

CopyPhot

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Instructions for use

INTRODUCTION

Thank you for choosing anodised aluminium base sheets from Polychromal Products.

These instructions for use explain the method used to produce, for example, text, name and front sheets using CopyPhot plus the associated screen-print pastes, inks and chemicals. CopyPhot is ideal for photomechanical printing. With careful use, our complete range of high-quality products guarantees top-quality end results.

GENERAL TERMS AND DEFINITIONS

Anodising

Anodising is an electrolytic process where the surface of ordinary aluminium is converted into aluminium oxide, resulting in the formation of a transparent porous layer on the surface. All or just part of this layer can be coloured and then sealed to form a ceramic layer.

Anodised layer

The transparent porous layer on the surface of the aluminium is the anodised layer. An anodised layer which has been properly anodised and sealed is twenty times more wear-resistant than a good epoxy coating. It is ideal as far as adhesion is concerned as the anodised layer is formed from the aluminium itself. The anodised layer grows from the aluminium underneath as it were.

Absorption

The capacity for dyes and chemicals to be absorbed into the base material through its porous structure.

Quality of the anodised layer

The anodised, but still unsealed, anodised layer has a porous structure which gives it a high capacity for absorption and makes it possible for dyes to penetrate. However, this capacity disappears very quickly. The aluminium oxide reacts with moisture and forms aluminium hydroxide as a result of which the capacity for absorption is reduced. However, it is possible to carry out anodising in such a way that pores with a larger diameter are formed so that the absorption capacity may be preserved longer. This does, however, affect the quality of the anodised layer.

Shelf life

Polychromal BV has developed a method for impregnating the pores and protecting them against external influences. Solvents containing dyes penetrate deep into the pores through this protection. This has made it possible for anodised, unsealed aluminium sheets to be coloured even years after they were anodised by means of screen printing, photomechanical processing or inkjet printing. Years later, any graphic image can still be reproduced in intense colours in an anodised layer without any concessions on quality.

Colouring

Dyes can be adsorbed in the anodised layer in different ways. The whole sheet can be given an intense colour by immersing an anodised aluminium sheet in a bath filled with pigment, for example. The dyes that are used for this are dissolved in water or in solvents. Other methods include screen printing, photomechanical printing and inkjet printing. These are also the principal techniques for applying multiple colours in the anodised layer according to a specific pattern.

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Dyes which are soluble in solvents are the most suitable for screen printing, inkjet printing or the photomechanical application of colours. They quickly penetrate deep into the pores and most are to a great extent lightfast. The choice of solvent and screen-print paste containing the dyes is very important in order to ensure good results. The molecules of pigment should always be smaller than the pores in the anodised layer otherwise the anodised layer will not be able to adsorb them. Pores in an anodised layer have an average diameter of 0.075 microns. As all pure white dyes are bigger than these pores, the anodised layer cannot be coloured white. Colour combinations with white, such as pink, are not possible either.

■ Sealing

Sealing is a process where the aluminium oxide in the anodised layer is converted into aluminium hydroxide by immersing it in water at 97 °C for 45 minutes. Because the aluminium hydroxide molecules are bigger than the aluminium oxide molecules, the pores are sealed off. As a result, the applied dyes which represent a reproduced text or image are enclosed in the anodised layer where they are no longer accessible to solvents or other chemicals unless the anodised layer itself is affected. Sealing does not improve the hardness of the anodised layer. However, the quality of sealing has a considerable influence on the colourfastness of the colours.

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PHOTOMECHANICAL PRINTING COPYPHOT

Materials

Not only CopyPhot base sheets can be used for photomechanical processing but also DuraSeal sheets which are coated with a photosensitive emulsion (CopyLon) for this application..

CopyColour printing inks can be used to apply intense, colourfast colours into the material before it is sealed and cleaned.

Single-colour photocopying

EXPOSURE

Use a UV light exposure frame with vacuum pump in order to ensure good contact between the sheet and film. An exposure frame with UV fluorescent tubes can be used for fine texts provided that the emulsion side of the film is unreadable. A vacuum light exposure frame with point light (metal halogen) should be used for halftones and very fine lines. Lithographic films ensure that an exact copy is made in the CopyPhot sheet.

EXPOSURE TIMES

If using a fluorescent light exposure frame, approximately two to three minutes; if using a 5000-watt metal halogen lamp, approximately 50 units with the lamp at a distance of 1 metre.

FILMS

Films should be highly transparent in the blank sections (no haze) and cover black or filter UV sufficiently (e.g. diazo) in the images.

DEVELOPING

Rinse by using a shower (cold water) until the aluminium surface appears. This will take one to two minutes. Let all surplus water run off.

DRYING

Dab off surplus water (do not rub) using absorbent paper, e.g. unprinted newspaper, and then dry with a hairdryer or in a drying cabinet.

COVERING

Before colouring, check the emulsion and cover any gaps or pinholes with CopyPhot Retouching Lacquer or with CopyLon without sensitizer. Texts already coloured can also be covered so that other texts on the sheet can be coloured with a different colour. Do not apply too thickly!

COLOURING

Place the sheet on a clean surface. Have Handy Pads and cellulose paper (rubbing cloths) to hand; choose the right CopyColour. Then apply sufficient CopyColour to the Handy Pad. Spread the CopyColour over the surface for approximately one minute. Add CopyColour if the Handypad does not move smoothly over the surface; CopyColour can also be poured onto the sheet. Make sure that the CopyColour cannot dry on during colouring. Remove as much of the surplus CopyColour on the exposed areas as possible using cellulose paper or rubbing cloths. Repeat these steps if required using a new CopyPhot Handypad and clean cellulose paper.

RUBBING OUT

Vigorously rub dry from left to right (as if you were waxing a car) using cellulose paper. Inspect the result. If the colour has not taken: develop, dry and colour the CopyPhot sheet again. If the result is still unsatisfactory: check the covering of the film, check the vacuum and check to make sure that the sheet was not pre-exposed (protect against daylight). During the first colouring procedure, an intermediate layer between the aluminium surface and the photosensitive emulsion dissolves and is removed during rubbing out. That is why it is important to repeat this a number of times.

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STRIPPING THE PHOTOGRAPHIC EMULSION

Rinse the coloured sheet thoroughly with water. Pour CopyStrip over the CopyPhot sheet and spread it over the surface using a stripping tampon or a soft brush. After removing the exposed photo emulsion, rinse again thoroughly with water.

Multi-colour photocopying

You can print multi-coloured images by colouring the CopyPhot sheet in sections. This can only be done if there is sufficient space between the texts or images.

You can colour small sections using a brush and then rub them out or dab them off.

You can colour large sections using a CopyPhot Handypad. The coloured zones can be covered with CopyPhot

Retouching Lacquer or CopyLon without sensitizer. The remaining exposed zones can then be coloured with another colour without disturbing the image already coloured.

After stripping, the multi-coloured image will appear.

The stripped sheets can also be made photo-sensitive again using CopyLon photo emulsion. CopyLon photo emulsion can be applied using a coating bar or Foduktor (roller coater). Once the emulsion is dry, the sheet can be exposed using a new film.

Sealing

Sealing is extremely important. Suspend the printed sheet in water at a minimum temperature of 97 °C and move the sheet back and forth for 1 to 2 minutes. After ten minutes, the surface is sealed and the image is no longer accessible to solvents. For colourfast results: 45 minutes at a constant temperature of 97-100 °C.

Sealing is a chemical process. Aluminium oxide binds with water molecules (hydration) and is then converted into aluminium hydroxide. The walls of the pores grow as it were and seal in the image. This process only works properly at temperatures above 97 °C and in water with a pH value of between 5.5 and 6.3. Other values can result in the 'bleeding' of the pigment. Therefore check the pH value of the sealing water regularly:

- pH < 5.5 : correct value by using sodium carbonate.
- pH > 6.3 : correct value by using acetic acid.

Placing large quantities of sheets in the sealing tank can cause the pH value of the sealing bath to increase considerably. In addition, the temperature will drop if a large quantity of sheets are immersed in the bath at the same time. The risk of 'bleeding' is highest at this time. It is recommended for the sheets to be moved around during the first minute of the sealing process. The contents of the bath can also be agitated using a circulation system. Compressed air is not suitable for use as it causes too much movement. You can also overheat the bath as the boiling will cause sufficient movement in the bath.

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Cleaning

After sealing, clean the sheets using CopyClean. If there are still any spots on the surface after cleaning, then these are to be removed using household abrasive cleaner and water. Metal polishes such as Brasso can also be used. Liquid paraffin is an excellent after-care agent. To maintain anodised aluminium: periodically remove dirt, wash and then rub in a small amount of liquid paraffin.

100% CopyClean consists of:

1-Methoxy-2-Propanol (CAS no. 107-98-2)

Other names:

Propylene glycol monomethyl ether (PGME)

Trade names:

Methylproxitol (Shell) and Dowanol PM (Dow)

Applying photo emulsion using the coating bar

The coating bar is to be used during multi-colour printing for applying by hand a new coating of photo emulsion which is required if there is not enough space between the texts or images to be coloured. Place the CopyPhot sheet on a clean and above all flat surface. Pour CopyLon onto one side of the sheet about 1 cm from the edge. Place the coating bar on the sheet using both hands, apply even pressure and pull - without rolling - the CopyLon emulsion across the sheet. Now dry the sheet using hot air (no hotter than 40 °C). If the result is not satisfactory, then strip the CopyPhot sheet, dry thoroughly and apply another coating.

Clean the coating bar thoroughly after each use using CopyStrip and a brush. Make sure that you rinse it again thoroughly! Then expose using the next film. Copy only new colours onto blank sections. The coating bar is very easy to use. It is also a very reliable method for widths of up to 65 cm.

Applying photo emulsion using the Foduktor

The Foduktor is designed to be used for the standard application of a new coating of photo emulsion to CopyPhot sheets or for applying CopyLon photo emulsion to DuraSeal sheets. The benefits of the Foduktor include a short start-up time, it is easy to clean, emulsion is applied extremely evenly and it is perfect for full-colour printing using very fine halftones.

Making up CopyLon

PROCESSING USING THE COATING BAR

Fill the brown bottle of sensitizer half full of water. Shake well and then pour into the CopyLon photo emulsion. Once more fill the brown bottle half full and pour out again. Stir well until the emulsion is homogeneous and light green in colour. The correct ratio is 2.5 g of sensitizer for 0.5 kg of CopyLon. Sensitised CopyLon can be kept for three weeks. It can be kept in the fridge for 3 to 5 weeks.

PROCESSING USING THE FODUKTOR

Fill the brown bottle of sensitizer half full of water. Shake well and then pour into the CopyLon photo emulsion. Add an additional 300 cc of water to the product and shake well again. Stir well until the emulsion is homogeneous and light green in colour. The correct ratio is 2.5 g of sensitizer for 0.5 kg of CopyLon. Sensitised CopyLon can be kept for three weeks. It can be kept in the fridge for 3 to 5 weeks.

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■ **Mechanical processing: cutting, sawing, punching and milling**

CopyPhot sheets can be cut without the risk of mayor hair cracks forming.
However, the cutting clearance should be set for the correct thickness:

- clearance for sheets from 0.25 through 1.50 mm = 0.15 mm
- clearance for sheets from 1.50 through 3.00 mm = 0.25 mm

Cutters and punching tools are to be well-sharpened. Strippers are to be set so that they closely surround the punches. As soon as the material is slightly bent, hair cracks will occur the anodised layer..

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