



Pad Print Machinery *of* Vermont



Polymer Plate Development Procedures

(800) 272-7764 or (802) 362-0844
www.padprintmachinery.com

Introduction

Understanding Plate Making

Polymer plates consist of a photosensitive material which changes its chemical composition when exposed to ultraviolet light. This reaction is called **“polymerization”**.

Using a film positive, the image is etched into the plate by preventing the image area from being exposed to ultra-violet light.

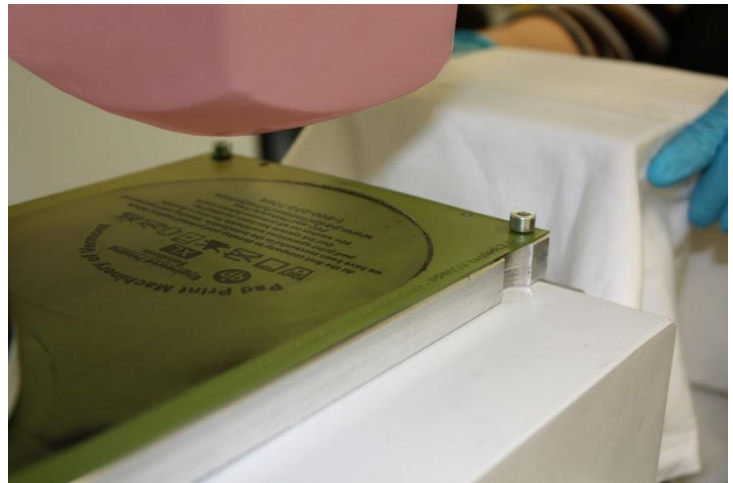
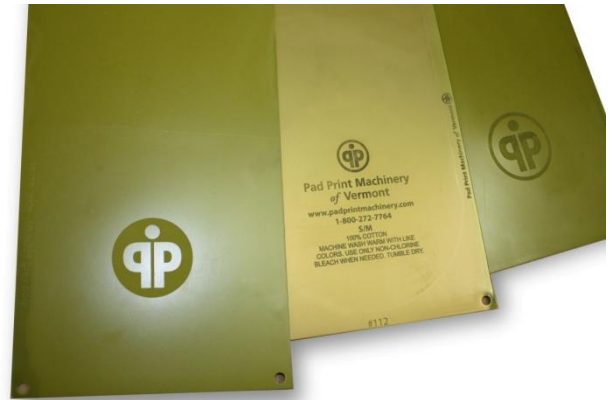
To control the etch depth, a second exposure with a screen is necessary. The screen allows a specific amount of ultraviolet light to pass, regulating the depth of the image area.

The plate is then soaked and brushed using an alcohol or water solution. To remove excess liquid out of the plate and ensure complete polymerization, the plate is dried and re-exposed to harden.

Polymer plates are fast, economical and best used for quick change over from one job to the next.

Plates have a shelf life of about one-year if stored in a black bag in an environment with low humidity.

The work space used for plate making must be out of direct sun as it contains ultraviolet light which could adversely affect the pre-exposed polymer surface. Using yellow safe lights or ultraviolet protective screens within your light fixtures are beneficial.



Equipment available for plate making from Pad Print Machinery of Vermont

- Exposure Units
 1. Portable suitcase units featuring ultraviolet lights and vacuum system.
 2. Stand-alone units can cure, develop and bake all in one unit. Units feature ultraviolet lights and vacuum system.
- Polymer Plate Material (*alcohol and water wash*)
- Laser film
- Depth Control Screen (90%/120 or 90%/80 lines per cm)
- Alcohol Developing Solution
- Photo Exposure Kit
For Portable Exposure Units
Includes:
 - 12 Quart Tray with lid
 - Quart of Developer
 - Magnetic sheet fixed to tray
 - Scrub Brush
 - 90%/120 or 90%/80 Line Screen
 - (5 Sheets) LF11 Laser film
 - Package of miscellaneous scrap plate material for testing



**Portable Unit
BR35M**



BR50SV

BR70SV

Stand-alone Units

Artwork Requirements

Artwork can be produced by Pad Print Machinery Graphics Department or be customer supplied.

Acceptable forms of artwork:

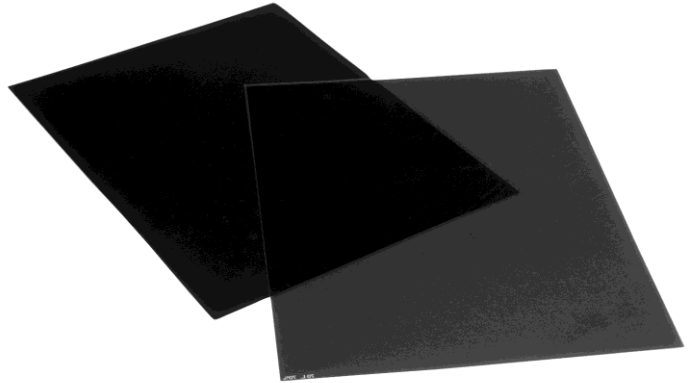
Camera ready: Camera ready artwork is any professional black and white rendering of your logo or copy. Photocopies or faxes are generally not acceptable. If a photocopy or fax is sent, the copy will have to be scanned and cleaned up resulting in additional artwork charges.

Email or disk: Please call our Graphics Department for exact information required.

Supplied **film positives** must be right reading, emulsion side down. The film density must be high. If the film density is low ultraviolet light will pass through and cause unwanted polymerization.

Screening Process

Except for single-exposure plate material - ***all plates should be screened.*** Using a screen yields a high ink transfer and maximum tonal range.



The screen ruling depends on the printing parameters: kind of image, colors, material, required cell depth, etc. A screen (90%/120 or 90%/80 lines per cm) allows a controlled amount of light through the clear holes of the screen and will “cure or harden” the image area that was previously protected from the UV light. Generally speaking, the finer the ruling, the better the optical resolution of fine lines and type.

To avoid faulty exposure, protect the screen from mechanical damage and entrapped dirt particles during the process.

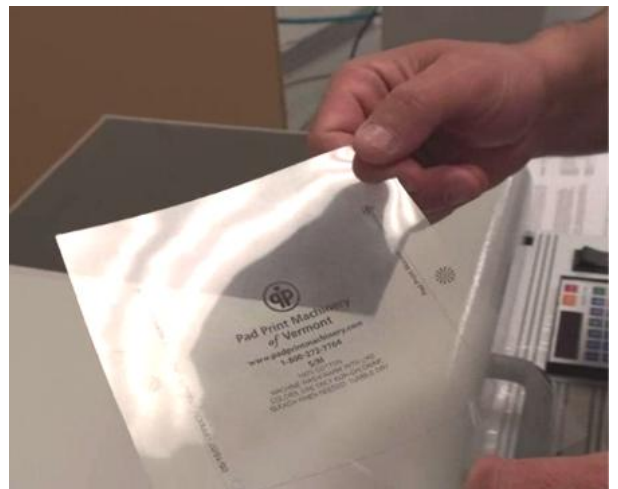
Film Positive Preparation

Inspect film for errors

NOTE: Black text or image on the film positive blocks the UV light during exposure. When exposed all clear areas on the polymer material will harden and the black areas (not exposed) will be etched in the plate after developing.

Place photopositive on the light table, **emulsion-side down** (right reading).

NOTE: Check film positive by scratching with a razor on the right reading side. If the emulsion scratches off, the emulsion needs to be changed and the image needs to be printed as a mirror image.



- ▶ Touch up holes within the artwork with a *Sharpie* permanent marker or opaque paint with a fine paintbrush if necessary.
 - To test opacity of the film positive, create a square outside the image area. Print film and hold up to a fluorescent bulb, if the bulb is clearly visible through the black square, the emulsion is too light and not acceptable to use.
- ▶ Turn **emulsion-side up** and clean dust and/or imperfections from around the artwork with needle or razor (*remove all black markings not wanted on the final product*)

Exposing the plate

NOTE: All Exposure Units, based upon bulb power, bulb spacing, bulb age, bulb distance from the exposure surface, vacuum blanket type or cleanliness, film material and many other factors will determine exposure time.

We recommend that you start by making test plates to determine the appropriate first and second exposure times. *It is also important to re-test for each new batch of plate material.*

Use scrap plates to test and begin with:

- 1st exposure time at 60 seconds with film positive emulsion side down
 - 2nd exposure time at 150 seconds using line screen
 - Wash for 35 seconds
 - Bake in oven for 15 minutes
 - UV Post exposure for 15 minutes
- ▶ If you notice the *area outside of the image is washed away or appears pitted*, that indicates your 1st exposure time is **too low** and you need to work your way up in increments of 5 seconds.
- ▶ If however you notice that you are *losing detail or fine lines* your 1st exposure time is **too high** and you need to decrease in increment of 5 seconds.
- ▶ If the etched depth is **too shallow**, the 2nd exposure time is **too high**:

A **high second exposure** yields a **shallow** etch depth. Ultraviolet light shines through the screen. As the time increases, the light **“expands”** and begins to undercut each dot, broadening the cell structure. This allows for less of the polymer to wash away.

A fingernail should catch nicely when dragged gently across the etched area.

- ▶ If the etched area is **too deep**, the 2nd exposure time is **too low**.

A **low second exposure** yields a **deep** etch depth. Ultraviolet light shines through the screen straight down, curing the area around each dot.

If the **exposure time is too low**, the dot pattern will almost disappear. A plate with a large etched image will allow scooping.



Never rely on using times that are given, these are only guidelines. Once you have established the exposure times, stick to it, but realize there are other factors in plate making that could change the equation. ***If you know how it works – you will know how to correct a problem.***

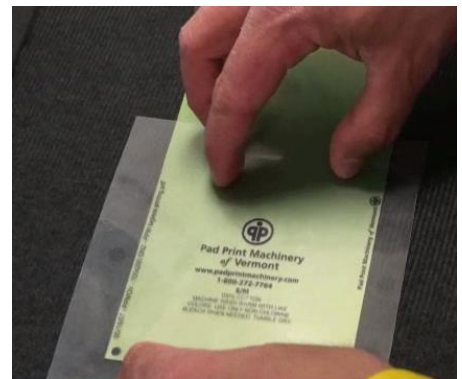
Technical assistance is always available! Please call 800-272-7764.

Making Plates

First Exposure

The first exposure sets the stage for the second exposure.

- Remove protective cover from the polymer plate.
- Dust the polymer surface using a make-up brush coated with a small amount of talcum or baby powder. *(This avoids trapping air and texturing of the surface)*
**For red polymer plates only.*
- Lift glass or plastic away from the base of the exposure unit.
- Place polymer plate on base of unit.
- Position film positive, emulsion-side down aligning guidelines with plate edges.
- Return glass or plastic to cover positive/polymer. *(if equipped with a vacuum wait until fully vacuum sealed)*
- Set timer to desired exposure time. Push Start/Stop button.



Second Exposure

On the second exposure, use a line screen of the 90%/120 or 90%/80 line per cm. The screen regulates the depth of a plate, by controlling the amount of light from the ultraviolet lamps.

- Lift glass or plastic.
- Remove film positive from plate.
- Place screen over the portion of the image to be fully etched, emulsion side down “shiny side up” *(If a portion of the image is not covered it will not be etched).*
- Return glass or plastic to cover screen/polymer. *(If equipped with vacuum, wait until fully vacuum sealed)*
- Set timer to desired exposure time. Push Start/Stop button.
- Remove the exposed plate and screen from the exposure unit.



Developing Alcohol Wash Plates

- Place plate in a tray of alcohol-wash solution.
- Lightly rub the surface for 35 seconds with the developer brush changing directions every 10 seconds

Dry

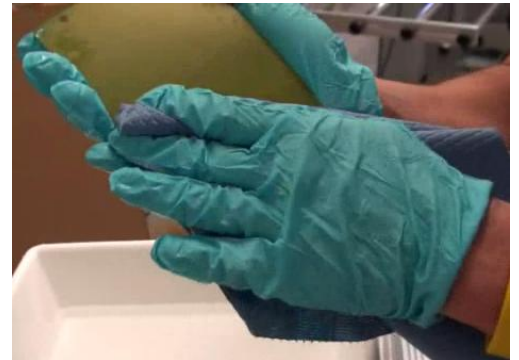
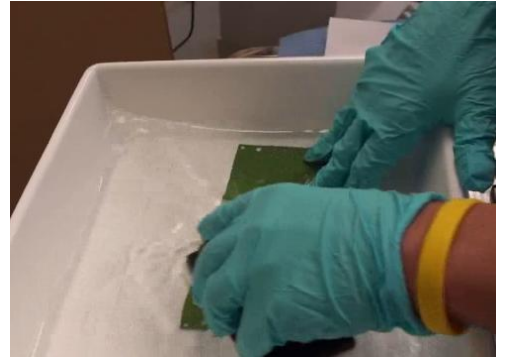
- Dry immediately with pressurized air gun or blot with no-lint towel to stop etching process.

Bake

- Place in oven at 180° F for 15 minutes to cure the plate.

Post Expose

- Place back in exposure unit for 15 minutes (*vacuum is not necessary*). This hardens the plate and insures the polymer is insoluble and is less likely to scratch.
- The plate now can be used and the image should appear slightly recessed. A screen pattern will be evident in the etched image with dual-exposure polymers.



Developing Water Wash Plates

- Wash plate under lukewarm running water for 90 seconds.

Dry

- Dry immediately with pressurized air gun or blot with no-lint towel to stop etching process.

Bake

- Place in oven at 180° F for 15 minutes to cure the plate.

Post Expose

- Place back in exposure unit for 15 minutes (*vacuum is not necessary*). This hardens the plate and insures the polymer is insoluble and is less likely to scratch.
- The plate now can be used and the image should appear slightly recessed. A screen pattern will be evident in the etched image with dual-exposure polymers.



Trouble Shooting

Image fuzzy or will not wash out

- Density low on film
- Film emulsion on wrong side.
- Air trapped between film and plate
- Over exposure

No image (*no latent image*)

- Incorrect light source
- Under exposure

Image depth too shallow

- Screen exposure too long
- Not enough wash time
- Alcohol solution may be incorrect or expired.

Surface residue or damaged looking

- Not rinsed thoroughly
- First exposure too low.

Blisters

- Drier too hot (*over 200° F*)

Premature wear

- Not dried enough
- Post exposure too short
- Improper tension on inkcup. Operating with an open inkwell system.

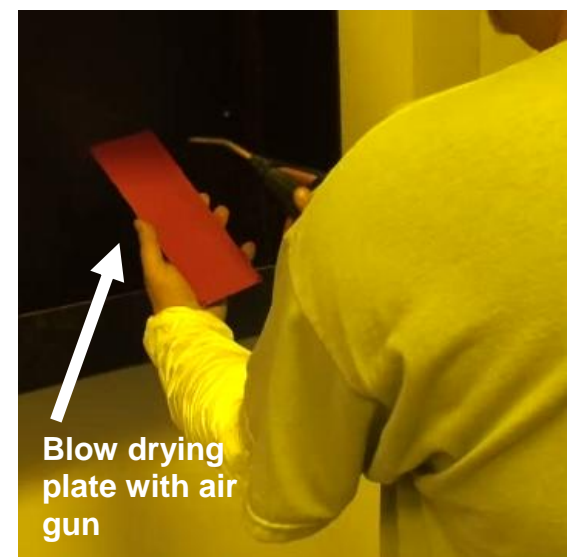
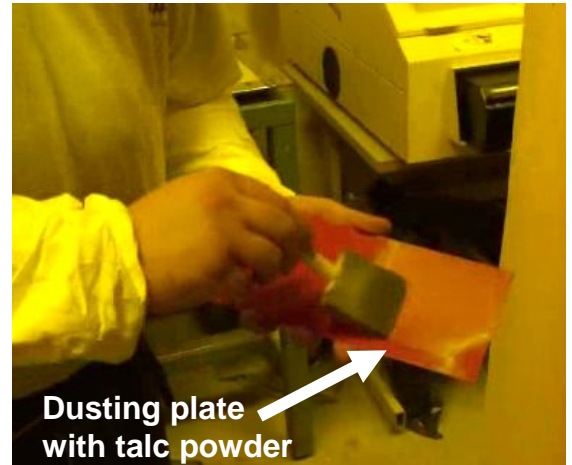


Plate Making Overview Exposure Times

Please note that these are approximate times and will vary due to light source and type of film positive used.

Type of material		Exposure times	
Grey Polymer <i>(Alcohol Wash)</i>	GY1	First	60 seconds
		Second	150 seconds
		Develop	35 seconds
		Oven Bake	15 minutes
		UV Post Exposure	15 minutes
Green Polymer <i>(Alcohol Wash)</i>	GY2	First	45 seconds
		Second	30-40 seconds
		Develop	65 seconds
		Oven Bake	15 minutes
		UV Post Exposure	15 minutes
NY20 Single Exp <i>(Alcohol Wash)</i>	GY3	Exposure	150 seconds
		Develop	1 minute
		Oven Bake	15 minutes
		UV Post Exposure	15 minutes
Green Polymer <i>(Alcohol Wash)</i>	GY4	First	60 seconds
		Second	140 seconds
		Develop	50 seconds
		Oven Bake	15 minutes
		UV Post Exposure	15 minutes
Red Polymer <i>(Alcohol Wash)</i>	RD	First	100 seconds
		Second	125 seconds
		Develop	50 seconds
		Oven Bake	15 minutes
		UV Post Exposure	15 minutes
Orange Polymer <i>(Water Wash)</i>	OR	First	35 seconds
		Second	30 seconds
		Develop	75 seconds
		Oven Bake	15 minutes
		UV Post Exposure	30 minutes
Aqua Nylon <i>(Water Wash)</i>	AQ	First	45 seconds
		Second	4-5 minutes
		Develop	90 seconds
		Oven Bake	15 minutes
		UV Post Exposure	15 minutes

Type of material		Exposure times	
Green Polymer <i>(Water Wash)</i>	GN1	First	35 seconds
		Second	35 seconds
		Develop	75 seconds
		Oven Bake	15 minutes
		UV Post Exposure	15 minutes
Green Polymer <i>(Water Wash)</i>	GN2	First	60 seconds
		Second	80 seconds
		Develop	90 seconds
		Oven Bake	15 minutes
		UV Post Exposure	15 minutes
Red Polymer <i>(Water Wash)</i>	RDW	First	100 seconds
		Second	215 seconds
		Develop	50 seconds
		Oven Bake	15 minutes
		UV Post Exposure	15 minutes