

*Screen Printing Instructions*

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*Instructions pour la Sérigraphie*

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*Instrucciones de serigrafía*

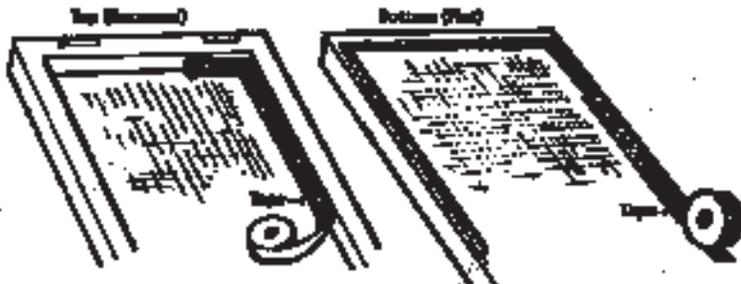
*Speedball®*



Taping in this way helps to maintain a "tight" screen, and prevents ink from leaking under the screen frame during printing and will keep the edges of your prints clean. To get maximum adhesion of the tape, rub it with a spoon. When choosing your pattern or design make sure to leave a generous border from the taped edges (minimum of 1" from taped edge).

### Step C

There are a number of ways to prepare a screen to print your picture or message. While the methods are different, the basic principle is to make a stencil on the screen fabric which allows ink to be forced through its "open" areas to produce a design.



## PREPARING SCREENS

### PAPER STENCIL METHOD

This is the best method for a beginner. It is the fastest, least expensive, and simplest way to prepare a screen. The Paper Stencil Method is good for geometric shapes and basic patterns. It is not intended for complicated designs or lettering. Begin by cutting an illustration from paper. Keep the paper flat and not wrinkled. For more accurate and durable cut paper stencils, use freezer wrap (shiny side up). Designs can be cut with scissors or stencil knife or they can be torn to create a textured appearance.

#### Step A

Cut your paper stencil. You may wish to create a design by folding and cutting your paper as illustrated. For your stencil, you can use either the cutout or the paper remaining.



#### Step B

Position printing paper under the frame. Lay your cutouts on this paper as desired and lower the screen.

#### Step C

Follow the directions found in section "Making Prints". Press down on the screen frame to ensure complete contact with all cutouts. Make your first print. You will find with the first pass of the squeegee, the ink will cause the cutouts to stick

to the underside of the screen, creating a stencil effect. Once you see how simple this method is, you may wish to try variations by creating two or three designs with torn paper of various shapes and printing each in a different color or hue. Do not overlap cutout pieces on the screen. *NOTE: Generally ten to fifteen prints can be satisfactorily produced by this method. When a larger number of prints are desired, you should use one or more "permanent" methods.*

### SCREEN FILLER METHOD

*(Direct block-out or "Negative Method")*

Using Screen Filler is another simple means of preparing a screen for printing. The screen filler is used to block out those areas that you do not wish to print. This allows the ink to be forced through the screen wherever the Screen Filler has not been applied.

#### Step A

On a sheet of plain paper, make up the illustrations or message you wish to print with your screen. Place this layout on a tabletop. Place your screen over this layout and trace your design directly on the screen fabric using a soft lead pencil.

#### Step B

Stir the Screen Filler until it is thoroughly mixed to a smooth consistency. Using a paintbrush, paint the screen filler on all areas of your layout that you do not want to print. Be certain that the bottom of the screen is elevated (not touching the table). When all areas to be blocked out are covered with Screen Filler, flip the screen over and smooth out places the filler may have collected on the opposite side of the screen. Be careful during this smoothing out process not to distort your work.



#### Step C

Leave the screen to dry in a level position. Make sure nothing touches the areas covered with Screen Filler. Thorough drying is necessary. Overnight drying is recommended to assure best results.

Check for pinholes in the blocked-out areas. You can do this by holding the screen up to a light. Fill any pinholes with Screen Filler and allow to dry completely. You are now ready to print.

**NOTE:** Since Screen Filler is applied to all areas which are not to be printed, this – along with all traditional "direct" methods – is considered to be a "negative" method of printing. Your print will be the opposite of that which you created in your screen.

## DRAWING FLUID – SCREEN FILLER METHOD

(*Tusche – resist or "positive method"*)

### Step A

On a sheet of plain paper, make up the illustration or message you wish to print with your screen. Place this layout on a tabletop. Place your screen over this layout, top side up. Trace your design directly on the screen fabric with a soft lead pencil.

### Step A (Alternative)

The preparation of a layout is to help guide the application of Drawing Fluid. If you feel such a guide is unnecessary, go directly to Step B.

### Step B

You can work on either side of the screen. Remember, however, that your printing will be done from the top (*or "ink-fill"*) side of the screen.

Be certain that the screen is elevated – not touching the table. Using a paintbrush, paint the Drawing Fluid over those areas of your layout that you want to print. Leave the screen to dry in a level, flat position. Make sure nothing touches the areas covered with Drawing Fluid.

### Step C

After the Drawing Fluid is completely dry, open the Screen Filler and mix it thoroughly to a smooth consistency. Spoon it onto the screen fabric on the same side of the screen used for the application of Drawing Fluid.



Use the squeegee or the plastic spreader to apply an evenly smooth coating over the entire screen. Make only one pass. Multiple passes of Screen Filler will dissolve the Drawing Fluid and prevent character washout. Again, put the screen to dry in a horizontal position making sure nothing touches the fabric. It is important that the Screen Filler dries completely.

### Step D

When the Screen Filler has thoroughly dried, spray cold water on both sides of the screen. Concentrate the spray on the areas where Drawing Fluid was applied. These areas will wash out and the screen will open at the points so that ink can flow through them. If some areas remain slightly blocked, scrub them lightly with a small stiff brush on both sides. (*An old toothbrush will work well.*) If necessary you can use Greased Lightning or Washing Soda by Arm & Hammer dissolved in warm water (*1 cup per gallon of water*). **DO NOT USE HOT WATER DURING THIS STAGE.** Allow your screen to dry in a level position, bot-

tom-side up. Using a hair dryer or fan may accelerate drying time. Move to section marked "Making Prints".



## PHOTOGRAPHIC EMULSION METHOD

Use polyester screen fabric. Nylon will stretch with water-based inks and is not suitable. Do not use silk or organdy if you wish to reclaim the screen.

This is one of the most exciting methods of screen printing because it offers the widest range of possibilities. It makes possible the printing of fine line drawings, various hand and commercial lettering techniques, as well as photographic half-tone positives.

All methods of photographic screen printing require three things:

1. A screen prepared with a light-sensitive coating (Photo Emulsion).
2. A film positive, or equal (Your printed transparency or acetate sheet).
3. A light source that will enable you to transfer the opaque images on your positive to the light-sensitive stencil you have prepared.

### Step A – Mixing the photo emulsion

**Diazo System:** Follow the mixing instructions given on both containers. Store the sensitized emulsion in a cool and dark place. Shelf life for the sensitized emulsion is 4 weeks at 90°F, 8 weeks at 70° F, and 4 months when refrigerated.

### Step B – Coating the screen

Coat the screen by first pouring a bead of the solution on one end of the bottom side of the screen. Spread it evenly and thinly with the squeegee. Use more solution where necessary, spreading evenly with the squeegee. Repeat this process on the backside of the screen, working to achieve an even continuous coating on both sides of the screen fabric. Return any of the excess solution to your mixing container. Be careful to clear away any extra drips of solution to obtain proper exposure.



### Step C – Drying the coated screen

In an area AWAY FROM LIGHT AND HEAT, set the screen to dry horizontally, bottom side down. This will provide the most even, flat “film” on the underside of the screen. It will, however, require your elevating the four corners of the underside of the frame during the drying stage with push pins or other suitable devices. An empty drawer, cupboard, cabinet, closet, or under a cardboard box will work we allow the screen to dry thoroughly. If more than 300 prints are to be run, it is best to apply a second coating of the sensitized Photo Emulsion to the bottom of the screen after the first coat is dry. Remember, work for a smooth even THIN coating. Repeat the process away from heat and light.

Once the sensitized screen is dry, it must remain in a darkened area until it is ready to be exposed. A fan in the dark area will greatly speed up the drying of the emulsion on the screen.

### Step D – Preparing a positive

With Speedball®’s Diazo System, the maximum allowable time between application of the sensitized emulsion to the screen and the exposure is four weeks at room temperature, in a completely dark environment.

A “positive” is any opaque image (*usually black*), on any transparent or translucent surface (*like acetate*). There are many ways you may choose to prepare them.

An excellent transparent film for this purpose is prepared acetate (printed directly on the acetate by your printer, or copying an image onto the acetate via copy machine). The printed sheets (*positives*) have copy and illustrations that may be used to create a picture or message. With the plain sheets, you may make artwork on your own with Speedball®’s Super Black Ink and an artist’s brush, speedball Drawing Pens or enamel paint pens. Excellent results can also be obtained by using a dry transfer, or pressure sensitive letters and symbols. These can be applied directly onto tracing paper or clear plastic or acetate. The graphics must be opaque to light (not see-through). Natural items such as leaves may be used between the glass and stencil.

Another way of producing positives is through copy machines that have the capability of reproducing very opaquely on film or acetate, tracing paper, etc. In order to satisfactorily produce a positive using a copy machine, the following conditions must be met:

1. Black & White line work
2. Must be opaque photographic print
3. Must have high contrast.

Using a desktop computer, you can download many copyright-free images suitable for screen printing from any simple graphic program. You can print that image directly on to transparency material (*acetate*). You can also make copies on a copier that will accept transparencies.

**TIP:** To get a bold solid image, try making 2 copies of the same image on transparencies. Match the designs and tape together for use as a positive.

### Step E – Light source

The BBA No.1 bulb is preferable, particularly for fine graphics because the exposure time is less. To set up your “light station” place the screen on top of a piece of black paper and center it 12 inches directly below a 150W clear incandescent bulb or a BBA No.1 Photoflood bulb. You can also use a light table with 20W florescent tubes. Either should be fitted with a reflector shop light.

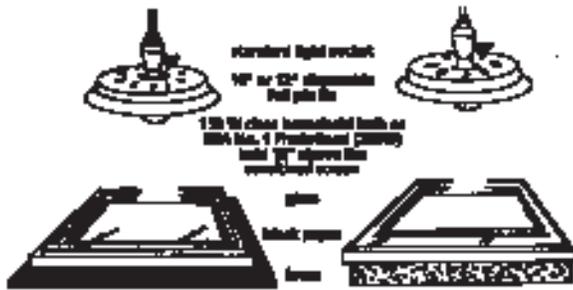
Unfiltered black light tubes will cut exposure time considerably. Maybe as little a 3–5 minutes. You need to test for accuracy.

The positive can be placed in contact with the coated (dry) screen by either of the above methods.

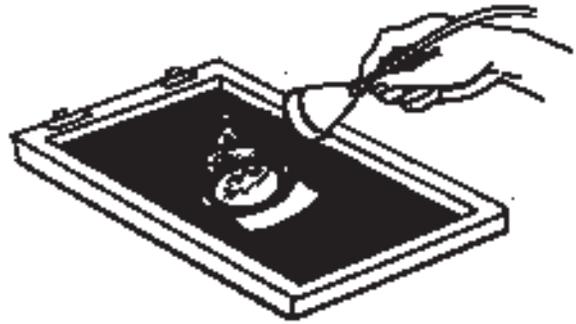
### Step F

Before you remove the sensitized screen from the dark drying area, make sure everything you need to print with is on hand. Set up your exposure lamp as described in Step E. Copy and illustrations (positives) can be fixed in place with cellophane tape. Do not let two layers of tracing paper overlap. A better alternative than taping the positives to the screen fabric is to lay a piece of clear glass, Lucite, or Plexiglas on top of them. One of these must be used if thin lines or lettering less than  $\frac{1}{8}$  inches tall is to be printed. Whichever you use, once you are sure all positives are in place and flat against the fabric, you are ready to expose the screen.





**NOTE:** Photo Emulsion should not be left in the screen indefinitely unless a permanent stencil is wanted. It should be washed out as soon as the run is completed. See Clean-up Instructions.



## SPEEDBALL® SCREEN PRINTING SYSTEM

Recommended Exposure Chart

### 150-Watt Bulb, Clear Incandescent

Screen Size	150W Bulb Height	Exposure time
8" x 10"	12 inches	45 minutes
10" x 14"	12 inches	45 minutes
12" x 18"	15 inches	1 hr. 14 minutes
16" x 20"	17 inches	1 hr. 32 minutes
18" x 20"	17 inches	1 hr. 32 minutes

### BBA No. 1 Photoflood (250 Watt)

Screen Size	Lamp Height	Exposure time
8" x 10"	12 inches	10 minutes
10" x 14"	12 inches	10 minutes
12" x 18"	15 inches	16 minutes
16" x 20"	17 inches	20 minutes
18" x 20"	17 inches	20 minutes

**PLEASE NOTE:** This chart has been prepared using an aluminum foil pie-plate reflector as indicated in our instructions. More sophisticated light sources, reflectors and equipment can be used. However, as any variable is changed, you will have to adjust the exposure times and distances. This will require experimentation to obtain proper results.

### Step G

Apply a forceful spray of water (body temperature) to both sides of the screen. **DO NOT USE HOT WATER.** Concentrate this spray on the light images on the topside of the screen. After a few minutes, these areas will become "open". Continue spraying until all unwanted emulsion is gone. Perform final spraying with cold water.

Once you have completely washed the screen, let it dry thoroughly in a level flat position.

Hold the dry frame to the light and check for pinholes. These can be covered with Speedball® Screen Filler or pieces of masking tape stuck to the bottom of the screen. If Screen Filler is used, let the screen dry again.

## MAKING PRINTS

### Step A - Preparations

Attach your screen frame to the base by interesting the hinge pins. For off-contact printing tape a penny or nickel to each of the four corners on the underside of the screen. Place a sheet of your printing paper under the screen and position it as it is to be printed. Allow for margins. When you are certain that the paper is in the correct position, lift the screen gently and mark where each edge of the paper should be placed.

Cut three pieces of cardboard about 1" x 2" and use these for registration guides. Place these next to the lines you drew on the base so you can correctly locate each sheet to be printed.



These guides should be fastened securely with tape or rubber cement. Good guides are particularly important if you intend to print more than one color on any print.

### Step B - Selecting Inks for Printing on Paper

#### Water Soluble Inks

Art prints require porous-surface papers of high quality. We recommend 100% rag or heavy paper for best results. For most other printing applications, construction paper, drawing paper, charcoal paper, pastel paper, most board items (except railroad board) and cover stock (especially good for greeting cards) will work well. Ink remains water-soluble after drying.

Avoid slick coated, high gloss papers or vinyl or plastic coated papers.

Stir the ink completely until you achieve a “buttery” or “creamy” consistency. If too thick, add one or two drops of water or Speedball® Water Soluble Transparent Extender Base. Mix thoroughly. Colors may be intermixed. Speedball® Water Soluble Transparent Extender Base may be used to make the colors more transparent.

### PERMANENT ACRYLIC INKS

Fine art prints require smooth matte finish, medium or heavy weight papers. To overcome buckling caused by water penetration, after each color run is dry, place a flat weight on stacked prints. This will cause them to dry flat and is especially important for good color registration.

These water-based acrylic inks dry water resistant.

To achieve transparency or economy, Speedball® Extender Base (preferred) or Transparent Base may be added. Never add more than 10–15% Transparent Base. Do not allow ink to dry in screen.

For most other printing applications like posters, greeting cards, book covers, etc., 20# weight and thicker cover stock paper is recommended. Avoid slick coated, high gloss papers or vinyl or plastic coated papers.

Stir the ink completely until you achieve a “buttery” or “creamy” consistency. If too thick, add one or two drops of water or Speedball® Acrylic Extender Base Speedball® Acrylic Transparent Base. Mix thoroughly.

### Step B – Alternative

#### Selecting inks for printing on non-paper surfaces.

**WATER SOLUBLE INKS** – These can be used on wood or masonite if first coated with an acrylic emulsion base coat such as Speedball® Gesso. To achieve water-resistance, use an acrylic, a spray fixative or a solvent-based varnish as a topcoat.

**FABRIC INKS** – These can be used on almost any fabric that can be subjected to a hot iron (275°-375°F). Do not use on non-porous fabrics such as nylon.

**ACRYLIC INKS** – These inks can also be used on wood, masonite and many coated surfaces. Always pre-test before using.

### Step C – Printing on Paper

Spoon the ink across the end of the screen nearest to you. With the screen lifted slightly from the base, apply an even blanket of ink onto the print area. Be sure to use an easy, smooth stroke with the squeegee at a slight angle away from you. This is the flood stroke. Drop the screen onto your paper. Lift the squeegee over the ridge of the ink and make the print stroke by pulling towards yourself. Keep the squeegee at a 45° angle with enough pressure to scrape the ink from the screen. Lift the screen from the print, make the flood stroke, set the kick leg, remove the print and put it to dry on your rack or line. Insert new paper, release the kick leg and repeat the process.

Sharp clear prints can be produced provided you maintain an adequate quantity of ink on the screen, and use the flood stroke but sparingly. For more detailed images avoid the flood stroke, and maintain adequate and even pressure on the squeegee during print stroke.

### Step D – Clean up

After you have made your prints, remove any remaining ink in the screen. This ink can be saved if you wish. Detach the frame from the base (don't lose the hinge pins). **SEE SECTION ON CLEAN-UP.**



## PRINTING WITH FABRIC INKS

For the most part, screen printing on fabric is the same as printing on paper. Use only fabrics that can be subjected to temperatures of at least 275°-375° F. Do not use on non-porous fabrics such as nylon. Pre-test all fabrics. Fabrics with sizing must be washed prior to printing. This will assure proper adhesion of the fabric ink to the fabric.

### Five Important Notes:

1. The screen frame is usually detached from the base and used alone. Usually two (2) people should work on the printing process – one holding the screen frame tightly against the fabric, and the other doing the printing.
2. On articles like T-shirts, a piece of foamboard, cardboard or paper must be put inside each garment to act as a barrier.
3. To improve the lubricity (*slipperiness*) of the ink, you may add the Transparent Base. To slow drying or to prevent screen clogging, add the Retarder Base (1-2 tbs. to 8 oz. of ink).

4. Wash-up of screens and tools must be done immediately after use. If they are allowed to dry on your screen or tools, they are difficult or impossible to remove.
5. After the fabric ink dries on the fabric, set a household iron at the highest dry heat (*no steam*) that will not scorch the fabric and with a cloth or paper between the iron and printed material, iron on each side for 3–5 minutes. This will make them withstand repeated washings.

**IMPORTANT: PRE-TEST SAMPLES PRIOR TO ALL PRODUCTION RUNS.** If inadequate wash fastness occurs, the print needs to be heat set longer.

## MULTI-COLOR PRINTING

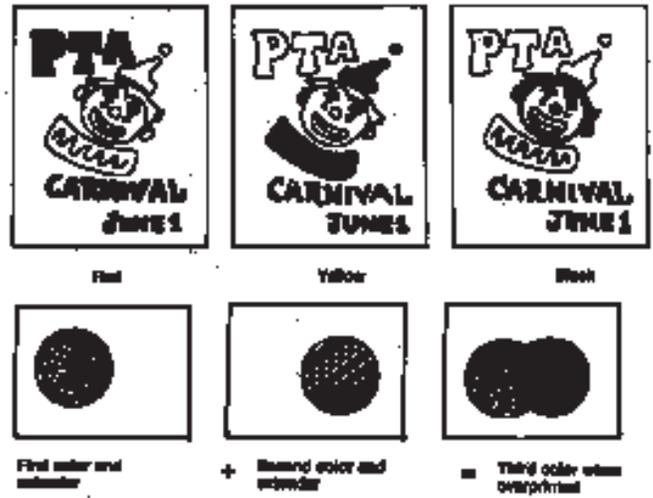
Multi-color signs can be achieved easily by making one screen with the entire message on it. Prepare the screen by any method you prefer. Once the screen is ready, simply block the words you do not want to print with your first color by putting masking tape or paper on the bottom side of the screen fabric.

After you have made your first run of prints, wash the ink from the screen and let it dry. Follow this by blocking out the words you just printed and unblocking words you want to print with your second run of color. After you have made this second run, again wash the screen and let it dry. Continue to repeat this process until you have completed your multi-color print.

Making multi-color prints of detailed artwork requires the making of a screen for each color to be printed. These screens should be prepared before you start to print. Additional Speedball® frames are available for purchase in many retail locations. Please check our website [www.speedballart.com](http://www.speedballart.com) for a store near you.

One interesting effect can be made by having a two color print on overlapping areas. These overlaps can add a third (darker) value to the print. Speedball® Transparent or Extender Bases are formulated to enable screen printers to achieve this.

Registration guides are very important when printing with more than one color. Details on registration guides are given in step A on the "Making Prints" section.



## SCREEN CLEAN-UP

An organized work area will make clean up easy. Here are the Recommended procedures:

### WATER SOLUBLE INKS

Use warm water and a soft brush. These inks will remain water-soluble even after thorough drying.

### FABRIC and ACRYLIC INKS

**Wash IMMEDIATELY after the last print is pulled.**

Use warm water and a soft brush.

Should ink dry in the screen, spray with Windex, or a similar window cleaner. Rub with a lint-free cloth. When ink is removed, wash with a mix of warm water and dishwasher detergent using a soft brush. Rinse with warm water.

### Drawing Fluid

Wash with cool water.

### Screen Filler

Speed Clean™ is preferable for removing screen filler. One (1) cup of Arm & Hammer's Washing Soda dissolved in (1) gallon of water is also suitable.

Instructions are:

- A. Apply to both sides with a paintbrush. Scrub with a nylon bristle brush.
- B. Apply again to both sides. Let stand in a horizontal position for three to five minutes.
- C. Scrub with a nylon bristle brush while spraying with a forceful stream of hot water.

## Photo Emulsion

PHOTO EMULSION SHOULD BE WASHED OUT OF YOUR SCREEN AS SOON AS YOUR PRINT RUN IS COMPLETED – UNLESS YOU WANT A PERMANENT STENCIL.

**ADULT SUPERVISION IS RECOMMENDED FOR THIS PROCEDURE. WEAR RUBBER GLOVES AND SMOCK.**

### Photo Emulsion Remover Method:

Be certain all the ink has been removed from the screen fabric. Apply SPEEDBALL Photo Emulsion Remover liberally to both sides of the stencil using a paintbrush. Immediately scrub both sides of the stencil with a dry nylon bristle brush. Again, apply SPEEDBALL Photo Emulsion Remover liberally to both sides of the stencil. Keep the screen in a horizontal position for three (3) minutes. Scrub both sides with the nylon bristle brush and flush with a hard spray of hot water. Once you have started removing Photo Emulsion you must not let the screen dry until completely clean.

## TROUBLESHOOTING

### Drawing Fluid, Screen Filler or Photo Emulsion will not adhere to screen.

Possible scenarios:

1. Screen fabric may be dirty.
2. Screen may have been used with solvent-based materials or the sizing may not have completely washed out of the screen fabric.

**Solution:** Scrub with a soft bristle brush and a dishwasher powder/water solution. Rinse well.

### Photo Emulsion will not wash out to create a stencil.

Possible scenarios:

1. Artwork not prepared with a visually or photo graphically opaque material.
2. Heat, as well as light, will set the photo emulsion. There must not be any heat build-up (above 150° F) on the stencil during exposure.
3. More than 12 hours (at 70° F) exposed before the sensitized screen was exposed.
4. The sensitized screen was exposed to too much light or heat before exposure to artwork.
5. Overexposure. The instructions list exposure times and heights for a "disposable foil pie tin" reflector. More efficient reflectors will require a higher bulb height and/or less exposure time.
6. Artwork did not make proper contact with screen.
7. Incomplete washout.

### Too much Photo Emulsion washed out of screen after exposure.

Possible scenarios:

1. Improper mixing of emulsion and sensitizer.
2. Underexposure.
3. Tracing paper or film not sufficiently transparent.
4. Washout temperature was too high (should be lukewarm, or at body temperature).
5. Screen not dry before coating.
6. Screen not dry before exposure.

### Some small details on Photo Emulsion screen did not wash out completely.

Possible scenarios:

1. See relevant "Possible scenarios" under "Photo Emulsion will not wash out to create a stencil".
2. Failure to use a black, non-reflective background under the screen during exposure.

**Solution:** Using a more intense light source, such as a BBA No. 1 Photoflood, will reduce the require exposure time and resultant light bounce-back. This will improve detail washout.

### Inks drying in screen.

**Solutions:**

1. Use the flood stroke technique given in the instructions.
2. Keep squeegees sharpened.
3. For the Acrylic Screen Inks and Fabric Inks, mix with 5–10% Retarder Base.
4. Use a couple of humidifiers or vaporizers in the printing area.

### Textile ink prints not opaque enough.

**Solutions:**

1. Use a coarser screen fabric.
2. Make multiple passes.
3. Use a rounded squeegee.
4. Use a soft base under the fabric to be printed.
5. Use a hair dryer to flush dry the print immediate after printing and then reprint ovetop in exact register.



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