

# ACRYLITE® FF Acrylic Sheet

## Fabrication Tech Brief #9 Painting & Printing

This brief gives advice for:

- Equipment and Materials
- Procedures
- Trouble Shooting
- Equipment Suppliers
- Additional Technical Information and Assistance

### Equipment and Materials

The crystal clarity and long-term weatherability of ACRYLITE FF® acrylic sheet allow for painting and printing on fabricated signs, displays, and other decorative items. Using the correct materials will help you produce a quality product.

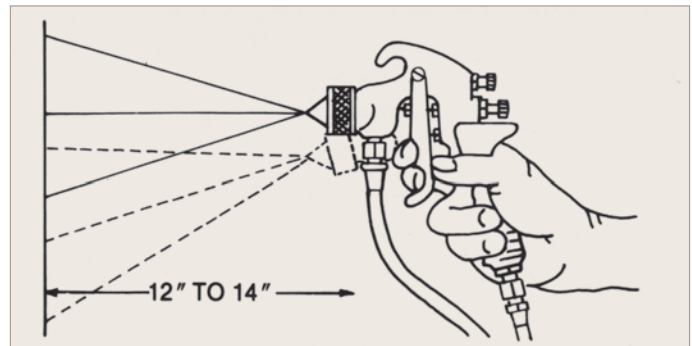
### Paints

The increased use of ACRYLITE FF sheet in signs and other decorative applications has led to a variety of paints designed especially for acrylics. Most are supplied as concentrates and require thinner to obtain the correct viscosity. As a rule, use mild thinner consisting of an alcohol blend, rather than one containing aromatic hydrocarbons. Benzene and toluene are two examples of aromatics. Follow paint supplier's recommendations on the amount and type of thinner.

ACRYLITE FF sheet's extraordinary transparency allows backpainting – applying paint to the side of the material that will not be exposed to the weather. Thus, the unpainted outer surface of the acrylic provides weather protection for the paint. However, if you must paint the outer surface, apply a protective coating over the paint. Paint suppliers can recommend a suitable coating.

### Spraying Systems

Any efficient atomizing spray gun system, which will uniformly distribute paint, may be used. Consult equipment suppliers regarding the equipment needed for a particular application. See the listing of suppliers at the end of this brief. Many paint suppliers also publish excellent manuals which provide up-to-date equipment suggestions.



To obtain atomizing air, the available line pressure should be in the range of 60-90 psig. Use a 25-ft, 5/16" minimum diameter hose to avoid pressure drops in the line. The air compressor should be large enough to provide the volume and pressure required for all guns. It is important to control water and oil in the atomizing air since this will spot the paint and cause non-uniform distribution. Water and oil traps in the line will alleviate the problem.

Equipment cleanliness is crucial to uniform paint dispersion. Place metal screen strainers at the pressure tank and spray gun. Clean these items and the spray gun daily.

Install a spray booth large enough to fit your largest work piece. Make sure it is adequately vented according to building code regulations. It is important to use a light box to judge paint uniformity on transparent plastics. Be sure the light box conforms to building code regulations for a spray painting area.

### Procedures

Be sure to follow the manufacturers' safety recommendations for equipment and materials used with ACRYLITE FF sheet.

### Fabrication Techniques

If you fabricate ACRYLITE FF sheet prior to painting, incorrect technique may cause heat build-up, resulting in crazing (numerous tiny cracks in the material) after painting. Fabrication Tech Briefs #2 through #8 discuss many aspects of fabrication. To ensure that crazing will not occur, review these briefs to assure your fabrication techniques are correct.

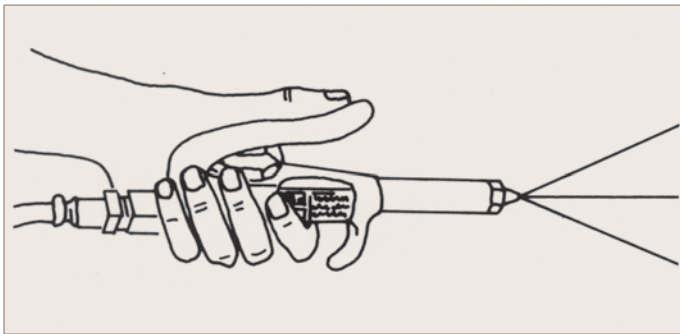
## Cleaning

Clean ACRYLITE FF sheet before painting to remove dust and assure paint adherence. Since acrylic sheet is sensitive to solvents such as aromatic hydrocarbons, concentrated alcohol, and ketones, use care in cleaning. Clean parts with a 25% solution of denatured alcohol and distilled water. However, for stains such as oil or grease, use a stronger cleaning agent such as hexane, aliphatic naphtha, or kerosene. Be sure the sheet is fully dry and clean before painting.

## Static Neutralization

Before painting, it is important to neutralize electric or static charges that accumulate on the sheet's surface. Dust on the sheet causes paint agglomeration and uneven layers. Since tearing the masking off the sheet will create a static charge, all acrylic pieces should be treated.

One common way to do this is with an ionizing air gun. These guns safely and effectively neutralize electric charges. Alternate techniques, such as wiping the sheet with a damp, lint-free cloth or cleaning with a diluted alcohol-water solution, are also effective.



Avoid anti-static cleaners since they may leave a residue and cause paint adhesion problems.

## Maskants

The protective paper masking is usually used as a protective layer for spray painting flat signs. However, many paint manufacturers also distribute liquid maskants, which are commonly used to spray paint designs onto ACRYLITE FF sheet. Maskant is supplied as a thick liquid consisting of water-soluble latex resins in solution. Because they are water solutions, maskants must be stored above 32°F to prevent freezing. Application is through the use of air or airless atomizing spray equipment – see the drawing on the first page of this brief.

Clogging may occur due to dried film mixed with the solution. To prevent this, obtain a special nozzle that reverses the flow of product and cleans out the build-up. These nozzles are available from the suppliers of painting equipment listed at the end of this brief. Spray the film on evenly to a wet thickness of 10-12 mils, which will dry to above 4-5 mils.

## Maskant Drying

Drying time is usually about 2 hours, although it is better to plan overnight drying to assure complete evaporation. Drying can be accelerated by using forced-air heating at 110°F – do not go above this temperature as doing so might dry the surface and prevent evaporation of the water in the layers beneath.

Leave the dried film in place until you are ready to paint to prevent dust accumulation on the plastic surface. Just before painting, score the design on the film using an X-Acto knife (available in art supply stores), giving it just enough pressure to cut the film without scratching the plastic. After painting, leave the film in place until the

paint is thoroughly dry. Otherwise, you will get smeared paint and uneven edges.

## Painting

Before painting, practice on a few test pieces to be sure that paint viscosity and air pressure are correct. Too high a delivery rate will result in too much paint and cause paint sag. It may also cause crazing due to too much solvent. Too low a delivery rate will result in “dry spray”, a matte surface caused by too much dusting.

As a rule, use the lowest pressure at which you obtain correct results. Hold the gun 12-14 inches from the workpiece – too close or too far will cause the above listed defects. Move the gun at an even pace and in a straight line. Its movement should never start or stop directly on the sheet surface.

Vary the direction of the spray, horizontally and vertically, to assure uniform coverage. Usually, four or five passes with several seconds between coats will provide sufficient paint. As mentioned, a light box behind the ACRYLITE FF sheet will help in judging the uniformity and intensity of color.

## Paint Removal

If you need to remove paint from the surface of ACRYLITE FF sheet, take it off immediately with the paint manufacturer's recommended cleaner. Apply the remover using a rag; wipe off paint using a clean rag. Because paint removers contain organic solvents, minimize the time the remover is in contact with acrylic to reduce the chance of crazing.

## Screen Printing

Screen-printing is used for volume production. It is fast, and economical. For beginners, it is best to purchase a screen from a local screen supply house. After setup, apply paint with the squeegee in a uniform, even motion in one direction. It will pass through the open mesh on the screen, transferring the pattern onto the acrylic. The most important factors in the screening process are the paint's viscosity and the size of the mesh openings. These will determine paint flow through the screen and the paint's appearance on the acrylic.

Since many different fabrics are used for screening, and paint viscosity depends on the application and temperature conditions, it is difficult to generalize what these conditions should be. Paint manufacturers give advice on thinning paint. Consult these companies should you need information.

## Digital Printing

Printers can generally be divided into two categories:

**Continuous flow** - systems which provide a constant flow of ink with a portion of this flow being re-circulated. Ink is deposited on the printing surface by electrostatic charges.

**Drop on demand (DOD)** – systems which expel ink from the printing heads only when needed. DOD systems can be further broken down into the following two categories:

*Thermal* – printers that gasify the ink immediately prior to application

*Piezo* – printers that mechanically supply liquid inks to the substrate

Thermal DOD printers, historically, benefited from lower initial cost at the expense of more maintenance to the printing heads due to clogging, and wear of nozzles. Piezo DOD systems while costing more initially, require less maintenance. An additional benefit of piezo printers is the ability to use more heavily pigmented inks that are better for outdoor applications.

The present day's demand for more durable prints coupled with reduced printer costs have, over time, made piezo systems the dominant type of printer.

Piezo systems use one of two main types of inks:

1. Solvent – includes water based, eco-solvent, and petroleum based solvent
2. UV curable

Piezo printers are designed to use either UV curable or solvent based inks, not both. Either of these ink types can be formulated using dyes, pigments, or a combination thereof. Generally inks will include some level of pigments in order to have good outdoor durability and opacity.

Solvent printers are a more mature technology and represent the vast majority of installations. Primarily solvent printers are used for roll to roll or flexible media with few installations set-up for rigid media or sheet. UV printers, driven in part by growing environmental concerns with the use of solvents, represent the fastest growing market for printers.

Whether printing with a solvent or UV machine, print adhesion is in large part determined by the ink. It is typical that printer manufacturers will offer only one choice of ink for their machines. Ink selection is therefore primarily dictated by machine selection. When considering a UV digital printer, acrylic and polycarbonate sheets will provide similar ink adhesion and durability. Adhesion may be improved by wiping the substrate with isopropyl alcohol immediately before printing. Care should be taken to wipe away this alcohol as prolonged and repeated exposure can cause crazing (chemical attack) of the sheet.

For demanding applications where high adhesion and resistance to scratching is important, "rigid" UV inks are a good solution. Currently "rigid" inks are used only in conjunction with a few brands of printers. The Durst Rho 600 and select Raster printers are two examples. Prints made using these printers with the rigid UV ink on ACRYLITE sheet exhibit excellent adhesion and scratch resistance.

## Trouble Shooting

The problems listed below represent the most common concerns when painting ACRYLITE FF sheet. Most paint manufacturers publish excellent paint manuals that contain much more detailed information on trouble-shooting paint problems. Consult these manuals or the paint manufacturer regarding problems not covered here.

Problem	Cause	Solution
<b>Maskants</b>		
<b>Weak and brittle maskant</b>	Air bubbles in film	Dilute slightly
	Film not thoroughly dry	Wait recommended drying time
	Maskant film too thin	Increase film thickness to 3-5 mils (10-12 mils wet)
<b>To much adhesion</b>	Maskant film too thin	Increase film thickness to 3-5 mils (10-12 mils wet)
	Coating exposed to UV	Do not store faces outside
<b>Spray Paints</b>		
<b>Poor adhesion</b>	Incorrect paint	Use paints recommended for use with acrylic
	Dirt or residue on sheet	Clean sheet thoroughly before painting
<b>Blotches of paint</b>	Static electricity	Neutralize charges with ionizing gun Wipe with damp cloth
	Uneven paint application	Apply paint in more passes using less paint per pass
	Paint not applied uniformly	Use back-lighting to check paint as it is being applied
<b>Screen Paints</b>		
<b>Poor detail</b>	Screen mesh too coarse	Use a finer mesh screen
	Paint too thin	Use less thinner
	Worn screen	Replace screen
<b>Paint drying on screen</b>	Hot, dry weather	Add retarder to slow paint drying
	Too much time between screening	Flood screen between passes
<b>Crazing</b>	Stress from fabrication	Review fabrication techniques –Tech Briefs 2 through 8
	Flame polishing	Flame polish as last step
<b>Digital Printing</b>		
<b>Ink is brittle</b>	Too much UV cure time	Adjust print conditions for less UV cure time
<b>Poor adhesion</b>	Dirt or residue on sheet	Clean sheet with 50:50 water plus IPA mix
	Wrong masking	Do not use sheet with adhesive based masking
	Insufficient dwell time	Adjust print conditions for additional cure time

### Important Notice:

The information and statements herein are believed to be reliable but are not to be construed as a warranty for which we assume legal responsibility. Users should undertake sufficient verification and testing to determine the suitability for their own particular purpose of any information or products referred to herein. NO WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE IS MADE. Nothing herein is to be taken as permission, inducement or recommendation to practice any patented invention without a license.

### Fire Precautions:

ACRYLITE GP and ACRYLITE FF acrylic sheet are combustible thermoplastics. Precautions should be taken to protect these materials from flames and high heat sources. ACRYLITE GP and ACRYLITE FF sheet usually burn rapidly to completion if not extinguished. The products of combustion, if sufficient air is present, are carbon dioxide and water. However, in many fires sufficient air will not be present and toxic carbon monoxide will be formed, as it will when other common combustible materials are burned. We urge good judgment in the use of these versatile materials and recommend that building codes be followed carefully to assure they are used properly.

## Equipment and Materials Suppliers

The suppliers listed below offer materials and equipment tested and approved by Evonik Cyro LLC. Authorized ACRYLITE Sheet Distributors may also offer materials and equipment.

### Paints

*Lacryl 400 Series (Sprayable Paints)*  
Use with: 205 Thinner at 1:1  
(2:1 for whites)  
*Lacryl 498 Block-out for opaque finishes*

**Spraylat Corporation**  
716 South Columbus Avenue  
Mount Vernon, NY 10550  
Ph 914-699-3030  
Fax: 914-699-3035  
www.spraylat.com

*Grip-Flex (Sprayable Paints)*  
Use with T-2003, T-2004, or T-2005  
reducers per Grip Flex Technical Data Sheet

**AKZO Nobel Coatings Inc.**  
5555 Spaulding Drive  
Norcross, GA 30092  
1-800-618-1010, 770-662-8464  
www.signfinishes.com

Wide selection of paints depending on pre-applied undercoat Tie Bond adhesive layer.

**Matthews Paint**  
Lakeview Corporate Park  
8201 100th Street  
Pleasant Prairie, WI 53158-2201  
800-323-6593  
www.matthewspaint.com

### Paint Removers

206 Cleaner / Remover  
205 Thinner

**Spraylat Corporation**  
716 South Columbus Avenue  
Mount Vernon, NY 10550  
914-699-3030  
Fax: 914-699-3035  
www.spraylat.com

T-4000 Cleaner / Remover  
T-2003 Reducer – medium temp reducer  
T-2004 Reducer – cold temp, fast reducer  
T-2005 Reducer – high temp, slow reducer

**AKZO Nobel Coatings Inc.**  
5555 Spaulding Drive  
Norcross, GA 30092  
1-800-618-1010, 770-662-8464  
www.signfinishes.com

### Screen Printing Inks

*Lacryl 800 Series (Screen Inks)*  
Use with: 208 Thinner, 218 Retarder  
*Lacryl 898 Block-out for opaque finishes*

**Spraylat Corporation**  
716 South Columbus Avenue  
Mount Vernon, NY 10550  
Ph 914-699-3030  
Fax: 914-699-3035  
www.spraylat.com

*9700 All Purpose Screen Ink*  
*70000 Plastivac Gloss Screen Ink*  
*Plastic Plus Gloss Vinyl Screen Ink*

**Naz-Dar**  
New Willow Road  
North Field, IL 60093  
312-943-8338  
Fax: 847-446-7667  
www.nazdar.com

Series REV  
Series HG

**Coates Screen/Sun Chemical**  
631 Central Ave.  
Carlstadt, NJ 07072  
Tel: +1 (201) 933-4500  
Fax: +1 (201) 288-0727

### Liquid Latex Maskants

Sign Strip

**Spraylat Corporation**  
716 South Columbus Avenue  
Mount Vernon, NY 10550  
914-699-3030  
Fax: 914-699-3035  
www.spraylat.com

Grip Mask

**AKZO Nobel Company**  
**Wyandotte Paint Products**  
5555 Spaulding Drive  
Norcross, GA 30092  
1-800-233-3301  
Fax: 1-800-888-8464  
www.signfinishes.com

### Anti-Static Air Guns

**The Simco Industrial Static Control**  
An Illinois Tool Works Co.  
2257 North Penn Road  
Hatfield, PA 19440-1998  
215-822-2171  
Fax: 215-822-3795  
www.simco-static.com

**AiRTX International**  
1770 W. Lexington Ave.  
Cincinnati, OH 45212  
1-800-307-7475  
www.artxltld.com

### Painting Equipment

**Binks ITW Industrial Finishing**  
195 International Blvd.  
Glendale Heights, IL 60139  
1-888-526-7658  
Fax: 630-237-5011  
www.binks.com

**The DeVilbiss Company**  
An Illinois Tool Works Co.  
P.O. Box 913  
Toledo, OH 43692  
419-470-2169  
Fax: 419-470-2270  
www.devilbiss.com

### Inks for UV Curable and Solvent Flatbed

*Inks for digital printers are typically are specific to the machine and sold primarily by the original equipment manufacturer (OEM). The following are large ink producers who offer various inks:*

**Fujifilm Sericol**  
1101 W. Cambridge Drive  
Kansas City, KS 66103  
Ph. 913-342-4060  
Fax 913-342-4752  
www.sericol.com

**Triangle Digital Imaging Solutions**  
2125 Williams Street  
San Leandro, CA 94577  
Ph. 510-895-8001  
Fax 510-895-8080  
www.triangledigital.biz

### Digital Printer Manufacturers

*There are many manufacturers of digital printers. The following references only a few manufacturers with whom Evonik Cyro has been in contact:*

**Durst US**  
50 Methodist Hill Drive  
Suite 100  
Rochester, NY 14623  
Ph. 585-486-0340  
www.durstus.com

**Gerber Scientific**  
83 Gerber Road  
South Windsor, CT 06074  
800-222-7446  
www.gspinc.com

**Raster Printers**  
2192 Bering Drive  
San Jose, Ca 95131  
(408) 545-0540  
www.rasterprinters.com

**Gandinovations**  
5975 Falbourne Street  
Mississauga, ON, L5R3V8  
866-500-Jeti  
www.gandinovations.com

### Knives to Cut Masking Film

**X-Acto**  
45-35 Van Dam Street  
Long Island City, NY 11101  
(Knives available in art supply stores)  
www.xacto.com

### Films

Contact Your Local Sign Supply Distributor

### Trim Cap

Contact Your Local Sign Supply Distributor

For further details on our specialty acrylic products please visit our website at [www.cyro.com](http://www.cyro.com) or [www.acrylite-magic.com](http://www.acrylite-magic.com). Contact us for information regarding custom colors and sizes.

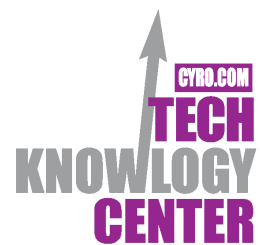
ACRYLITE® is a registered trademark of Evonik Cyro LLC. PLEXIGLAS® is a registered trademark of Evonik Röhm GmbH, Darmstadt, Germany. Both companies are part of Evonik Industries' Business Unit Performance Polymers, a worldwide manufacturer of acrylic sheet products sold under the PLEXIGLAS trademark on the European, Asian, African and Australian continents and under the trademark ACRYLITE® in the Americas.



**Evonik Cyro LLC**  
379 Interpace Parkway  
Parsippany, NJ 07054

PHONE: 1+ 800 631 5384 or 1+ 973 541 8000

[www.cyro.com](http://www.cyro.com)  
[www.evonik.com](http://www.evonik.com)



### Technical Support

Visit the Tech Knowledge Center at [www.cyro.com](http://www.cyro.com) where visitors have immediate access to FAQs, technical information, tips, and hundreds of other facts about ACRYLITE acrylic products.