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**WHAT ARE PHOTOPOLYMER PLATES?**

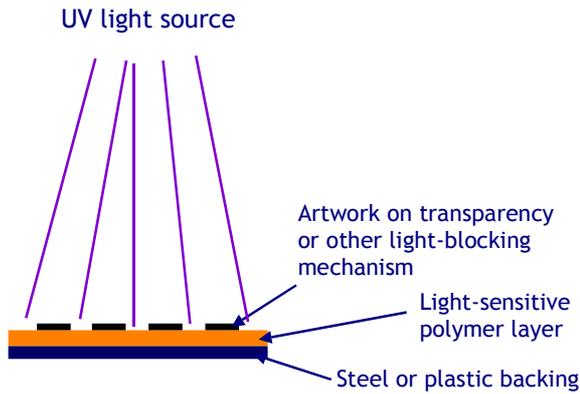


Photopolymer plates, which are also known as solar plates, are used for flexographic printing and by artist printmakers. Now that water-wash plates are available, plates can be made at home as no harmful or dangerous chemicals are used and the equipment required is easy to find and is inexpensive.

The plates are available on steel or plastic backing material and in different thicknesses. This makes them suitable for a number of processes such as Keum Boo, enamelling and general textures and designs.

Each plate is made up of 3 layers:

1. A steel or plastic backing plate.
2. A gel-like light-sensitive polymer layer that will form the impression. When this layer is exposed to ultraviolet (UV) light, this layer hardens except in places where the UV light has been blocked.
3. A protective cover film which is removed before the plate has artwork applied and the plate is exposed.



Artwork on a transparent medium such as overhead transparencies or light-blocking objects are placed on the light-sensitive polymer layer and the plate is exposed to UV light. The opaque areas block the light, while those that are exposed harden.



The artwork is removed and the plate scrubbed in tepid water. This removes the unexposed polymer, which is still soft, and the remaining, hardened polymer forms the mould or texture

## **MAKING THE ARTWORK**

The main requirement of artwork to be used in preparing photopolymer plates is that it must be a strong black-and-white image (no colours, no greys, no shading) with lines no thinner than 1 pt (0.5mm/0.02").

## **OPTIONS**

There are two important points to note regarding the preparation of artwork:

1. Black areas will be removed from the photopolymer plate, meaning that they will be raised on the metal clay impression.
2. Keep text the right way round - the ink side of the print will be placed face down on the photopolymer plate, giving the necessary reversal.

## **DRAWING**

If you can draw, you can use pen and black ink for your designs - this is called 'line art' by artists. Alternatively, a design done in pencil can be photocopied to give a high-contrast copy.

## **SCANNER**

Use a scanner to scan a drawing, handprint, text, footprint etc. in high-resolution (300dpi) black-and-white. Use a graphics editor to reduce, crop or otherwise edit the image to your requirements.

## **COMPUTER ART**

Create your artwork with drawing software such as DrawPlus, PagePlus or CorelDraw.

## **FOUND IMAGES**

These can be anything from children's drawings, photographs, copyright-free art, stencils - the list goes on. Suitable results can be achieved by adjusting scanner and/or copier settings or graphics software.

## **CREATING THE TRANSPARENCY**

### **TRANSFERRING ARTWORK**

Once you have your black-and-white artwork it must be transferred to an overhead projector (OHP) transparency. This can be done at a copy centre, asking them to make a high-quality copy onto OHP film. You can also print the OHP film on your own computer, using either a laser or an inkjet computer. Make sure you buy the correct type of OHP film for your printer, and take care to print on the correct side of the film.

On inkjet printers use the highest quality print you can.

Once it is printed, check that the black areas are solid with no visible pinmarks. You can check this by holding the transparency up to the light.

### **CREATING ARTWORK DIRECTLY ON THE TRANSPARENCY**

You can use markers and pens specially formulated for use on OHP film to create your artwork directly onto the transparency. As always, make sure that the markers are very black and the lines sharp, with no faint areas or pinmarks.

## **TOOLS AND EQUIPMENT**

### **LIGHT SOURCES**

Any source of ultraviolet light can be used to expose a photopolymer plate.

#### **SUNSHINE**

This can be sunshine (this is where the name 'solar plates' comes from) but the variability in strength of the UV from the Sun, depending of the time of year, time of day and latitude of the location, make this an unreliable option. If this is your chosen light source, it is imperative that you make a test strip (see below) first.

#### **HALOGEN LAMP**

A 50-watt halogen lamp produces a reasonable level of UV light.

However, they get quite hot and too much heat will harden a photopolymer plate, even beneath black areas of artwork. Exposures are timed in minutes rather than seconds.



#### **UV FLUORESCENT TUBES**

These are the best source of UV light as they give off little heat and have a strong UV signature.

Although you can buy purpose-designed UV light boxes they are usually very expensive.

UV fluorescent tubes can be purchased from lighting shops and disco/club suppliers, together with lampholders. They need to be mounted into a lampholder (some of which take multiple tubes) and they must be set up in such a way that you can repeat the setup every time, unless you want to make test strips every time you want to make a plate.



Many metal clay artists have found the UV lights used by nail technicians to cure UV nail gels more than adequate for the purpose. The 36-watt 'tunnel' type lights are the best choice, as they use 4 replaceable lamps, are compact and can be used to expose quite large images. They have the additional advantage that if one or two of the bulbs fail and you have no replacements the lamp can still be used although longer exposure times would be needed.

### **CUTTING THE PLATES**

Photopolymer plates are not cheap so use as small a piece as you can. They are supplied in various sizes, the commonest from metal clay suppliers being A6. This is large enough to make up to 6 medium size plates.

Plastic-backed plates can be cut with strong household scissors. The plastic-backed plates available from PAJED can be cut with an office-quality paper-trimmer.

Metal-backed plates can be cut with metal shears, or by pulling a sharp blade repeatedly through the metal backing until the plate snaps. The latter is hard work, but is a viable option.

### **TIMER**

You will need a timer or stopwatch that records seconds as well as minutes to time the exposure.

**EXPOSURE FRAME**



The exposure frame is made up of a piece of thin board (hardboard, thin plywood etc), a piece of bubble-wrap or thin foam rubber the same size for equalising pressure, a piece of thick paper or thin card to cover the foam or bubble-wrap and a sheet of glass the same size as the backing board. 4 sprung clips are used to hold these components together.

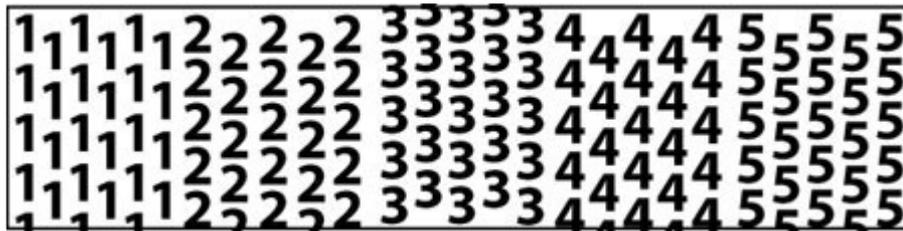
The numbered lines shown in the picture are useful for making test strips.

**MAKING A TEST STRIP TO DETERMINE EXPOSURE TIME**

Photopolymer plates can be handled safely in any non-UV light. Ordinary fluorescent tubes and low-energy light bulbs are safe. The plates must be kept out of sunlight and away from UV light sources until they have been exposed.

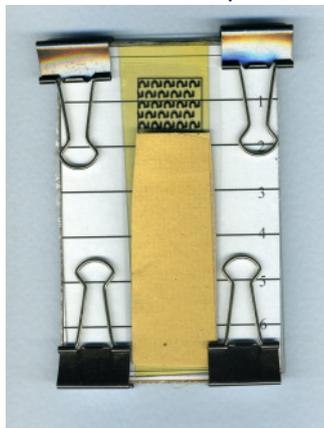
The exposure times mentioned below are a guide only. It may be necessary to do 2 or 3 test strips to determine the optimum exposure time for your light source. The times given are for 36-watt UV tubes. For a 9-watt UV tube use increments of 20 seconds, and for a 50-watt halogen lamp use 1 minute increments.

Every time you use a new type of plate or a new light source you must make a new test strip.

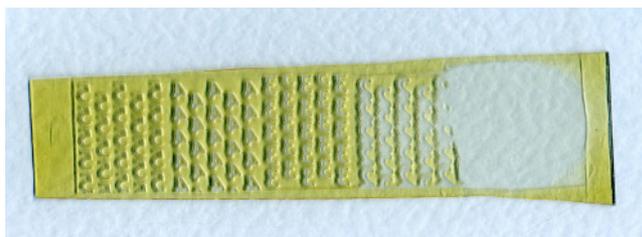


Test strip designed by Maggie Bergman

1. Cut a strip from a plate to the size of your test strip. Remove the cover film from the plate and position the test strip artwork on the plate with the printed side touching the plate. Position the plate in the centre of the exposure frame, cover with the glass sheet and position the sprung clips so they keep away from the design itself.
2. Cover the plate with some heavy card for all of its length except the number 5's on the artwork.



3. Set the timer for 10 seconds, switch on your UV light source and expose for that length of time.
4. Switch off the light, reset the timer for another 10 seconds, move the cardboard to the number 4's and expose again. Keep on doing this until the whole strip has been exposed. The very last exposure will have only received 10 seconds of light, the next 20 seconds etc.
5. Remove the exposed plate from the frame and use lukewarm water and a natural bristle brush to wash out the plate. Use a circular motion and continue for 2-3 minutes until all the soft polymer has been removed.
6. The correct exposure time is indicated by those numbers which are sharp and clear on the washed-out plate after the shortest time.



exposure and are clear and sharp. The correct exposure time for *this type of plate with this light source* is therefore 30 seconds.

7. This test strip, made from plastic-backed plate, was exposed in 10 second increments. The 1's were exposed for only 10 seconds, the polymer did not harden at all and the soft polymer washed out completely. The 2's had 20 seconds exposure and have partly washed out, while the 3's had 30 seconds

If you don't want to use artwork for a test strip use the numbers on the exposure frame sheet to determine where to place the cardboard on each exposure.

### **TROUBLESHOOTING TEST STRIPS**

1. If the washed out line looks wider than it should too much has washed away; this means the plate is under exposed and longer exposure time is needed (as in the 2's in the picture above).
2. No image or a shallow image after washing out; the image is over exposed. This can happen because:
  - The exposure was too long. - cut down the exposure time
  - Transparency not solid black - double it up if transparency is not solid black (check by looking through to light)
  - Plate was left out in UV light rendering the plate fully exposed - keep unexposed plates wrapped up in light tight material, such as black plastic, especially near UV light.

## MAKING THE PLATE

1. Prepare the artwork on OHP film. This artwork is for a piece that will be enamelled using the *bas taille* technique.
2. Cut the Photopolymer plate to the required size.
3. Remove the cover film from the plate surface. As the cover film might contain small amounts of polymer residue it should be discarded.
4. Place the OH transparency artwork on the plate, ink side down, and into the exposure frame, clamping it securely with sprung clips. Expose the plate, using the time determined from the test strip exposure.
5. Wash out the plate in barely warm water (if the water is too hot the plate could harden), gently scrubbing with a natural bristle brush in a circular motion.

For shallow textures, such as those used for Keum Boo, only remove the unexposed polymer to the required depth. Very shallow washouts can be done with a natural sponge.

For a deep washout continue brushing until the base material is exposed. You should be able to see or feel any unexposed polymer.

6. Remove excess water off the plate with paper towel, a natural sponge or chamois (anything that is lint-free) and let the plate dry completely. This can be done by standing the plate on its edge about 30cm in front of a fan heater set on medium for about 5 minutes, or with a hairdryer. The plate should feel totally dry with no stickiness.
7. Expose the plate again for the same length of time as the initial exposure. This will harden the plate all the way through. Brush a little vegetable oil over the whole plate to stop it from drying out and cracking.
8. Store finished plates in a plastic bag to exclude moisture.



## USING THE PLATE

To use a photopolymer plate with metal clay, brush the plate with olive oil. If the plate has very fine or deep detail, the clay may be easier to release from the plate if the clay surface is very lightly smeared with oil on the rolled out clay.

Photopolymer plates can also be used with polymer clay by using talcum powder or cornflour as a release.

## TROUBLESHOOTING THE PLATE

1. If there is a lack of detail in the image the contact between the OHP transparency and the plate was not tight enough. Using an exposure frame to keep the film tight on the plate during exposure will prevent this problem.
2. If the polymer layer is cracking or lifting off the plate has been exposed to too much heat. This can happen:
  - at exposure, in which case raise the light and keep exposure time as short as possible under a hot lamp.
  - when washing out if the water is too hot, in which case use cooler water
  - when drying after wash-out, in which case keep the dryer on medium or low