

# AGABÊ MANUAL

## PREPARATION OF SCREEN PRINTING STENCILS



### PRODUCTS:

Photographic emulsions.

### APPLICATION:

For the preparation of Screen Printing stencils (direct process).

### PROPERTIES:

- Broad range of photographic emulsions for the preparation of stencils with perfect definition and high resolution.
- For coating on nylon, polyester or stainless steel meshes, with mono or multifilament threads, white or yellow, for all mesh counts.
- Available with resistance to water based, solvent based, UV, plastisol and co-solvent inks (which contain water and solvents).
- Variety of viscosities for coating on all mesh counts: higher viscosities for coarser meshes and lower viscosities for finer meshes.

## THERE ARE SIX FAMILIES OF AGABÉ EMULSIONS:

**1 - UNIFILM:** pre-sensitized photopolymer emulsions. Ready to use, it is not necessary to add any sensitizer. Fast exposure, high definition and resolution. Resistant to temperatures up to 140°F (60°C) without loss of photographic properties.

**2 - DUALFILM:** dual cure emulsions with two types of sensitizers: Diazo and Photopolymer. Thanks to this advanced technology, these emulsions provide characteristics that can not be achieved with Diazo or Dichromate emulsions: resistance to co-solvents (water and solvents), higher resolution and definition, wider exposure latitude, shorter exposure than plain diazo emulsions and flatter stencils (lower Rz) with less coating.

**3 - DIRAFILM:** dual cure emulsions that are sensitized with a special Diazo D.A.D. (Direct Addition Diazo) which is directly added to the emulsion. There is no need to dissolve it in water. The properties of the emulsions are not affected by the quantity or quality of the water.

**4 - DECAFILM:** sensitized with Diazo or Dichromate. Excellent chemical resistance for high quality image reproduction. All types of light sources can be used with the Dichromate sensitizer.

**5 - AGABÉ:** high quality Diazo emulsions.

**6 - SCREEN FOTO:** sensitized with Dichromate. For fast exposure and easy reclaiming. For use with all light sources.

## SHELF LIFE AND STORAGE:

TYPE OF EMULSION	POT LIFE	SENSITIZED EMULSION	COATED ON THE MESH (exposed or unexposed)
UNIFILM	24 months	-----	3 months (up to 100°F/37°C, in a dry and dark place)
DUALFILM DIRAFILM DECAFILM/Diazo AGABÉ	24 months	3 months (at 72°F/22°C) 6 months (refrigerated)	15 days (up to 72°F/22°C, in a dry and dark place)
DECAFILM/Dichromate SCREEN FOTO	24 months	4 days	4 hours

**Note:** Do not store the emulsions in freezing conditions.

TYPE OF SENSITIZER	SHELF LIFE AND STORAGE
DICHROMATE	24 months, under any climate condition.
DIAZO	Slowly degrades with heat and humidity. It has a shelf life of 18 months when stored in refrigerated conditions (below 32°F/0°C). The shelf life is reduced at higher temperature and humidity. For example, at 72°F/22°C, the shelf life is approximately 6 months. Avoid long term storage above 78°F/25°C.



## INSTRUCTIONS:

### SENSITIZING:

TYPE OF EMULSION	SENSITIZING
<b>Pre-sensitized</b> UNIFILM	UNIFILM emulsions are ready to use. It is not necessary to add any sensitizer. Open the container and handle the emulsion under yellow light.
<b>Dual cure</b> DUALFILM	These emulsions are partially sensitized. Even before adding the Diazo sensitizer, handle the emulsion in an area free of UV radiation. The procedure to sensitize with Diazo is the same as for a standard emulsion (see instructions below).
<b>Diazo</b> DECAFILM/Diazo AGABÊ	It is advisable to use distilled or deionized water at 72°F/22°C. For a pot with 900 ml of emulsion, add 90 ml of water into the sensitizer bottle. Close the cap and shake the bottle until all powder is dissolved. Add this solution to the pot of emulsion and stir well. For one gallon (3440 ml) of emulsion, add 170 ml of water into the sensitizer bottle. Close the cap and shake the bottle until all powder is dissolved. Add this solution to the container of emulsion. Add another 170 ml of water to the emulsion and stir well. For other volumes, follow the instructions on the label of the bottle of sensitizer. After stirring the emulsion, leave it resting for about two hours to eliminate air bubbles.
<b>D.A.D. Diazo</b> DIRAFILM	DIRAFILM are also dual cure emulsions and should be handled under yellow light. The D.A.D. sensitizer comes in pouches that protect it from light and humidity. Cut the pouch open and add the contents directly into the emulsion. Stir well until all powder is dissolved. Leave it for about two hours to eliminate air bubbles.
<b>Dichromate</b> DECAFILM/Dichromate SCREEN FOTO	Due to the chemical properties of Dichromate, sensitize only the amount of emulsion that will be used in up to 4 days. Add one part of sensitizer to 9 parts of emulsion (in volume). Stir well. Leave it for about two hours to eliminate air bubbles.

**Note:** The Diazo sensitizer is packed with the exact quantity needed to sensitize the amount of emulsion in one container (450 ml, 900 ml, 1 gallon/3440 ml or 5 gallons/17.2 liters). Check on the next table the type of sensitizer recommended for each emulsion.

### CHOOSING THE MESH:

The correct choice of mesh is extremely important. The mesh is the structure that supports the photographic layer, determines the ink deposit and affects the print definition and resolution.

To choose the ideal mesh, the following factors must be observed:

- a - Thread material:** determines the physical and chemical properties of the mesh: flexibility, dimensional stability, abrasion resistance, and resistance to chemical products. The mesh can be made of nylon (good flexibility), polyester (excellent dimensional stability) or metallic (maximum dimensional stability and thermal and anti-static effects due to its electrical conductivity).
- b - Mesh Count (number of threads per inch or per centimeter):** determines the ink deposit on the substrate. This factor is also related to the adhesion of the emulsion layer. For thicker ink deposits, we suggest coarser meshes (less threads per inch or per centimeter). For finer details, use a mesh count which will ensure that the smallest dot of the stencil is supported by at least two threads of the mesh in each direction.
- c - Thread type:** due to its precision and ink flow characteristics, use meshes made with monofilament threads. Avoid multifilament meshes.
- d - Thread diameter:** influences the physical properties of the mesh (mechanical resistance), the ink flow and the resolution of the finest details.
- e - Color:** dyed meshes (yellow or orange) avoid light diffraction thus allowing better image definition and resolution.

## MESH STRETCHING:

Stretch the mesh according to the tension recommended by the manufacturer. Each type of mesh has its own value of ideal tension. For better control of the final tension, use pneumatic or mechanical equipment, or retensionable frames.

For stretch and glue, it is recommended to use the DECAFIX Adhesive (two components or instant dry), which provides a strong and permanent bonding of all types of meshes on wood, aluminum or iron frames. After the curing time, the adhesive is completely resistant to all solvents used in screen printing.

## MESH PREPARATION:

Before coating the emulsion, clean the mesh thoroughly to guarantee the uniformity of the layer, a perfect adhesion of the emulsion and to increase the durability of the stencil.

For the removal of grease contaminants, dirt and dust particles, use DECAPREP Conditioner or HB 10 Degreaser (Paste or Gel). After the treatment do not touch the mesh.

The adhesion of the emulsion can be improved by pre-treating the fabric with HB 12 Abrader (Paste), which increases the surface area of the threads, besides cleaning.

## CHOOSING THE CORRECT EMULSION:

The following factors should be considered:

**a - Chemical resistance:** check the solvents in the ink: water, solvents, co-solvent (water + solvent), plastisol or UV curable. Check also what chemical will be used to clean the stencil.

**b - Mesh count:** number of threads per inch (or per centimeter) which is related to the finest detail and amount of ink to be deposited;

**c - Definition and Resolution:** print quality;

**d - Reclaiming:** how easy it should be to remove the stencil to reclaim the mesh;

**e - Light source:** pre-sensitized, dual cure and Diazo emulsions should be exposed to light sources that produce emissions rich in UV radiation.

On the next table we present the full range of AGABÉ emulsions classified according to the parameters above. Use the table to select the emulsion that best suits your needs.

## COATING:

For manual coating, use HB APLIC® emulsion coater (Scoop coater), made with anodized aluminum with removable plastic ends. With an adequate design for easier handling and cleaning after use. Different edges allow thicker or thinner coats. The shape of the edges provides an adequate contact to the screen during the coating process.


Always use a coater long enough to cover the whole image area of the stencil. Never use a smaller coater in parallel passes, which will create a layer of irregular thickness.

With the screen in a vertical position, slightly tilted, coat the emulsion 1 or 2 times on the print side, and 2 or more times on the squeegee side (without intermediate drying).

The ideal stencil thickness ranges from 10 to 25% of the mesh thickness. In special applications, different thicknesses can be used. We advise the use of a thickness gauge for perfect process control.

After the emulsion is dried, more emulsion can be coated on the print side to improve stencil flatness or slightly increase the thickness.

# LINE OF SCREEN PRINTING PHOTO EMULSION

 AGABÉ	RANGE OF MESH COUNT (Threads/mct)	SOLVENT RESISTANCE	WATER RESISTANCE	DEFINITION	RESOLUTION	SENSITIZER	TYPE OF DIAZO	COLOR WITHOUT SENSITIZER	VISCOSITY	SOLID CONTENT (%) WITHOUT SENSITIZER	POSSIBILITY OF POST EXPOSURE	RECLAIMING
<b>UNIFILM C2</b> (SOLVENT AND WATER BASED UV)	107 to 508	5	2	5	5	PS	-	Light purple	Medium high	38	Yes	4
<b>UNIFILM MICRO</b> (FINE DETAILS)	140 to 508	5	3	5	5	PS	-	Purple	Medium high	39	Yes	4
<b>UNIFILM SP</b> (SUPER PERFORMANCE)	230 to 508	5	1	5	5	PS	-	Purple	Medium	37	Yes	4
<b>UNIFILM UV</b> (LOW R <sub>Z</sub> VALUE & LOW THICKNESS)	140 to 460	4	1	5	5	PS	-	Light purple	Medium high	65	Yes	4
<b>UNIFILM SOL</b> (SOLVENTS)	195 to 508	5	2	4	5	PS	-	Blue	Medium	35	Yes	5
<b>UNIFILM SR</b> (SOLVENT RESISTANT)	195 to 508	5	0	3	3	PS	-	Blue	Medium	24	Yes	5
<b>UNIFILM ACQ</b> (PLASTISOL AND WATER BASED)	107 to 355	1	4	5	4	PS	-	Magenta	Medium high	42	Yes	2
<b>UNIFILM WR</b> (WATER BASED AND PLASTISOL)	107 to 355	0	5	4	4	PS	-	Blue or magenta	Medium	40	Yes	1
<b>UNIFILM 3D</b> (HIGH DENSITY - PLASTISOL AND WATER BASED INKS)	20 to 107	1	5	5	2	PS	-	Purple	Very high	56	Yes	2
<b>UNIFILM 3D-Light</b> (HIGH DENSITY PLASTISOL - FINE DETAILS)	81 to 230	2	4	5	3	PS	-	Magenta	High	52	Yes	3
<b>UNIFILM 3D-SOLV</b> (HIGH DENSITY - PLASTISOL AND SOLVENT BASED INKS)	53 to 195	5	0	5	3	PS	-	Light blue	Very high	55	Yes	4
<b>UNIFILM PRO-SR</b> (PROJECTION SYSTEM - SOLVENT RESISTANT)	250 to 380	5	0	4	4	PS	-	Light blue	Medium	29	Yes	5
<b>UNIFILM ALFA</b> (PROJECTION SYSTEM - PLASTISOL AND WATER BASED INKS)	195 to 380	0	5	4	4	PS	-	Light blue	Medium	35	Yes	1
<b>DUALFILM SP</b> (SUPER PERFORMANCE)	230 to 508	5	3	5	5	DF	Diazo D	Purple	Medium	41	Yes	4
<b>DUALFILM AG</b> (GENERAL PURPOSE)	107 to 460	5	1	5	5	DF	Diazo E	Purple	Medium high	43	Yes	4
<b>DUALFILM POLY PLUS 2</b> (HIGH MECHANICAL RESISTANCE)	140 to 460	5	2	5	5	DF	Diazo E	Purple	Medium	40	Yes	4
<b>DUALFILM SA PLUS</b> (UV, SOLVENT AND WATER BASED)	195 to 508	4	3	5	5	DF	Diazo E	Purple	Medium	39	Yes	5
<b>DUALFILM HV</b> (HIGH VISCOSITY - GRAPHICS)	107 to 460	5	1	5	5	DF	Diazo E	Purple	Medium high	47	Yes	4
<b>DUALFILM MULTI</b> (MULTI PURPOSE)	107 to 460	5	2	4	4	DF	Diazo E	Blue	Medium high	36	Yes	5
<b>DUALFILM PA</b> (WATER BASED INKS AND PLASTISOL)	107 to 355	3	5	5	5	DF	Diazo E	Light blue	Medium high	50	Yes	2
<b>DUALFILM RA</b> (WATER BASED INKS AND PLASTISOL)	107 to 355	1	5	5	4	DF	Diazo E	Blue	Medium high	46	Yes	1
<b>DUALFILM CE</b> (CERAMIC INDUSTRY)	140 to 305	2	5	5	5	DF	Diazo E	Blue	Medium high	45	Yes	1
<b>DIRAFILM TX</b> (TEXTILE - LONG PRINT RUNS)	140 to 380	1	5	5	4	DF	DAD	Blue or magenta	Medium low	36	Yes	2
<b>DECAFILM HD</b> (HIGH DEFINITION)	170 to 508	5	0	4	4	D/B	Diazo H	Purple	High	38	No	4
<b>DECAFILM FAST</b> (FAST EXPOSURE)	195 to 508	5	0	4	4	D/B	Diazo H	Light purple	Medium high	39	Yes	5
<b>DECAFILM SRX</b> (SOLVENT RESISTANCE)	140 to 508	5	0	3	4	D/B	Diazo D	Purple	Medium high	29	No	4
<b>DECAFILM TX</b> (TEXTILE - LONG PRINT RUNS)	107 to 355	2	5	4	5	D/B	Diazo D	Blue or green	Medium high	45	No	1
<b>DECAFILM PA</b> (WATER BASED PRODUCTS AND PLASTISOL)	107 to 305	1	5	4	4	D/B	Diazo H	Light blue	Medium high	50	No	1
<b>DECAFILM PAHV</b> (WATER BASED PRODUCTS - HIGH VISCOSITY)	25 to 195	1	5	4	3	D/B	Diazo H	Light blue	Very high	58	No	1
<b>DECAFILM SR</b> (SOLVENT RESISTANCE)	140 to 508	5	0	3	4	D/B	Diazo D	Light blue	High	26	No	4
<b>DECAFILM WR</b> (WATER BASED INKS AND PLASTISOL)	140 to 355	0	5	4	3	D/B	Diazo D	Blue	Medium	42	No	2
<b>DECAFILM ACQ</b> (PLASTISOL AND WATER BASED INKS)	107 to 355	1	5	3	4	D/B	Diazo D	Purple or clear	Medium	40	No	3
<b>HB 36</b>	170 to 460	5	0	4	4	D	Diazo H	Blue	Medium	36	No	4
<b>HB 38</b>	25 to 195	1	5	4	3	D	Diazo H	Light blue	Very high	58	No	1
<b>SCREEN FOTO VINÍLICA</b>	195 to 508	4	0	2	3	B	-	Blue	Medium	22	No	5
<b>SCREEN FOTO ACQUA NEW</b>	107 to 355	1	4	3	3	B	-	Purple	Medium	42	No	3
<b>SCREEN FOTO ACQUA</b>	107 to 305	0	4	3	3	B	-	Magenta or green	Medium high	46	No	2
<b>SENSITIZER</b>	PS - Pre-sensitized		DF - Diazo-Photopolymer		D - Diazo		B - Dichromate					
<b>PROPERTIES</b>	5 - Outstanding		4 - Excellent		3 - Very good		2 - Good		1 - Fair		0 - Poor	

## **DRYING:**

Dry the emulsion completely with the print side down. The drying time depends on the type of mesh, type of emulsion and coating thickness.

The air in the dryer should be warm, dry and clean (filtered). The used air should be expelled out of the workplace. In areas of high relative humidity, use a dehumidifier. For dual cure, Diazo and Dichromate sensitized emulsions, the drying temperature should not exceed 100°F/ 37°C). If a drying equipment is not available, leave the screens at ambient conditions, in a place that is dry, dark and free of dust.

For thicker stencils on coarser meshes, the drying time is longer.

For Dichromate sensitized emulsions, expose and wash out the screens as soon as the stencil is dried. Otherwise, the stencil becomes completely or partially hardened even if it has not been exposed to light.

## **EXPOSURE TO LIGHT (Copying the image):**

The photographic stencil becomes insoluble in water when exposed to light. An image can be created if a mask is placed between the stencil and the light source. The perfect image reproduction depends on some factors:

### ***POSITIVE (film):***

Check the quality of the positive. The dark areas must be opaque (optical density over 3.2) to block completely the light. The remaining areas must be transparent and free of dust and dirt to avoid light retention that will cause pinholes in the stencil. The use of translucent films such as those commonly used for laser or ink jet printers is not recommended for precise work. In those cases, it is best to use photographic films. Use positives with at least 1200 DPI resolution. With less resolution the edges of the final print will not be sharp.

Place the positive on the print side of the screen and fix it with adhesive tape. The opaque layer of the positive should be in contact with the screen printing emulsion.

Maintain a perfect contact between the positive and the stencil during exposure. Otherwise there will be a space in which light will penetrate and cause loss of resolution. It is advisable to use a vacuum frame.

### ***LIGHT SOURCE:***

**Type:** pre-sensitized, dual cure and Diazo emulsions require the use of a source which emits light rich in UV rays, such as metal halide or mercury lamps. Dichromate sensitized emulsions can also be exposed using white fluorescent, incandescent or photo flood lamps.

**Geometry:** for good image reproduction and uniform hardening of the emulsion, the distance between the light source and the surface of the stencil should be, at least, equal to the diagonal of the screen. A larger distance reduces the loss of image resolution, but requires a longer exposure time. The use of several tube lamps produces a diffuse and unfocused light, therefore making these inadequate for detail copying.

### ***EXPOSURE TIME:***

The exposure time is extremely important because it determines the quality of definition, the level of resolution and the durability of the stencil.

During exposure, the print side of the stencil reacts initially with the light rays. After some time, the hardening also reaches the inner layer of the emulsion. If the exposure time is insufficient (under exposure), the squeegee side of the emulsion layer will not be completely hard and will result in a weak stencil. If the exposure time is too long (over exposure) the light diffraction will cause loss of detail and edge sharpness.

The correct exposure time depends on the mesh count, thread diameter, fabric color, type and thickness of the photographic layer, power and age of the UV lamp, distance between lamp and stencil, correct drying of the emulsion and positive quality (transparency and opacity levels).

To determine the ideal exposure time, use the AGABÉ Test Positive (for Normal or Thick stencils). With this test, you may also evaluate the sharpness of the image and measure the loss of resolution.

The exposure time recommended for each emulsion is presented on its specific technical manual.



# AGABÊ MANUAL

## WASHING OUT:

Wash out the screen evenly, using a soft water spray over both sides of the whole stencil. Wash until the image fully appears and the non exposed areas are free from residues. Use higher pressure only on the print side.

For thick stencils or coarse meshes, the screens can be left submerged in water for 20 minutes prior to using the water jet.

Check the AGABÊ Test Positive. Observe the stencil hardening, definition and resolution to evaluate if the exposure time was correct.

After washing out, apply the Exposure Enhancer HB 70 (Liquid Light) on the stencil while still wet. Begin on the squeegee side using a soft sponge or spray. Wait some seconds and rinse it. This product reacts with the stencil completing the light exposure, fixing the emulsion and preventing residues from running down in open areas.

## POST TREATMENT:

**Post exposure (optional):** for pre-sensitized and dual cure emulsions, post exposing to UV light (after washing out) will enhance the chemical resistance of the stencil.

**Chemical hardening:** to increase the stencil resistance to abrasion and water based products, use catalyst HB 74 or hardeners HB 72 or HB 76.

## FINISHING:

Dry the screen completely. HB 20 Removable block out (Normal or Fast Drying) is recommended for printing with plastisols, UV and solvent based inks. For plastisols and water based inks, use HB 20 ACQUA Permanent block out.

Seal the edges of the stencil, registration marks and the Test Positive with the block out chosen. Dry the stencil with hot air.

## RECLAIMING (for reusing the mesh):

Use HB 52 or DECASOLV LM Ink removers to eliminate any ink residues that create a barrier that blocks the action of the stencil decoaters.

Following this step, use HB 50 Stencil remover to dissolve the emulsion layer.

Chemically hardened emulsions are harder to reclaim. It might be necessary to use HB 52 or DECASOLV LM again, after using HB 50 Stencil remover.

To remove the so called ghost images (mesh threads dyed by the printing ink) use One component DECACLEAN HR or HB 54 Haze remover mixed with HB 52 Ink remover.

**Note: Before using the reclaiming products, read the technical manuals for detailed instructions and consult the Material Safety Data Sheets (MSDS) for each product.**

## CAUTION:

The emulsions do not present risks if the basic principles of work safety and hygiene are followed.

Dichromate sensitizers contain heavy metals. They are dangerous to the health and to the environment. Before using this sensitizer, check the local legislation to verify if its use is allowed. AGABÊ does not recommend sensitizing emulsions with Dichromate. Use Diazo or pre-sensitized emulsions.

Read the Material Safety Data Sheets before using the products.

## OTHER INFORMATION:

The information on this document is based on the best of our current knowledge. This product is solely intended for industrial use. No warranties are made or implied. AGABÊ will not be held liable for claims related to any party's use or reliance on information or recommendation contained herein.