Unifilm 3D

TECHNICAL INFORMATION

The alternative for Capilary Films

APPLICATION:

For the preparation of thick stencils used in screen printing High Density inks for 3D designs.

PROPERTIES:

- **Chemical resistance:** for printing with plastisols, glitter, gel, silicone, mineral spirits and water based inks. Also suitable for glass frits and special ceramic inks.
- **High viscosity:** during the coating operation, the UNIFILM 3D emulsion does not run down or drip, allowing the use of wet on wet coating technique. All the coating is done in one operation, without the need for intermediate drying, or laminating steps. For stencils up to 1500 µm on mesh counts from 15 to 110 threads per inch (8 to 43 threads per cm).
- **High solid content:** with 56% solids, the amount of water is low. Because of this, there is a low thickness loss during the drying process.
- **High definition:** provides sharp edges that are independent of the mesh structure, even for coarse meshes.
- **Pre-sensitized - pure photopolymer formulation:** it comes ready to use. It is not necessary to add any sensitizer, or to wait for the disappearing of the air bubbles generated in the process of sensitization. It can be used for up to 2 years.
- **Extremely short exposure time:** thanks to its new and exclusive photopolymer technology, the exposure time is very short even for thick stencils. With UNIFILM 3D, the correct exposure time is about ten times shorter than a stencil of the same thickness made with a traditional diazo emulsion.
- **Long print runs:** during the coating process the emulsion penetrates in the fabric structure. Compared to capillary films it provides superior mesh adhesion and consequently longer print runs.
- **Fast process:** for the preparation of thick stencils, providing up to 1500 mm (59 thousand) in a single step process. There is no need for several drying cycles nor over laminating capillary films.

CHARACTERISTICS:

TECHNICAL FACTORS	UNIFILM 3D
Resistant to:	Plastisol (regular and high density) & Water based inks
Definition:	Superior
Mesh Counts:	15 to 110 threads/in (8 to 43 threads/cm)
Color:	Purple
Solid content:	56%
Shelf Life:	24 months
Shelf life of coated meshes:	3 months (at 100°F/37°C, in a dark and dry area)

Note: *Do not* store below freezing (32°F/0ºC).

INSTRUCTIONS:

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 can affect the print definition and resolution.

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

a - Thread material: use a high modulus polyester mesh, with better dimensional stability, which provides better registration. It also has good mechanical and tearing resistance.

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 detail, 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, only use mesh made with monofilament threads.

d - Thread diameter: for the same mesh count, thicker threads may block the ink flow, causing problems when printing finer details. We suggest the use of meshes with the highest percentage of open area (thinner thread diameter).

MESH STRETCHING:

For printing thick layers of high density plastisol, the mesh should be stretched with final tension higher than 25 N/cm. The manufacturers of other types of inks should be contacted in order to obtain the specification of the correct tension based on the characteristics of the printing process. Use pneumatic equipment or retensionable frames. The lack of tension control will cause distortion, loss of registration and variations in the ink deposit and color printed.

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 and dust particles, use a Degreaser or Mesh Abraider (Liquid or Gel): Apply one of them on the wet stencil, over the whole surface - on both sides of the mesh. Rinse well with water, including the frame. After the treatment do not touch the mesh.

For coarser meshes, the adhesion of the emulsion can be improved by pre-treating the fabric with HB 12 Abrasive paste, which increases the surface area of the threads besides cleaning.

SENSITIZING:

The emulsion UNIFILM 3D is ready to use. There is no need to add any sensitizer.

Open the pot and handle the emulsion only under yellow light. Since the emulsion is extremely sensitive to light (very short exposure time), the screens should be coated, dried and handled in areas free of UV radiation. Avoid accidental exposure to white light in the working areas. Exposure to white light may harden the emulsion, causing loss of details and impairing the wash out.

COATING:

For manual coating, use HB APLIC® coating through 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. It is preferable to use the thinner edge of the coater. The screen should be in the vertical position, slightly tilted.

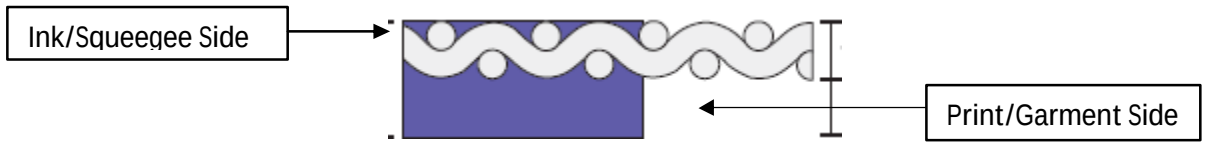
Slowly coat 4 times on the inside (that is the squeegee side), filling the mesh with emulsion. Then, in order to avoid air bubbles on the stencil, scrape the excess emulsion from the print side with another coater. This collected excess emulsion should be kept for subsequent use. After that, without drying, coat 6 to 18 times on the squeegee side, forcing the emulsion to the outside, creating thus a thick layer.

In order to obtain a more uniform emulsion layer, reverse the coating direction every 4 passes.

The more coats on the squeegee side, the thicker the emulsion layer on the print side. For the same coating process, the final thickness depends on the type of mesh.

The table 1 presents the final thickness results for several coating methods on several fabrics.

During manual coating, the thickness can vary slightly, depending on the amount of emulsion loaded on the coater, the stencil angle and coating pressure and speed. For a perfect control, a thickness gauge should be used.



Thick Film Stencil

THICKNESS & COATING CHART:

UNIFILM 3D	**Total thickness (in Microns / µm)**				EOM/SS
MESH COUNT US/METRIC	4 squeegee side + remove on print side + 8 squeegee side	4 squeegee side + remove on print side + 12 squeegee side	4 squeegee side + remove on print side + 16 squeegee side	4 squeegee side + remove on print side + 20 squeegee side	Thickness increase per coating stroke on the squeegee side
Polyester 25ct (10 metric)	790 µm	970 µm	1.150 µm	1.330 µm	45 µm/coat
Polyester 54ct (21 metric)	480 µm	600 µm	715 µm	830 µm	29 µm/coat
Polyester 81ct (32 metric)	335 µm	435 µm	530 µm	625 µm	24 µm/coat
Polyester 110ct (42 metric)	265 µm	345 µm	420 µm	495 µm	19 µm/coat

DRYING:

Dry the emulsion completely with the print side down. Never dry, leaving the screen upside down because gravity would force the emulsion to the squeegee side, reducing the external thickness and impairing the stencil flatness.

The thicker the emulsion layer, the longer will be the drying time. For very thick layers it is suggested to leave the screen to dry overnight at ambient temperature (75°F/22ºC) in a dark and dry area. Care should be taken to avoid accidental exposure to light.

To evaluate if the emulsion has dried completely, a surface humidity meter can be used. Otherwise the transparency of the emulsion layer should be observed: If the stencil looks milky the emulsion is not dry enough.

If the drying air is too hot, it may cause the formation of a hard surface layer which may difficult the drying of the inside layers. It can also create a non uniform layer with bubbles and influences the fabric stability.

EXPOSURE TO UV LIGHT:

Observe the following factors:

POSITIVE (film):

Avoid the use of translucent films such as those commonly used for laser or ink jet printers. It is best to use transparent films.

The black areas must be opaque to block completely all UV rays. All other areas must be transparent, clean and free of dust, to avoid light retention that will cause pinholes. Use positives with at least 1200 DPI resolution. With less resolution the edges of the final print will not be sharp.

Due to the characteristic of the process of printing thick layers, it is more difficult to reproduce fine details. Some practical experience is required to determine the size of the smallest dots and lines that can be printed. As an initial starting point, we suggest that the size of the finest detail should be at least twice the thickness of the stencil.

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.

LIGHT SOURCE:

Type: A pre-sensitized emulsion such as UNIFILM 3D requires the use of a source which emits light rich in UV rays such as halogen or mercury lamps.

Geometry: For a good image reproduction and a uniform hardening of the emulsion, the distance between a single light source and the surface of the stencil should be, at least, equal to the diagonal measurements of the screen. A larger distance reduces the loss of image resolution. 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 the 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 exposed stencil), the squeegee side of the emulsion layer will not be completely hard and will peel off the mesh during wash out. If the exposure time is too long (over exposure) the light diffraction will cause the loss of detail and of 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 AGABÊ Test positive for thick stencil. With this test, you may also evaluate the sharpness of the image and measure the loss of resolution.

There is also a practical way of achieving the right exposure time, using the Water Drop Test: Attach the positive to the print side of the stencil with transparent adhesive tape. Expose the stencil to UV light for a short period (for example 30 seconds).

EXPOSURE TIME TABLE

This Table below shows examples of ideal exposure times for several fabrics and thicknesses for UNIFILM 3D and may be used as a base for initial tests.

Mesh Count US/Metric	Mesh thickness	Coating method	Dried stencil thickness	Lamp	Distance	Exposure time
Polyester 110ct (42 metric) white	115 µm	4 SS + rem PS + 15 SS	400 µm	Halogen 7000 W	49 in (125 cm)	150 sec.
Polyester 81ct (32 metric) white	145 µm	4 SS + rem PS + 6 SS	290 µm	Halogen 7000 W	51 in (130 cm)	90 sec.
Polyester 54ct (21 metric) white	250 µm	4 SS + rem PS + 18 SS	770 µm	Halogen 7000 W	59 in (150 cm)	280 sec.
Polyester 25-270 (10-270) white	430 µm	4 SS + rem PS + 15 SS	1.105 µm	Halogen 7000 W	59 in (150 cm)	430 sec.

Note: SS - Squeegee Side / PS - Print Side.

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. To guarantee uniform wash out with details, it is suggested to rotate the screen and spread the water in several directions.

Stencils with very thick layer can be left submerged for at least 20 minutes prior to using water jet. The use of slightly warm water helps to dissolve unexposed emulsion. Verify the finer details to evaluate if the exposure time was correct. If the stencil is under exposed, the Liquid light exposure enhancer HB 70 can be used to fix the emulsion and to keep the residues from running down in open areas.

FINISHING:

Dry the screen completely. For plastisols inks, it is recomended to block the stencil edges with Water Removable block out (Normal or Fast drying). Seal the edges of the stencil, registration marks and the Test positive with block out chosen.

POST TREATMENT:

To increase the stencil resistance to abrasion and water based products, use Hardeners HB 76.

RECLAIMING (for reusing the mesh):

Use Platisol Ink Wash to eliminate any ink residues that create a barrier that block the action of the stencil decoaters. Apply the product using a nylon brush and wash it with running water.

Following this step, your Emulsion remover to decoat the emulsion layer. For best results, wet the screen with water and apply the Emulsion remover (Liquid or Gel) on the squeegee side. Leave it on for a few minutes (do no let it dry on the stencil). Wash it with running water and use high pressure water on the squeegee side.

To remove the so called ghost images use Haze remover (Liquid or Paste). Apply the Haze Remover on both sides of the dry mesh with a brush. Wash the stencil well using running water, prior to using high pressure jets.

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