Application of Primers – Good Priming Practice

Interprime 820 and Interprime 880

The paint system on a boat is normally judged by the accuracy of the profile after filling and degree of gloss shown in the finish. However primers are the keys to longevity of the paint system. The following are the key aspects of good priming practice.

Prior to Initial Priming

Check the condition of the metal substrate meets the required standard regarding quality of blasting or grinding. Ensure contamination does not exist and that the surface to be coated is not “gingered” or in the case of aluminium, showing traces of the white corrosion product often evident on exposed alloy surfaces. Note batch numbers of products to be used and conditions at time of application. (Fill in the International Paint Coating Diary as appropriate) Application of epoxy primers in cold or highly humid conditions is not recommended and care should be taken to monitor temperature, relative humidity, and most of all ensure that climatic conditions in conjunction with substrate temperature do not mean that dew point is fast approaching. Condensing moisture has a detrimental effect on the curing and longevity of primer systems.

Control of the initial primer application is important. Certain types of holding primers subsequently de-laminate if applied too thickly. Holding or initial primers are intended to fully coat the blast profile. Failure to achieve this leads to pinhead corrosion before filler application. If the application is to be by airless spray and the applicator is unfamiliar with either the primer or the spray equipment, we recommend that spray trials be carried out. Check the tip size (ideally use reversible tips) and check the wet end to dry end stroke ratio in order to govern output ratio etc. thus ensuring the correct wet film thickness (WFT) is applied. Similar checks would apply to other forms of pressurised spray units.

Interprime 820 thinned 15% is widely used as a holding primer and when applied at recommended DFT of 65 microns is less prone to split tan some other holding primers.

After Initial Priming

It is difficult to get accurate readings of dry film thickness (DFT) off a blast profile so the following approaches should be adopted:

- Calculate the volume of paint for a given area and back-calculate against the actual usage, then giving the WFT applied (allowing for overspray wastage).

- Place steel shims (small pieces of steel) around the vessel, in portholes etc from which thickness readings can be taken. These are removed for measurement and the area beneath touched in by brush.
- Check for bare patches of substrate that may need to be touched up prior to filling stages. This is particularly applicable down the side of welds, inside gangway boxes, window frames etc. Spot prime if necessary.

Prior to Priming after Filling

Whilst long periods will be spent filling and profiling the vessel the true effect of filling is not noticed until the first coat of primer is applied. Many applicators prefer a thin coat of primer over the filler simply to look at the profile since Interprime 820 has a significant sheen and inaccuracies in the profile can be easily seen and corrected. Modern epoxy based fillers have good anti-corrosive properties but this should not detract from the need for thorough priming since the thickness of filler varies considerably and indeed sand through to substrate on some areas of the boat is not uncommon. Note batch numbers to be used on the Coating Diary and note conditions at time of application. Carry out the airless spray or pressure pot checks as noted above.

Interprime 820

Interprime 820 (White YPA828/YPA824 Grey YPA829/YPA824) is a world renowned two-component epoxy primer with inert pigmentation. It is suitable for use on steel and aluminium where it gives excellent anticorrosive protection. It is equally useful on timber and GRP. Whilst possessing a significant sheen the product retains easy sanding properties. Interprime 820 can be used from rail to keel but when used in underwater system a tie coat of Interprotect will be required to ensure antifouling adhesion to the paint system. When used over fillers in topside systems Interprime 820 will normally be over-coated with either Polyurethane Basecoat or Interprime 880 prior to the application of finishing coats.

Interprime 880

Interprime 880 (White YPA884/YPA883 Blue/Grey YPA885/YPA883) is a recent advance in epoxy primer technology thus producing a primer with the capability of curing at a wide range of temperatures. This curing ability makes it an ideal product for M&R situations in warm climates where rapid curing characteristics ensure continuation of working practises, reducing the risk of vessels delaying time on slipways and in dry docks as well as maintaining its characteristics as a product suitable for new buildings.

Interprime 880 offers additional advantages since it gives more typical primer characteristics and is therefore more than an intermediate between primer system and finishing coats, having the ability to perform as an anticorrosive when adjacent to bare metals, typically sand through areas, and can be safely applied over Interfill 830, Interfill 833 and Interfill 835. It can be used as a build coat in maintenance systems where it is normally applied at 225 – 250 microns WFT. The product will also continue to perform as an undercoat prior to finishing for those applicators that have a preference for epoxy undercoats rather than polyurethane based undercoats in superyacht painting systems.

Interprime 880 off white finish primer (also available in blue/grey) has excellent sanding an aspect of the scheme that remains widely used by those preferring epoxy preparation coats prior to finishing. It can be prepared for finishing coats with the very minimum of sanding marks when sanded with 240 grade followed by 320- 400 grade wet or dry paper. Interprime 880 assures excellent gloss hold out and long-term durability of the topcoat.

All of these primers can be applied with a wide variety of spray guns (see spray gun application chart) and are versatile in diverse conditions.

After Priming after Filling

Note the quantity of paint used to allow for calculation of volume vs. area and WFT. Look for any patches of bare metal or holding primer grinning through where the filler has been sanded heavily and make good the thickness.

It is difficult to measure dry film thickness of primer when yachts are filled since the filler thickness often appears as centimetres thick against a target dry thickness of between, say, 125 – 200 microns. Shims placed around the vessel are important guides, which can be removed for measuring purposes. These readings should be compared to the initial WFT readings at the time of application. Once dried or cured it is advised that you:

- **Check** for toughness of the coating and adhesion to the filler using the crosshatch test (knife and tape).
- **Check** for pinholes - further filling may be required if they are present.
- **Check** for orange peel - if excessive, more sanding down is required which will cut down the thickness of the primer, so check the thickness of the system **after** sanding.
- **Check** the overall sheen of the coating - this indicates the smoothness of the application and the accuracy of the profile.
- **Check** for any traces of solvent odour. If present, increase the heat and ventilation. This should remove the final traces of solvent. If not the coating may, in the worst instances of over application, have to be ground off, the substrate dried and the application begun again. If in doubt consult your International Technical Representative.

Examples of Spray Gun Settings for the Application of Interprime 820

Devilbiss JGA Gun with KB2 Remote Pressure Feed Cup

Air cap	AV-4239-777
Fluid tip	AV-650-EX (1.8mm) (Needle Part No JGA-421-DEX)
Air pressure	55 - 60 PSI / 3.7 - 4.0 bar
Pot pressure	10 - 15 PSI / 0.6 - 1.09 bar

DeVilbiss Compact Gun with KB2 Remote Pressure Feed Cup

Air Cap	SP-100-497-K
Fluid Tip	SP-200S-1.8 (Needle Part No SP-300S-18)
Air Pressure	55 - 60 PSI / 3.7 - 4.0 bar
Pot Pressure	10 - 15 PSI / 0.6 - 1.09 bar

Graco & Binks High Pressure Airless Systems

Pump Ratio	32:1 to 66:1
Fluid tip	1560, 1580, 1880, 2180 (2680 can be used but excessive WFT may result)

Pressure	2,500 - 3,000 PSI / 175 - 210 bar

The Following Spray Gun Settings are Suggested for the application of Interprime 880

Binks 2001 Gun with Steadygrip 2 Remote Pressure Feed Cup*

Air cap	63PB
Fluid tip	63B (Needle Part No 563A)
Air Pressure	50 – 60 PSI / 3.5 – 4.0 Bar
Pot Pressure	8 – 12 PSI / 0.55 – 0.85 bar

Binks 95 Gun with Steadygrip 2 Remote Pressure Feed Cup*

Air cap	63PB
Fluid tip	66 (Needle Part No 663A)
Air Pressure	50 – 60 PSI / 3.5 – 4.0 bar
Pot Pressure	8 – 12 PSI / 0.55 – 0.85 bar

Binks Mach 1 HVLP Gun with Steadygrip 2 Remote Pressure Feed Cup*

Air cap	95P
Fluid tip	94 or 95 (Needle Part No 54-4382)
Air Pressure	45 – 55 PSI / 3.0 – 3.6 bar
Pot Pressure	8 – 10 PSI / 0.55 – 0.66 bar

DeVilbiss JGA Gun with KB2 Remote Pressure Feed Cup

Air cap	AV-4239-704
Fluid tip	AV-650-FX (Needle Part No JGA-421-FX)
Air Pressure	30 – 60 PSI /2.1– 4.0 bar
Pot Pressure	8 – 10 PSI / 0.55 – 0.66 bar

DeVilbiss GTI Gun with Pressure Feed Tank

Air Cap	GTI-407-122
Fluid Tip	GTI-213-11 (Needle Part No GTI-499-10)
Air Pressure	50 – 60 PSI / 3.5 – 4.0 bar
Pot Pressure	30 – 45 PSI / 2.0 – 3.0 bar

DeVilbiss GFG Gravity Feed Gun

Air Cap	AV-4239-30
Fluid Tip	AV-645-EX (1.8mm) (Needle Part No JGA-421-DEX)
Air Pressure	50 – 60 PSI / 3.4 – 4.0 bar

DeVilbiss GTI Gravity Feed gun

Air Cap	GTI-407-110
Fluid Tip	GTI-214-20 (Needle Part No GTI-420)
Air Pressure	45 – 55 PSI / 3.0 – 3.7 bar

DeVilbiss Compact Gun with Pressure Feed Tank

Air Cap	SP-100-513
Fluid Tip	SP-200S-1.8 (Needle Part No SP-300S-18)
Air Pressure	50 – 60 PSI / 3.4 – 4.0 bar
Pot Pressure	30 – 45 PSI / 2.0 – 3.0 bar

DeVilbiss Compact Gravity Feed Gun

Air Cap	SP-100-510
Fluid Tip	SP-200S-2.0 (Needle Part No SP-300S-20)
Air Pressure	45 – 55 PSI / 3.0 – 3.7 bar

Notes:

** These guns are available only in the USA.*

Air Regulator and Pressure tank pressures will vary depending upon hose length and diameter between gun and Fluid source.

Interprime 880 can also be airless sprayed. It is recommended that a 1565 or 1580 tip is used with an output pressure of between 2,400 – 3,000 PSI (165 – 210 bar).
If the spray gun model you currently use is not mentioned in this section, consult your International Paint Professional Market Contact.

Alternative primers/primer surfacers to the Interprime range

There are three well-established products for applicators who desire alternatives to the Interprime range:

- **International Epoxy GP Coating (IPB110 series/IPB112)**
- **International Midcoat Flat HS (IPE200 series/IPE201)**
- **Interior Primer 860**

Each product has a key role to play in alternative specifications to those used in the Interprime range.

International GP Primer

International Epoxy GP Coating (IPB110 series /IPB112) is a universally applicable epoxy based coating primarily formulated for airless spray and pressure pot application although brush/roller application may be applicable in some circumstances. Its primary use is that of a primer on pre-treated steel, aluminium, GRP and dimensionally stables plywood and can be used both above and below the water line. As with all two-component products the components need to be thoroughly mixed in the correct ratio to obtain a homogeneous product.
If the paint is a little thick the viscosity can be reduced with a small addition of epoxy solvent prior to application. International GP Primer has a long pot-life but it is advised that the product datasheet be consulted.

It is normal to apply two coats, which in the case of steel should be to a surface from which rust has been removed (St 3) or that has been grit blasted to Sa 2½. The primer can be used between temperatures of 10°C - 40°C in conditions where the humidity does not exceed 80%. Good ventilation is required for adequate cure to be obtained.

If steel has been treated with a shop/prefabrication primer it is essential that the shop primer be compatible with International Epoxy GP Coating. If in doubt consult your local Technical Representative. It is also essential to ensure that the surface is devoid of grease and dirt and that weld spatter, burn marks etc are treated before application. Likewise for application to aluminium the surface should be free of flushing oil, either blasted with aluminium oxide grit or some other alternative inert blasting abrasive or coarse sanded with P24 – P80 grade aluminium oxide paper. Also if applying to dimensionally stable marine plywood the surface should be sanded with P150 – P180 grade and the sanding debris removed prior to application.

International Midcoat Flat HS

International Midcoat Flat HS (IPE200 series/IPE201) is a two-component polyurethane based primer/surfacer that has very good pore filling properties and excellent sanding characteristics. Versatile and suitable for most substrates it can be used above and below water within the paint system. The satin appearance once cured is an ideal indicator for minor imperfections in the system. Versatile in application, the product can be conventionally sprayed or brush/roller applied – see product datasheet for full application advice and pot-life data. International Midcoat Flat HS should be applied in well-ventilated conditions between temperatures of 10°C - 30°C with relative humidity not exceeding 80%.

Painting Tanks and other Confined Spaces

The previous section described the sort of activity appropriate to external surfaces, or, in the case of straight priming, those activities appropriate to the vastness of interiors. Painting tanks and other confined spaces in superyachts needs different considerations, which the following section describes. International have available a wide range of products suitable for tank coatings and specialist-coating materials for confined spaces. The Interline, Intergard, Intertuf and Intershield ranges are known and proven the world over.

Tanks Condition – New Building

Prior to the commencement of blasting it is essential that the tanks be clean, dry, and in a condition suitable for surface preparation and the application of the specified tank coatings. The following briefly out lines the minimum requirements:

- All grease and oil must be removed from all surfaces
- All hot work in way of tanks should be complete.
- Heating coils (if to be fitted as many superyacht yachts don't have heated tanks) should be installed.
- After final tank testing, tanks should be fresh water washed and dried especially if they have been in contact with seawater during the tank testing procedure.
- Defective steelwork, prior to the contract commencement should be repaired prior to painting.

In addition, welding using a basic consumable can result in alkaline deposits around the weld seam. These deposits could have a detrimental effect on the performance of the applied coating. Therefore, although the weld seam will be grit blasted, prior to blasting it is recommended that the pH (alkalinity/acidity reading) around the weld seam be checked. A simple check is to soak a pH paper with distilled water and pressing it on the surface, within 8 centimetres of the weld seam, for 30 seconds. If the pH is 9 or greater, it is recommended that the area is fresh water washed prior to grit blasting.

Ventilation

During the blasting operation, ventilation is necessary to allow adequate visibility. Flexible ventilation trunking should be used to allow the point of extraction to be reasonably close to the blasting operator. The ventilation system should be so placed that "dead spaces" do not exist.

Ventilation must be maintained during application and continue whilst solvent is released from the paint film during drying. The ventilation system must prevent the vapour concentration exceeding 10% of the lower explosive limit (LEL) or less if required by local regulations. For solvent containing coatings it is recommended that during the drying period 10 air changes per hour be maintained. This should be maintained for at least 48 hrs after the application of the paint system. However during application, to minimise possible dry spray, a lower level of ventilation may be maintained. Under certain circumstance this can be as low as 2 air changes per hour.

Air changes and paint application rate should be balanced to ensure that the solvent vapour content is below the 10% Lower Explosion Limit. Equipment must be electrically safe during the operation and it is essential that it does not re-introduce dust, solvent vapour etc into the tanks. For this reason, a positive pressure above normal atmospheric pressure should be maintained inside the tank or confined space.

Dehumidification

Humidity can be a major problem. Dehumidification equipment, when required, must be of adequate capacity to maintain the condition of the blasted steelwork to the required standard. Additionally, in order to prevent condensation, the steel temperature should always be at least 3°C above the dew point. Coatings may be applied to surfaces that have been maintained in a dry condition with the steel temperatures at least 3°C above the dew point for more than 1 hour. The surface must be visibly dry and clean at the time of application. This condition must be maintained until the coating is cured. Coating tanks and confined spaces must only be under taken in acceptable atmospheric conditions otherwise adverse effects may occur.

As a guide relative humidity (RH) levels of 40 – 60% give optimum results although for most materials, application may be carried out between 25 – 85% relative humidity.

Heating and Lighting

If heating is necessary it should be by means of a heat exchange system e.g. air admitted to the tank should not pass directly through a combustion chamber. Temperatures should be maintained for the duration of the contract from application to cure and provision should be made for 24-hour surveillance of equipment.

Lighting during the blasting and painting must be electrically safe and provide suitable illumination for all work. As a guide, lighting may be considered suitable if standard text can be read at a distance of 30 centimetres from the eye. Ideally the lighting should be powerful mains supplied spotlight with background lighting on at all times in the interests of safety.

Maintenance and Repair of Previously Painted Tanks

Unlike commercial vessels the tanks of large yachts do not carry complex chemical compositions are essentially storage for fuel and lubricants, potable water, grey water and sewage. Hence they generally run for long period without major maintenance or indeed any maintenance at all. However at some stage in their life tanks will have to be maintained.

Prior to the commencement of re-blasting it is essential that the tanks are clean and dry and must be suitable for further preparation and coating application. The following briefly out lines the minimum requirements:

- Tanks must be cleaned, and in the case of fuel tanks, gas free.
- Any blisters present must be burst and the blister caps removed from the surface.
- Heavy scale must be removed from all surfaces.
- Scale, debris and other residues (oil, grease etc) must be removed from the tanks.
- All hot work in the way of tanks should be complete.
- All tanks should be fresh water washed.
- Any areas of steel renewal should be suitably prepared.

International Paint has a wide range of primers available, too many to mention in this publication. Should you require further information regarding primer availability to meet your specific requirements consult you local International Paint Technical Representative.