior and exterior wood surfaces. Recommended for both professional use. It penetrates deep into the wood, highlighting its natural appearance. It provides excellent protection against water and oily stains, extending the endurance of wooden surfaces. Recommended for application on new or untreated surfaces.

Advantages

- Excellent waterproof and oil repellent properties.
- Highly flexible, no cracking.
- Rub and scratch resistance.
- Excellent adhesion, long lasting durability, resistance to adverse weather conditions.
- Enhances the appearance of natural wood grains.

Colour

Available as transparent coating and up to 8 shades (Colour Card)

Application

Surfaces must be clean, dry and rubbed down with a suitable abrasive paper (in case of unmodified surface). Stir well before use. SurfaPaint Wood Stain is ready to use. Apply 1-2 coats by brush or spraying, depending on the desirable finish of wood appearance. Do not over-brush. Additional coats should be applied 3-4 hours after previous applications. The final shade depends on the natural color of the wood, the absorption and the number of coats. Consumption rate is 10-12 m^2/L, depending on surface absorption.

Available packaging

375mL, 750mL plastic canisters.

▶ SurfaPaint Wood Varnish - UV Blocker

Product description

Surfapaint Wood Varnish - UV Blocker is a polyurethane (PU modified) water-based varnish for interior, but mainly exterior wooden surfaces. Because of its polyurethane composition, it has very good adhesion on wood surfaces and long lasting durability in harsh weather conditions. It seals the wood, creating a transparent film, while allowing the surface to "breathe." It contains special filters which absorb UV radiation, thereby preventing the aesthetic degradation, discolouration, and the destruction of the wood mass. As a result, wooden surfaces retain their original appearance for longer time. Highly recommended as an overcoat to Surfapaint Wood Stain to provide a great colour satin finish.

Advantages

- Excellent waterproof and oil repellent properties.
- Due to its UV filters, it prevents the esthetic degradation and discolouration of wood.
- Rub and scratch resistance.
- Excellent adhesion to wooden surfaces and resistance to harsh weather conditions.
- Satin finish

Colour

Transparent.

Application

Surfaces must be clean, dry and rubbed down with a suitable abrasive paper (in case of unpainted surface). Stir well before use. SurfaPaint Wood Varnish-UV Blocker is ready to use. Apply 1-2 coats by brush or spraying, depending on the desired finish of the wood appearance. Do not over-brush. Additional coats should be applied 3-4 hours after the previous application. If you have previously used SurfaPaint Wood Stain, apply after 48 hours, depending on the number of layers that have already applied. Coverage: 10-12 m^2/L, depending on surface absorption.

Available packaging

375mL and 750mL plastic canisters.

▶ CGU Cool Glossy Stain Resistant PU Enamel

Product description

CGU is an acrylic/polyurethane coating with outstanding colour retention abilities. This coating has exceptional resistance to weathering, staining and corrosive environment. Can be used to exterior or interior applications, or wherever a superior gloss and colour retention finish is desired. It can be applied directly on gelcoat or over an adhesive primer, like EPR. Special Nanostructured ingredients reflect incident heat radiation, thereby enhancing the degree of comfort and "coolness" inside the hull, especially in summer.

Recommended use

Topcoat colour, which provides an excellent basis for long-lasting glossy finish on the sides of yacht or on the upper structure (cabins,fly bridges etc). Remarkable protection from UV radiation. Does not yellow. A highly resistant coating to abrasion, which incorporates features of prolonged retention of gloss and colour.

Film thickness per coat

	Minimum	Maximum	Recommended
Dry Film Thickness DFT (μm)	80	120	100
Wet film Thickness WFT (μm)	145	218	182
Coverage Rate (m^2/L)	7	4.5	5.5

Drying times differentiate between minimum or maximum values. Maintain recommended values during application. Coverage rate is theoretical and does not include any losses.

Properties

Type	Acrylic Aliphatic PU	**Touch Dry Time**	2h @ 20°C
Components	Base A & Hardener B	**Dry Through Time**	4h @ 20°C
Colour	Colour Card	**Full Curing**	24h @ 20°C
Thinner/ Cleaning Solvent	NanoPhos Thinner B	**Min. Recoat Interval**	12h @ 20°C
Mixing Ratio	4:1 A:B per volume	**Flash Point**	24°C
Max. Pot. Life	6h @ 20°C	**Water Resistance**	Excellent
		Abrasion Resistance	Excellent

Surface Preparation

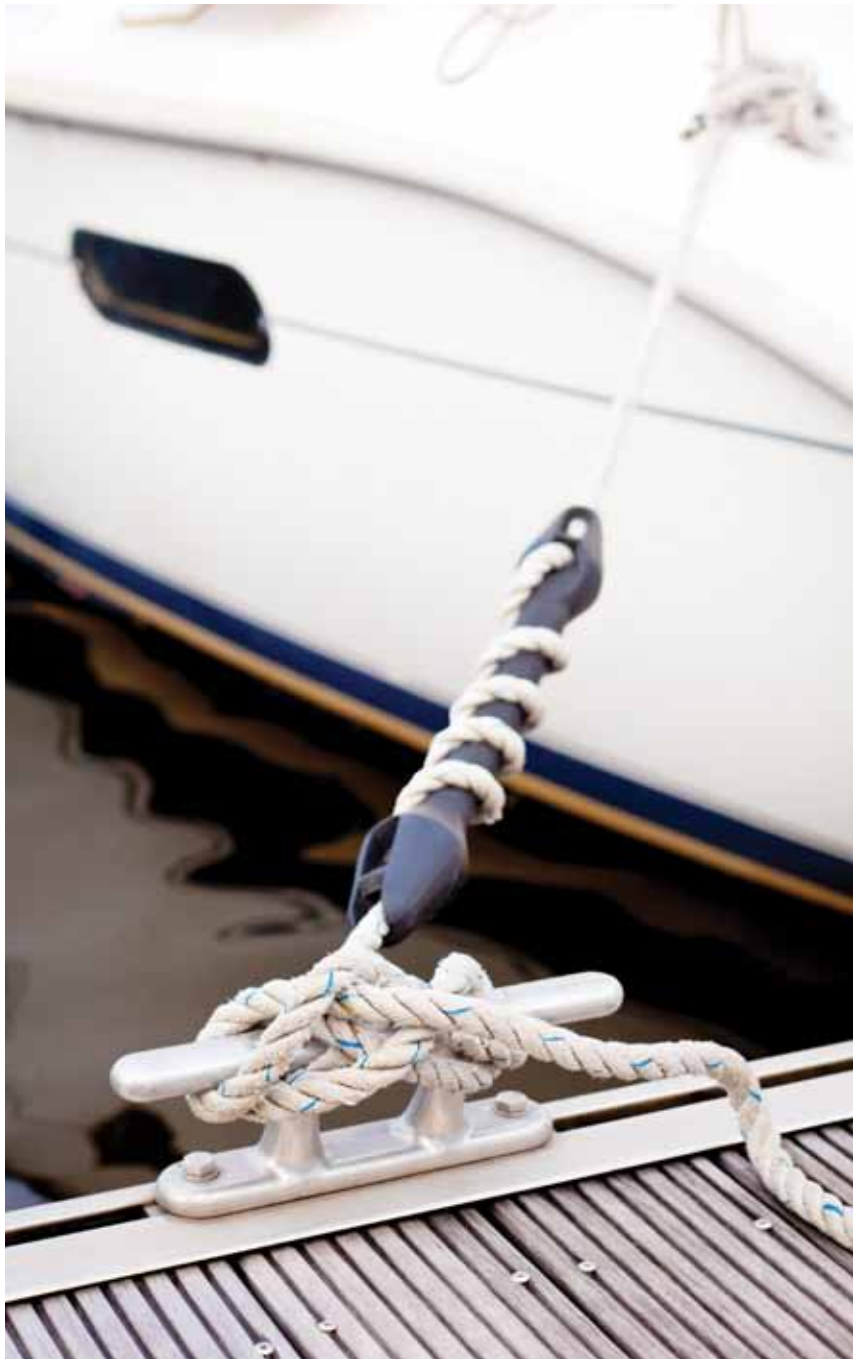
All surfaces should be clean, dry and free from oil, grease and other foreign matters or contamination. Follow the preparation instructions, as described in Chapter 3.

Application

The application of paint can be done through conventional sprayers, airless sprayers, roller or brush. These are indicative methods of application and it is to the judgement of each person which method he will apply.
Substrate temperature should be minimum 5°C above the environmental temperature and at least 3°C above air dew point. Good ventilation is required to ensure proper drying.

Available packaging

2,5L unit (total 2,5 liters in two metal canisters 4:1, A: B per volume). 5L unit (total 5 liters in two metal canisters 4:1, A: B per volume). 20L unit (total 20 liters in two metal canisters 4:1, A:B per volume).



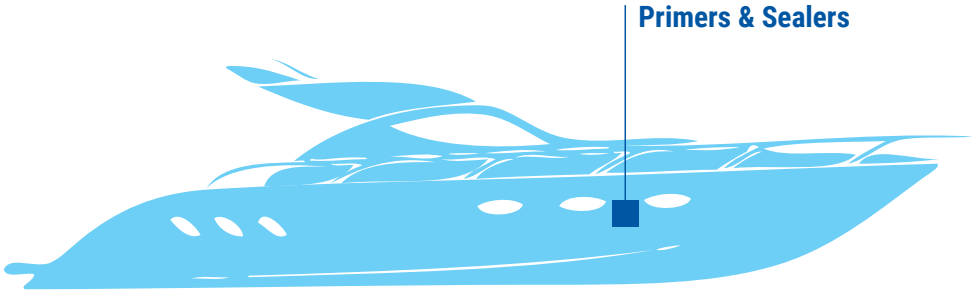
PRIMERS & SEALERS

Select the appropriate primer to:

- Protect the substrate of yacht that is exposed to the marine environment above and below waterline.
- Avoid early failure of the paint system.
- Enhance the final surface finish.

The appropriate amount of colour is needed for:

- Improving the performance of the yacht in the water.
- Strengthening the protection of the yacht below and above the waterline.
- Good adhesion on wet and dry exposure conditions.
- Enhancing the cathodic protection of yacht.
- Long-term performance and anti-corrosive protection.



▶ EPR Epoxy Primer

Product description

EPR is a two component epoxy primer with anticorrosive long lasting action. It is suitable for application on plastic, or fiberglass or metal surfaces. It contains anticorrosive pigments.

Recommended use

As an excellent quick drying primer for corrosion protection. Ideal for surfaces exposed to marine environment above and below the waterline. It can be applied to all surfaces which need primer before painting. Fast-drying corrosion protective paint that smoothens rough surfaces. It can be covered by any kind of colour and antifouling. **It can also be used as a sealer / bonding layer over existing epoxy primers.**

Film thickness per coat

	Minimum	Maximum	Recommended
Dry Film Thickness DFT (μm)	80	150	100
Wet film Thickness WFT (μm)	107	203	135
Coverage rate (m^2/L)	9.4	5	7.5

Drying times differentiate between minimum or maximum values. Maintain recommended values during application. Coverage rate is theoretical and does not include any losses.

Properties

Type	Epoxy Polyamide	**Touch Dry Time**	30min @ 20°C
Components	Base A & Hardener B	**Dry Through Time**	4h @ 20°C
Colour	Colour Card	**Full Curing**	10d @ 20°C
Thinner/ Cleaning Solvent	NanoPhos Thinner A	**Min. Recoat Interval**	6h @ 20°C
Mixing Ratio	4:1 A:B per volume	**Induction Time**	15min @ 20°C
		Flash Point	>23°C
Max. Pot. Life	6h @ 20°C	**Water Resistance**	Excellent
		Abrasion Resistance	Excellent

Surface preparation

Existing compatible substrate: All surfaces should be clean, dry and free from oil, grease and other foreign matters or contamination. Follow the preparation instructions as referred to in Chapter 3.

Application

The application of EPR can be done through conventional sprayers, airless sprayers and roller or brush. These are indicative methods of application and it is to the judgement of each person which method he will apply.
Substrate temperature should be minimum 5°C above the environmental temperature and at least 3°C above air dew point. Good ventilation is required to ensure proper drying.

Available packaging

2,5L unit (total 2,5 liters in two metal canisters 4:1, A: B per volume). 5L unit (total 5 liters in two metal canisters 4:1, A: B per volume). 20L unit (total 20 liters in two metal canisters 4:1, A:B per volume).

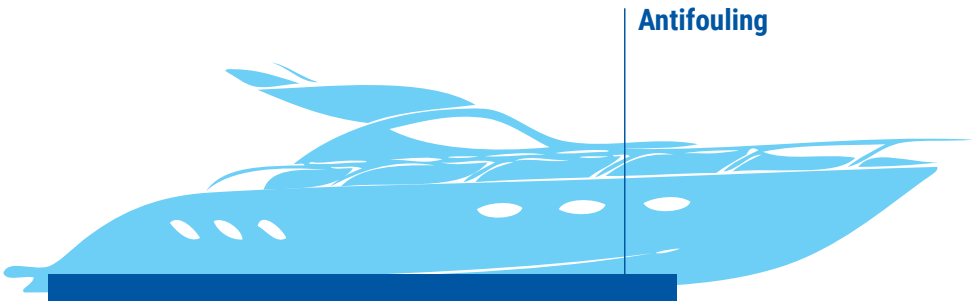
ANTIFOULING PAINTS

Antifouling paints for the surface below the waterline

- Prevent hard- and soft-fouling.
- They help saving fuel costs, reducing the slip rate.
- Tin free. SeaQueen Extreme is also copper free.
- Excellent compatibility with conventional self-polishing coatings.
- Type Approved.

How antifouling's work?

- They gradually liberate bioactive ingredients which protect against microorganisms deposition.
- They prevent the growth of microorganisms, leaving the surface clean, even when the yacht remains idle for long periods.



▶ SeaQueen Antifouling *Ultra-XT*

Product description
Superior performance antifouling coating, tin free. Self-Polishing Coating. Developed to meet the harshest fouling environment in closed ports and marinas. It can be applied on vessels with speed up to 40kt. It also responds (fouling free) to vessels' needs that remain idle or move at a very low speed for extended periods. It conforms to the strictest National and International Regulations of the International Maritime Organisation (IMO).

▶ SeaQueen Antifouling *Extreme*

Product description
Innovative antifouling coating, tin & copper free. Self-Polishing Coating. It can be applied to vessels with speed up to 40kt. It also responds (fouling free) to vessels' needs that remain idle or move at a very low speed for extended periods. Ideal for sea environments with a high degree of fouling from microorganisms (hard fouling: barnacles). It conforms to the strictest National, Community and International Regulations of the International Maritime Organisation (IMO).

▶ SeaQueen Antifouling

Product description
Wide performance range antifouling formulation that is based on active copper. Self-Polishing Coating. It responds well to algae (soft fouling) and to microorganisms (hard fouling) of marine environment. Ideal for yachts coming out of the water in winter. It can be applied on yachts with speed up to 40kt. It conforms to the strictest National and International Regulations of the International Maritime Organisation (IMO).

Recommended use
Antifouling protection coating for coastal, closed-sea or even international traveling. Universal performance formulations.

Approvals & certificates

Approved by DNV-GL, in accordance with the requirements and the standards of IMO Antifouling System Convention on hulls. Type approvals can be provided upon request.

Film thickness per coat

	Minimum	Maximum	Recommended
Dry Film Thickness DFT (µm)	75	150	100
Wet film Thickness WFT (µm)	125	250	167
Coverage Rate (m^2/L)	8.0	4.0	6.0

Drying times differentiate between minimum or maximum values. Maintain recommended values during application. Coverage rate is theoretical and does not include any losses.

Surface preparation

Existing compatible substrate: All surfaces should be clean, dry and free from oil, grease and other foreign matters or contamination. Follow the preparation instructions as referred to in Chapter 3.

Application

The application of paint can be done through conventional sprayers, airless sprayers and roller or brush. These are indicative methods of application and it is to the judgement of each person which method he will apply. Substrate temperature should be minimum 5°C above the environmental temperature and at least 3°C above air dew point. Good ventilation is required to ensure proper drying.

Properties

Type	Antifouling paint based on copolymer resin	**Touch Dry Time**	30min @ 20°C
Components	One component	**Dry Through Time**	5h @ 20°C
Colour	Colour Card	**Min. Recoat Interval**	4h @ 20°C
Thinner/Cleaning Solvent	NanoPhos Thinner B	**Min. Time to Immersion**	18h @ 20°C
Mixing Ratio	One component	**Flash Point**	22°C
		Water Resistance	Excellent
		Abrasion Resistance	Very Good

Available packaging

1L, 2.5L, 5L and 20L metal canisters.

COVERAGE

Required quantity of antifouling

Type of Yacht	Fin Keel 	Full Keel 	Motor cruise 
6m/20ft	**2.5ltr** (1x2.5)	**2.5ltr** (1x2.5)	**2.5ltr** (1x2.5)
7.5m/25ft	**5ltr** (1x2.5)	**5ltr** (1x2.5)	**2.5ltr** (1x2.5)
8.5m/28ft	**5ltr** (1x5)	**7.5ltr** (1x5+1x2.5)	**5ltr** (1x5)
10m/33ft	**5ltr** (1x5)	**10ltr** (2x5)	**7.5ltr** (1x5+1x2.5)
11.5m/38ft	**7.5ltr** (1x5+1x2.5)	**12.5ltr** (1x2.5+2x5)	**10ltr** (2x5)
13m/43ft	**10ltr** (2x5)	**15ltr** (3x5)	**12.5ltr** (2x5+1x2.5)
14.5m/48ft	**12.5ltr** (2x5+1x2.5)	**17.5ltr** (3x5+1x2.5)	**15ltr** (3x5)
16m/53ft	**15ltr** (3x5)	**20ltr** (1x20)	**20ltr** (1x20)
18m/60ft	**20ltr** (1x20)	**25ltr** (1x20+1x2.5)	**25ltr** (1x20+1x5)

Note:
The above table is indicative and can be used as a guide only, since the dimensions of the hull of each yacht, as well as the in-water idle time may vary.

THINNERS

▶ NPTA NanoPhos Thinner A

Product description
Organic, solvent based thinner for epoxy paint systems.

Typical properties
Density/VOC: 0,85 ±0,02 (850-870 g.L-1)., Medium evaporation rate, Flash point 25°C.

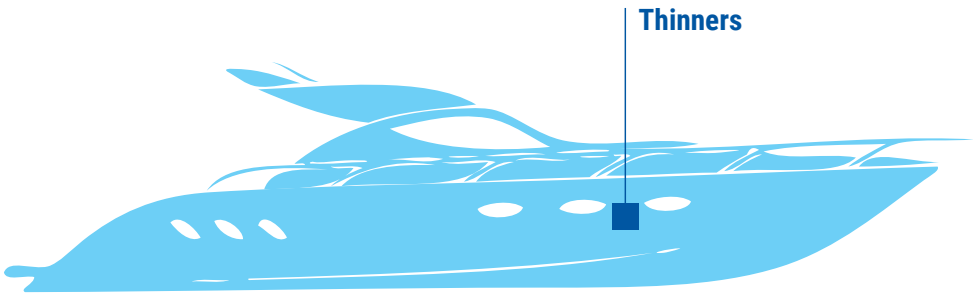
Available packaging
1L, 5L and 20L metal canisters.

▶ NPTB NanoPhos Thinner B

Product description
Organic, solvent based thinner for alkyd/acrylic/vinyl/ PU, paint systems.

Typical properties
Density/VOC: 0,85 ±0,02 (780 g.L-1, Medium evaporation rate, Flash point 40°C.

Available packaging
1L, 5L and 20L metal canisters.



PERSONAL SAFETY

NanoPhos products that are presented in this catalogue are intended exclusively for professional use. Read and understand the relevant Safety Data Sheet of each product before application. All Safety Data Sheets can be found on the web site www.NanoPhos-Marine.com or contact us on the telephone number +30 22920 69312. Strictly apply the protective measures as indicated in the relevant Safety Data Sheet of each product. Request, read and comprehend updated Technical Data Sheets, Safety Data Sheets and Hull Colouring Instructions.

Before applying, **make sure that the workplace** is well aired and there is adequate ventilation. **When choosing** personal protective equipment, be sure to ask for further advice from the supplier.

Individual protective equipment must display the CE marking which certifies its compliance with the appropriate regulations.

Store closed containers away from sources of flame, sparks, in a dry, closed room at a temperature of 5°C to 35°C, for up to 18 months from production date.

PAINTING PREPARATION

Equipment
Surface Preparation
Instructions
Osmosis

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EQUIPMENT

Brush

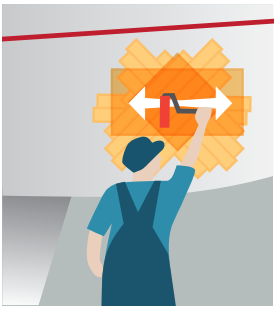
Use special brushes, ideal for painting polyurethane and epoxy resin based coatings. The brushes should have natural hair/bristles and also be resistant to solvents. Household brushes for plastic / acrylic water-based masonry colours may dissolve because of their non-resistance to solvent media. Superior quality brushes ensure constant, even and repetitive results of the brush strokes. Recommended application method only for narrow or small areas.

Paint Roller

The paint roller application is a fast method of covering large surface areas. Proper selection of the size of roller, produces excellent results. In all cases use the cross-stroke technique, with the final coat always along the yacht to achieve uniform results.

A. Cover an area of half a square meter starting with diagonal movements of the roller (45º).

B. Continue with diagonal movements of the roller (90º to the original application direction).



C. Complete painting with horizontal movements of the roller (from the front to the rear of the yacht), so as the final coating of the paint colour direction being parallel to the waterline.

Spray guns

NanoPhos Marine products can be applied by a variety of professional quality airless spray guns. As with all equipment, the spray gun, hoses, tips and paint reservoirs should be kept clean and rinsed with solvent prior to each use. Be sure to test spray on a sample surface area prior to each application.

▶ Before application make sure that the spray accessories and air hoses are clean and free from moisture.

Replace dirty air pipes and check regularly for leaks. Check the supplied air purity by spraying for 5 minutes against a white cotton cloth, so as to be sure that it comes out clean and leaves no residues. Changing filters and air supply must take place at regular intervals. Be sure using a sufficient number of filters for large air tubes.

SURFACE PREPARATION

Make sure that the surface is clean

Before starting the painting job, ensure that the application surface is clean and dry. NanoPhos Marine offers effective products for surface preparation prior to each application. It is vitally important to use appropriate products and follow correct procedures in the preparation of the surface so as to ensure the proper adhesion of the applied coating.

Check the environmental conditions

The temperature of both ambient air and substrate, humidity and air flow should be checked to ensure the best outcome. DO NOT attempt to paint in extreme weather conditions, or hurry the process when the environmental conditions are volatile. Make sure that the air is as clean as possible. Rinse and clean the surface thoroughly, particularly before applying a coating. Be sure to follow the recommendations and instructions on the "Technical Data Sheets" before applying any product of NanoPhos Marine.

Make sure oily residues have been removed

Before any coating application, all grease, oils, fuel, waxes, silicone and other oily residues must have been removed, setting the application surface clean and ready for painting. Follow the cleaning instructions and use **HMD Heavy Duty Marine Degreaser** for removing residues.

Always use a clean cloth to avoid contamination of the surface. The degreasing should be done in a well ventilated area using a clean cloth dipped in **HMD Heavy Duty Marine Degreaser**. Use a cloth in circular motions cleaning 1m² surface at a time and changing the cloth surface before proceeding to the next section. During this process and for your safety, you should use protective gloves and goggles. Refer to the relevant Safety Data Sheet.

Protect the parts that will not be painted

Plastic Parts

All plastic parts should be removed or covered (masking tape) properly before painting. This process is considered necessary as the paint may oxidize the supporting metal parts. Do not paint rubber or flexible surface areas. The paint hardens when cured and the surfaces remain soft. This result to paint cracking and thus water or humidity can penetrate with disastrous results.

Teak Wood
The surface of teak wood should always be properly protected before proceeding with painting. Teak wood can be easily stained, so that its appearance will be destroyed. Moreover, wood retains moisture, which can be entrapped below the paint film, and thus make the coating flake. It is recommended that wood pieces are removed, when below surfaces need to be coated.

Water Rinsing - Hydro blasting
Proceed with rinsing or hydro blasting. Watch closely the flow and colour of the water to determine whether the surface is clean. Flow openings and holes indicate areas that may need additional preparation. It is important to use fresh water and a tube that is not contaminated with oil or other foreign objects.

Sanding
After cleaning, proceed with a light sanding of the surface either mechanically (using sander) or manually (using sandpaper) for smaller surfaces. The aim is to create a good surface profile. Remove residues and dust using air blowing.

Application
Substrate temperature should be minimum 5°C above the ambient temperature and at least 3°C above air dew point. Good ventilation is required to ensure proper drying (curing).

PAINTING INSTRUCTIONS

Pretreatment - Preparation

After cleaning, sanding and before painting it is necessary to apply a good primer that smooths out imperfections and simultaneously enhances the adhesion of the new paint. All surface defects should be eliminated. Upon preparation completion, the surface of your yacht should have the same texture to that of a paper piece. Before start painting, do check of the yacht's surface: using a powerful headlight or by finger feeling, you should be unable to detect surface defects.

Painting of fiberglass

Fiberglass (GRP, Glass Reinforced Polyester) is a polyester resin reinforced with glass fibers, forming a lightweight material with high durability and low maintenace needs. Fiberglass is coated with a gel coat layer. Over time, the gelcoat and fiberglass get effected upon exposure to UV radiation and hard use, resulting appearance fading and hairline cracking.

- When fiberglass is new, wax and demoulding agents may exist on its surface. These residues may prove very persistent. Therefore it is important to remove them following the oily residues removal process.
- The old, overused gelcoat and GRP can become porous and will require special care.

Painting of metal

Mild steel and aluminum are mainly used in the construction of yachts, because of their durability, they are easy to manufacture and their waterproofing/impenetrability abilities. In the marine environment, these materials will require painting, both to withstand corrosion and to also improve their appearance. With the proper surface preparation and the appropriate paint systems, tools and materials, hulls, made from steel and aluminum, will remain for a long period of time in good condition and will require minimal maintenance.

- It is important to completely insulate metal surfaces from air and water, before proceeding with painting.
- The metal plates are often treated with a preliminary/preparative paint (Shop Primer), which is not part of the coating system, and should ideally be removed prior to the application of the paint.
- Before starting any work on the metal surfaces, it must show no signs of corrosion, and most importantly, all salt and dirt residues must be removed by washing it off with fresh water at high pressure (minimum 2500 psi) by washing.

- For steel surfaces use blasting type Sa 2½ (Swedish Visual Standard, ie. almost white metal) or good sanding.
- For aluminum surfaces, use blasting with non-metallic abrasives or rub with sandpaper 60-120 until it turns the metal into a "white" colour.
- Before painting, test the temperature of the surface, as metal tends to vary considerably from the surrounding environmental temperature.

Painting of wood

Wood as a natural material, can develop various problems when exposed to the marine environment. As it is a biodegradable, it offers food to various organisms from the rot-causing fungi to scabs that eventually destroy the wood. Additionally, wood can absorb large quantities of water, causing contractions and expansions, and proving detrimental to the adhesion of the coating systems. A wooden yacht must be also protected against its main enemy: the UV rays of the sun, which destroy the natural fibers of the wood, as well as seawater, rain, wind and dust suspended in the air. With the proper surface preparation and use of an appropriate coating system, these problems can be overcome and the natural beauty of wood to be highlighted. Proper surface preparation is important in achieving a very good application of varnish, regardless of the type of product that will be applied. It is vital to remove any impurities from the surface, with the use of a medium sanding paper. In case of existing older varnish, use thin abrasive paper. Either way, dust/dirt residue need to be removed from the surface.

The twists/difficult areas

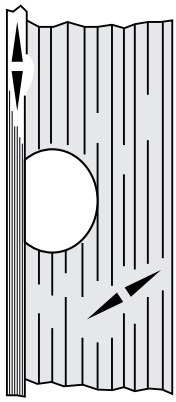
Often enough the designers of a yacht create on it stylish and sharp-edged alcoves in their effort to achieve a stylish results. However, these alcoves create difficulty for the craftsman who will be taking over the paiting of the yacht. The alcoves and sharp corners are not practical for spray painting, as a nice equal application of colour cannot always be achieved. If the colour does not reach everywhere and with the same thickness, it then does not dry evenly, and dangerous cracks can be created. These difficult areas may require the use of a paint brush. The brush of course will leave some lines. Neat application of the paint brush is required. Make sure that these areas are therefore, at all costs painted.

Slip-resistant surfaces

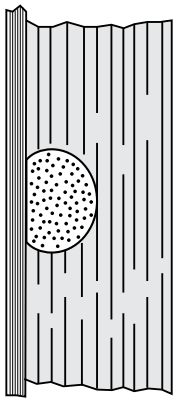
The deck of a yacht must be slip-resistant, and therefore to be painted with a special paint. When applying non slip-resistant paint in these areas, the small protrusions of the slip-resistant surface are covered, reducing or suppressing the friction ability. Such a surface needs to be sanded thoroughly and then coated again with slip-resistant paint. Alternatively, it is recommended to cover this surface completely during the painting of the remaining yacht.

OSMOSIS

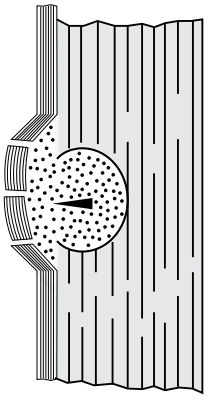
Osmosis is the spontaneous net movement of solvent molecules (e.g. water) through a semi-permeable membrane into a region of higher solute concentration, in the direction that tends to equalize the solute concentrations on the two sides.
Yachts are made of polyester resin reinforced by glass fibers (fiberglass or GRP). Incisions, attached points, scratches or aging gelcoat can lead to the polyester getting wet and water then being absorbed. The polyester gradually starts decomposing locally (hydrolysis GRP), providing substances to enter the "local" liquid mixture and increase its build up. On the other hand, the "dilute" salt water through osmosis provides the molecules of the solvent (pure water) to balance the increasing concentration, next to GRP moiety. Thus, more and more water starts penetrating the vessel. This phenomenon is widely known as the "Osmosis Problem".
Osmosis causes the creation of bubbles on the yacht surface, with diameters from 2-3mm to 2-3cm that contain liquid with an acid odour. The odour is due to the polyester hydrolysis components (acetic acid). This liquid has a high density and it is acidic, therefore the eyes must be protected when bursting the bubbles.



Cohesion split polyester construction error.



Water collection in vacuum beneath the gelcoat.



Detachment of gelcoat of glass fabrics and appearance blister.

Prevention

To avoid the phenomenon of osmosis there are some steps that should be followed during its maintenance. During idle months, when the yacht is out of sea, it is advisable to dry out adequately. The yacht should ideally stay at least a month out of water and dry properly and then measure for the moisture content of the polyester which should not exceed 15%. If it does exceed, it is recommended to get the advice of a professional.

After the yacht is removed from the water and it is well-dried, it must be repaired from all the cracks on the gelcoat and top coat, so as to prevent moisture from entering in the healthy polyester.

The most vulnerable areas from where moisture can enter and create the osmosis effect are those areas where holes have been opened for motor settings, water extraction, rudders, flaps etc. These areas should be double checked and the necessary waterproofing be done if needed.

Healing

The first step that must be done when the yacht shows signs of osmosis (bubbles), is to ask an expert advice of a technician, on what procedure should be followed to repair the damage and if remediation should be local or general.

Apart from the bubbles on the exterior surface of the yacht that indicate osmosis, you need to make a thorough check over the whole yacht with a hygrometer to find out if there is any internal moisture in the polyester, which is the hidden osmosis. In such instances the colour, needs to be removed from the entire surface of the yacht and all the areas with osmosis repaired locally. The yacht must then be left without colour for a long period of time, in order to allow any existing moisture to evaporate completely. Measure the moisture content of the hull, and if it is below 15%, then proceed to paint.


TECHNICAL TERMS

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TECHNICAL TERMS

Alkyd:
Synthetic paint resin.

Dry Film Thickness:
Dry film thickness. It is measured in micron (micrometers). 1mm = 1000 microns (µm).

Wet Film Thickness:
Thickness of wet film. It is measured in micron (micrometers). 1mm = 1000 microns (µm).

Epoxy:
Synthetic resin containing epoxide components.

Air Pressure:
The relative force of air in a defined area or volume.

Biocide:
Active ingredient added to a coating to repel/discourage unwanted organisms responsible for microbiological degradation.

Blasting:
Use of an abrasive under pressure to remove coatings or surface contamination that is too difficult to remove by other means.

Compatibility:
Ability of two or more materials to be mixed together without causing undesirable effects.

Density:
Ratio of mass to volume. Usuall expressed in Kg/L or g/mL. 1Kg/L = 1g/mL.

Drying:
The total drying time of a paint.

Corrosion:
Deterioration or deformation of a substrate usually attributed to oxidation, electrolysis or other chemical reaction that causes pieces of a substrate to react and detach from the original mass they were a part of.

Coverage:
The measured area a certain quantity of paint will cover at a given thickness.

Polyurethane:
A durable synthetic resin used in two pack topcoats and comprising of carbamate links.

Primer:
Paint applied to a non-painted or prepared substrate to give protection, and/or in readiness for subsequent coatings.

Maximum duration of mixture in the pot (pot life):
The time that a two-component product remains workable, after the mixing of the two components.

Solvent:
A liquid used to dissolve or disperse paint and other oils.

Substrate:
Surface to be coated.

Sealer Tie Coat:
Coating with good adhesion properties and a low response when connecting two disparate layers.


COLOUR CARD

NanoPhos

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Nanotechnology

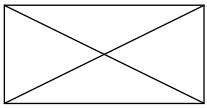
COLOUR CARD

EPR EPOXY PRIMER

RAL 3011
Red Brown

RAL 1014
Buff cream

SURFAPAINT WOOD STAIN



Trasparent

C01

O02

WM03

W04

CH05

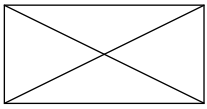
M06

G07

B08

W09

SURFAPAINT WOOD VARNISH - UV BLOCKER



Trasparent

SEAQUEEN ANTIFOULING *EXTREME*

Red Brown | **Blue** | **Black** | **White**

SEAQUEEN ANTIFOULING & SEAQUEEN ANTIFOULING *ULTRA-XT*

Red Brown | **Blue** | **Black**

CGU COOL GLOSSY STAIN RESISTANT PU ENAMEL

RAL 1003
Signal Yellow

RAL 3011
Red Brown

RAL 5005
Signal Blue

RAL 6002
Leaf green

RAL 9010
Pure White

RAL 5008
Grey Blue

RAL 7001
Silver Grey

More colours are available upon request.

NanoPhos

Marine Pioneering Nanotechnology

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