FOME-COR®

The Paper-Faced Foam Board Family

FOME-COR® BOARD
VALUBOARD™
ACID-FREE
SELF-ADHESIVE
HEAT-ACTIVATED
JETMOUNT®
FOAM-X® RECOVERY

Fabrication Manual

3A Composites

May 2011

Foreword

Thank you for choosing a 3A Composites product for your graphic display applications.

We have compiled this Fabrication Manual based on our Fabrication Guide, which is divided into the following sections:

Mounting

Repositioning Vinyl

Direct Digital Printing

Direct Screen Printing

Painting

Knife Cutting

Saw Cutting

Routing

Die Cutting / Punching

Embossing

Forming Curves

Appendix I: MSDS (Material Data Safety Sheet)

Appendix II: Specifications

This Fabrication Guide was created to incorporate the most common fabrication methods that are used with 3A Composites' line of graphics display products. Not all fabrication methods are compatible with each product, but this format was kept for consistency purposes. **The term "the substrate" is used throughout this guide and is meant to apply to all members of the substrate family unless noted otherwise.** Those fabrication methods that do not apply to a certain product are stated with a short explanation and a recommendation for an alternative product that fits that application method.

This manual also contains Appendix I which provides a Material Safety Data Sheet section. Appendix II includes an adhesives, fastening and storage guidelines section. Any unique product information will be contained in Appendix II. See Table of Contents. An Appendix III section lists products that can be used in conjunction with 3A Composites products. 3A Composites is not responsible for the performance of any of these products when used independently or with any 3A Composites product.

The date of the last revision is shown on the bottom right hand corner of each page. Please make sure you have the most current version by going to GraphicDisplayUSA.com and selecting the document library.

If you have any further questions about our product or about how to use this manual, please feel free to contact us at 1-800-626-3365.

PLEASE NOTE:

TRIALING IS RECOMMENDED TO ENSURE SUITABILITY FOR THE PROPOSED APPLICATION AND FABRICATION BEFORE FULL-SCALE COMMERCIALIZATION.

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CHOOSING YOUR GRAPHIC DISPLAY BOARD IS EASIER THAN EVER.

3A Composites offers a legendary array of brands for the graphic display market, including: fluted polypropylene sheets, paper-faced foam boards, expanded plastic boards, polystyrene foam boards with wood-fiber veneers, and aluminum composite panels. All of our brands offer unique competitive advantages and outstanding capabilities for designers and fabricators seeking to create signage, displays and graphic applications on an epic scale.

FLUTED POLYPROPYLENE

- **Omni-Flute™** is fluted polypropylene specifically for graphic display. It is comprised of extruded polypropylene flutes and facers to form a homogeneous corrugated sheet.

WHY CHOOSE OMNI-FLUTE™?

- Made with latest technology and equipment
- Extremely lightweight yet rigid
- Color consistent
- Specially treated surface on both sides to promote the adhesion of most forms of graphics

THE PAPER-FACED FOAM BOARD FAMILY

- **Fome-Cor® Board** is the industry's leading paper-faced foam board for more than 40 years. It is comprised of extruded polystyrene foam with clay-coated white or black paper facers.
- **Fome-Cor® ValuBoard™** is comprised of extruded polystyrene foam with natural kraft facers.
- **Fome-Cor® Acid-Free** is comprised of extruded polystyrene foam with acid-free paper facers that meet Library of Congress standards for conservation framing.
- **Fome-Cor® Self-Adhesive** is comprised of extruded polystyrene foam with clay-coated paper facers, one of which is covered with pressure sensitive adhesive. Simply peel back the release facer as you position the graphic on the sticky surface.
- **Fome-Cor® Heat-Activated** is comprised of extruded polystyrene foam with clay-coated paper facers, one of which is covered with heat-activated adhesive.
- **Fome-Cor® JetMount®** is comprised of denser extruded polystyrene foam with clay-coated paper facers.
- **Foam-X® Recovery** is comprised of "memory retaining" polystyrene foam with clay-coated paper facers.

3A Composites Family of Products

FOME-COR®
FomeCorUSA.com

WHY CHOOSE FOME-COR®?

- The original graphic arts foam board with a great reputation for performance
- Perfect for die cutting with a compressed edge that stays closed
- Quick service on cut-to-size orders including large sheets up to 8'x10'
- Uniquely embossable for 3-D effect displays
- Cuts easily and cleanly, even by hand
- Extremely lightweight
- Well-suited for screen printing or digital direct printing applications

WHY CHOOSE FOME-COR® VALUEBOARD™?

- A cost-effective alternative to corrugated cardboard
- Provides a smooth surface for mounting with no flute marks

WHY CHOOSE FOME-COR® ACID FREE?

- Perfect for the archival preservation of valuable art and photographs
- No additional backing is required, saving time and framing materials

WHY CHOOSE FOME-COR® SELF-ADHESIVE?

- Eliminates the use of pressure-sensitive adhesive stock
- Available in repositionable Low-Tack (LT) or immediate bonding High-Tack (HT)
- HT identified by red release facer and LT identified by blue release facer

WHY CHOOSE FOME-COR® HEAT-ACTIVATED?

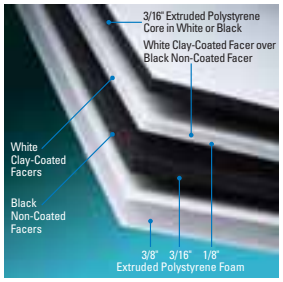
- Eliminates the use of hot melt tissue stock
- The adhesive is activated with low temperature settings for a quick, damage-free mount
- Can be used on a heated mechanical or vacuum dry mount press, or with a heated roller laminator

WHY CHOOSE FOME-COR® JETMOUNT®?

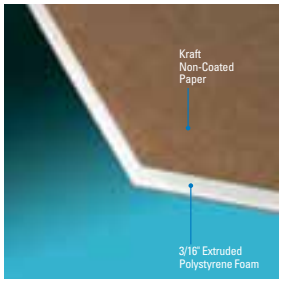
- The denser foam core provides increased rigidity and warp resistance
- Great for more demanding mounting jobs for display, signage and framing

WHY CHOOSE FOAM-X® RECOVERY?

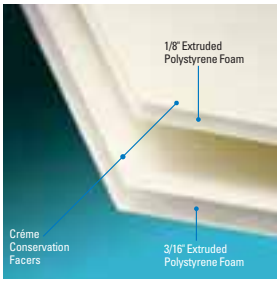
- Memory core resists denting
- Edges remain open when die cut
- Economical alternative to competitive foam boards



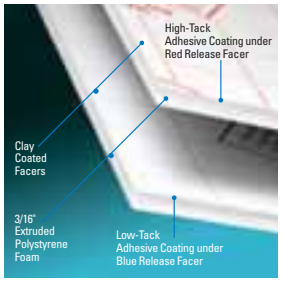
Fome-Cor® Board



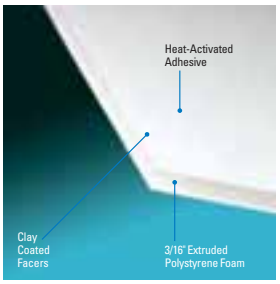
ValuBoard™



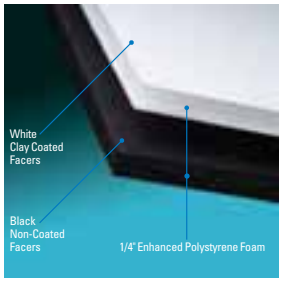
Acid-Free



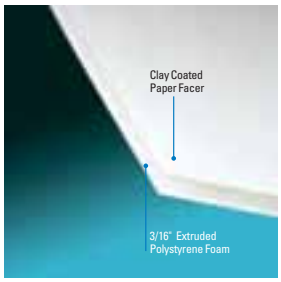
Self-Adhesive



Heat-Activated



JetMount®



Foam-X® Recovery

THE FOAMED PVC FAMILY

- **Sintra®** has been the industry's leading PVC for more than 20 years. It is comprised of moderately expanded closed-cell polyvinyl chloride (PVC) in a homogenous sheet with a low-gloss matte finish.
- **e-pvc™** is a low-density, lighter, and less rigid expanded PVC board.

WHY CHOOSE SINTRA®?

- Sintra Bright White is now the brightest and whitest PVC board on the market
- The trusted brand leader by which all others are measured
- Lightweight yet rigid and durable
- Easily formed into just about any shape imaginable using wood and foam board fabrication techniques
- Heat formable and chemical resistant
- Superior dent and scratch resistance

WHY CHOOSE e-pvc™?

- Economical PVC alternative for less-demanding applications

THE HEAVY-DUTY FOAM BOARD FAMILY

- **Gatorfoam®** is the industry's leading heavy-duty foam board for more than 30 years. It is comprised of extruded polystyrene foam bonded between two layers of wood-fiber veneer.
- **Gatorplast®** is comprised of extruded polystyrene foam bonded between two layers of high-impact polystyrene cap sheets.
- **Gatorblanks®** are thick panels of extruded polystyrene foam with no facers.

WHY CHOOSE GATORFOAM®?

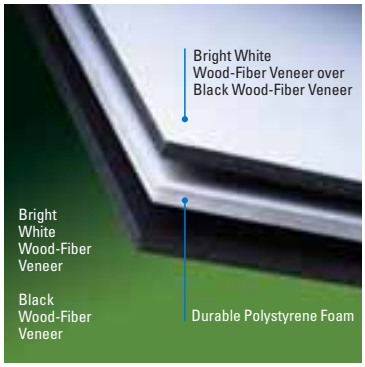
- The original, heavy-duty graphic arts board
- Excellent reputation for digital and screenprinting
- New, Bright White facer is the brightest board of its kind
- Dent and scratch resistant

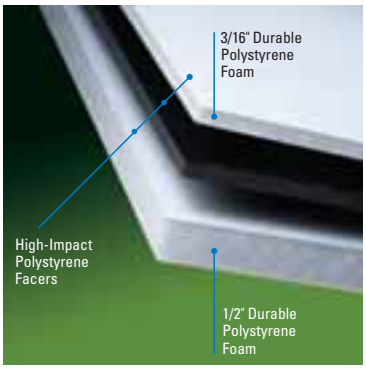
WHY CHOOSE GATORPLAST®?

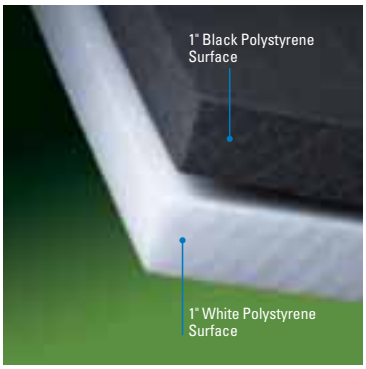
- Smooth, high-impact liners resist warping
- Lightweight and water-resistant
- Vinyl graphics are repositionable

WHY CHOOSE GATORBLANKS®?

- Perfect for signs, displays and dramatic in-store lettering
- Lightweight yet durable, and easy to cut and form







THE ALUMINUM COMPOSITE MATERIAL (ACM) FAMILY

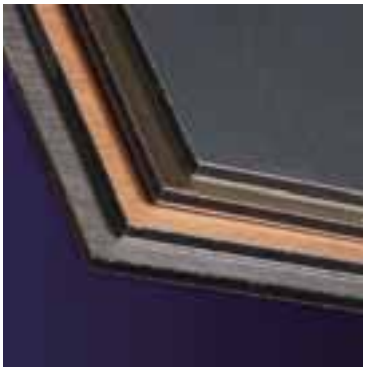
- **Dibond®** has been the industry's leading ACM for more than 15 years. It is comprised of two pre-painted sheets of .012" aluminum with a solid polyethylene core.
- **e-panel™** is comprised of two pre-painted sheets of .008" aluminum with a solid polyethylene core, and manufactured in China.

WHY CHOOSE DIBOND®?

- Flattest panel on the market
- Superior surface protects expensive digital and screen-printed graphics
- Provides excellent durability in outdoor applications
- Won't bow or oil can
- Approximately one half the weight of a solid aluminum sheet
- Can be routed and returned to add dimension or roll-formed to deliver sweeping curves

WHY CHOOSE e-panel™?

- Recommended for flat panel applications



Choosing Your Graphic Display Board

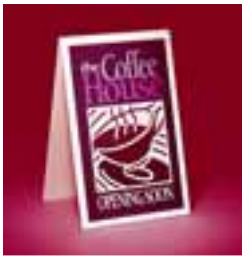
FOME-COR®
FomeCorUSA.com

Application Guide

PRICE RANGE

	POP Displays	Exhibits & Kiosks	Framing	Framing - Archival	Signage - Interior	Signage - Exterior	Signage - Structural
$ Omni-Flute™	M	M			M	S	
Fome-Cor® ValuBoard™	S	S	L		S		
Fome-Cor® Board	S	S	L		S		
Foam-X® Recovery	S	S	L		S		
Fome-Cor® Acid-Free				L			
Fome-Cor® Self-Adhesive HT	S	S	L		S		
Fome-Cor® Self-Adhesive LT	S	S	L		S		
$$ Fome-Cor® Heat-Activated	S	S	L		S		
Fome-Cor® JetMount®	S	S	L		S		
e-pvc™	M	M	L	L	M	M	
Sintra®	M	M	L	L	M	M	
Gatorblanks®	M	M			M	M	
Gatorplast®	M	M			M		
Gatorfoam®	M	M	L		M	M1	
e-panel™	L	L	L	L	L	L	
$$$ Dibond®	L	L	L	L	L	L	L1

S Short-term application life
M Medium-term application life
M1 Black Gatorfoam is not recommended for outdoor usage
L Long-term application life
L1 Applications such as workzone signage, canopies, pylons and column covers



TOP TO BOTTOM / SAMPLE APPLICATIONS

> Short-term interior signage using 3/16" White Foam-X Recovery photomounted.
> Medium-term POP display using 3mm White Sintra screenprinted.
> Long-term exterior signage using 3mm White Dibond with colored acrylic overlay.

Fabrication Guide

PRICE RANGE

	Mounting	Repositioning Vinyl	Direct Digital Printing	Direct Screen Printing	Painting	Knife Cutting	Saw Cutting	Routing	Die Cutting/Punching	Embossing	Forming Curves
$ Omni-Flute™	◆	◆	◆	◆	◆	◆	◆	◆	◆		
Fome-Cor® ValuBoard™	◆					◆			◆	◆	
Fome-Cor® Board	◆		◆	◆	3	◆			◆	◆	
Foam-X® Recovery	◆		◆	◆	3	◆			◆		
Fome-Cor® Acid-Free	0					◆			◆		
Fome-Cor® Self-Adhesive HT	◆					◆			◆	◆	
Fome-Cor® Self-Adhesive LT	◆					◆			◆	◆	
$$ Fome-Cor® Heat-Activated	◆					◆			◆	◆	
Fome-Cor® JetMount®	◆		◆	◆	3	◆			◆		
e-pvc™	◆	◆	◆	◆	◆	4	◆	◆	5		◆
Sintra®	1	◆	◆	◆	◆	4	◆	◆	5		◆
Gatorblanks®	◆				3	◆	◆	◆			
Gatorplast®	◆	◆	◆	◆	3	◆	◆	◆	5		
Gatorfoam®	◆		◆	2	3		◆	◆			
e-panel™	1	◆	◆	◆	◆		◆	◆	6		
$$$ Dibond®	1	◆	◆	◆	◆		◆	◆	6		◆

0 Archival conservation mounting
1 Cold mounting techniques only
2 Face priming will provide better results
3 Do not expose polystyrene to solvent-based paints
4 May be knife cut in gauges up to 3mm
5 May be die cut in gauges up to 5mm or 3/16"
6 Punch press die set is required, not a steel rule die

TOP TO BOTTOM / SAMPLE APPLICATIONS

> Exterior signage application using pyramid rolled 3mm Black Dibond.
> Archival photo mounting using 3/16" Fome-Cor Acid-Free.
> In-store signage application features multiple layers of 1/2", 3/4" and 1-1/2" White Gatorfoam spray painted, silk screened and routed.

Introduction to Fome-Cor®

The original paper-faced foam-centered graphic display boards that set the industry standard. More graphic arts ideas have appeared on legendary Fome-Cor products than any other graphic arts board. Fome-Cor, the original foam core graphic arts board, has been supporting your creative vision for more than 40+ years; and it's still the one you ask for by name.

Fome-Cor Graphic Display Products consists of two products lines – Fome-Cor Board and Fome-Cor Specialty Products, which consist of:

Fome-Cor®:	**Fome-Cor® Specialty Products:**
Fome-Cor® Board	Fome-Cor® Acid-Free
Fome-Cor JetMount®	Fome-Cor® Self-Adhesive (Low-Tack and High-Tack)
ValuBoard	Fome-Cor® Heat Activated
Foam-X®	

Fome-Cor Products consist of extruded polystyrene foam bonded between various high-quality papers. It's available in a wide variety of sheet sizes and thicknesses as described below for just about any graphic display application. You can choose from white, black, or natural liners; white or black foam for various looks; recovery foam or embossable; and two types of adhesive surfaces on clay-coated liners.

Why Choose Fome-Cor?

The Fome-Cor board set of products feature a lightweight, rigid, smooth, flat and uniform surface. These characteristics make Fome-Cor board suitable for a wide variety of application and fabrication methods. It can be mounted on or direct printed. It can be easily cut with knife like tools or dramatic die cutting. Die-cutting features of an open edge can be accomplished with Foam-X and closed edges and 3-D embossing with Fome-Cor Board. Fome-Cor board products are available as thin as 1/8", progressing to 3/16", 1/4" and finally 3/8". Consult the 3A Composites website for the most current products and sizes at **GraphicDisplayUSA.com**.

The Fome-Cor board Specialty Products provide two methods for adhering artwork with either a peel and stick self-adhesive in a repositional low-tack or quick set high-tack, or a heat-activated. For those conservation framing jobs we provide an acid-free board.

Application

	POP Displays	Exhibits & Kiosks	Framing	Framing - Archival	Signage - Interior	Signage - Exterior	Signage - Structural
Fome-Cor® Board	S	S	L		S		
Fome-Cor® ValuBoard™	S	S	L		S		
Fome-Cor® Acid-Free				L			
Fome-Cor® Self-Adhesive HT	S	S	L		S		
Fome-Cor® Self-Adhesive LT	S	S	L		S		
Fome-Cor® Heat-Activated	S	S	L		S		
Fome-Cor® JetMount	S	S	L		S		
Foam-X® Recovery	S	S	L		S		

S Short-term application life

L Long-term application life

Fabrication

	Mounting	Repositioning Vinyl	Direct Digital Printing	Direct Screenprinting	Painting	Knife Cutting	Saw Cutting	Routing	Die Cutting / Punching	Embossing	Forming Curves
Fome-Cor® Board	◆		◆	◆	2	◆			◆	◆	
Fome-Cor® ValuBoard™	◆					◆			◆	◆	
Fome-Cor® Acid-Free	1					◆			◆		
Fome-Cor® Self-Adhesive HT	◆					◆			◆	◆	
Fome-Cor® Self-Adhesive LT	◆					◆			◆	◆	
Fome-Cor® Heat-Activated	◆					◆			◆	◆	
Fome-Cor® JetMount	◆		◆	◆	2	◆			◆		
Foam-X® Recovery	◆		◆	◆	2	◆			◆		

1 Archival conservation mounting

2 Do not expose core to solvent-based paints

Mounting – General Notes

Mounting, laminating and bonding are terms that are often times interchanged. For this document mounting is defined as the attachment of the graphic to the substrate. Lamination is the application of a covering (film or liquid) over the mounted item to either protect the graphic or provide a certain appearance i.e. matte or glossy finish. Bonding also conveys affixing one thing to another. This can involve a graphic to a substrate or one substrate to another. This document uses the term "mounting" to convey affixing as opposed to bonding. A paper, foil, plastic or fabric graphic can be mounted to the substrate.

With regard to adhesive, mounting consideration should follow the adhesive manufacturer's instructions. In general, determine the minimum amount of adhesive lay down to attain the desired adhesion level. It is advisable to leave the boards for a period of time to setup. Consult the adhesive manufacturer's instructions to see what specific times are recommended. Please refer to Appendix I for additional adhesive information.

1. A Note on Archival Mounting (Conservation Framing)

a. Only Fome-Cor Acid Free is suitable for Archival Mounting.

b. Conservation or archival mounting requires the selection of materials that are pH neutral to use in conjunction with the substrate and the artwork. This includes matting material, hinges, and adhesives. Matboards, particularly those in contact with the art, should meet the Library of Congress specifications. Art must never be mounted in contact with the glass. If long-term preservation is the goal, only UV protection glass should be used. Finally, it is a good practice to seal the back of the frame with a dust cover or barrier paper.

2. Methods for Mounting

a. There are a variety of methods (adhesive, pressure, etc.) for mounting a graphic to a substrate. For this document, mounting will be broken into two groupings; hot or cold mounting, with discussion on the various methods of applying pressure.

   i. Hot mounting provides a heat source to activate the adhesive. Typically, this is accomplished with a heat source associated with either a vacuum press or a roller press.

   ii. Cold mounting typically utilizes a spray or pressure-sensitive film or coating in combination with a roller press.

b. Printed papers, foils, and fabrics can all be mounted to the substrate provided that the proper types of adhesives are selected. Mounting can be accomplished on most standard equipment capable of applying adhesive and laminating sheets or roll stock to rigid boards.

3. Surface Preparation

a. Surface should be cleaned and free of any surface contaminates (i.e. oils, dust particles, etc.) prior to commencing.

4. Other Considerations

a. Care should be taken when using laminate films on only one side of the mounted graphic. Moisture pickup will be sealed on one side while the other side in not protected from moisture pickup. Bowing may occur because of moisture imbalance.

b. Additionally, care should be taken when mounting only one side with spray adhesives. As the mount cures out, tensile forces within the adhesive may cause the substrate to bow. It may be necessary to apply a counter-mount of comparable strength on the backside.

c. Finally, one must use the minimum amount of tension when mounting with film or pressure sensitive adhesives as too much tension will cause the substrate to bow; too little will cause the graphic to wrinkle.

Hot Mounting – General Notes

The substrate can be hot mounted utilizing dry mount tissues or Fome-Cor® Heat-Activated can be used. The following settings are recommendations; trialing is necessary before commercialization:

- Maximum temperature not to exceed 190°F.
- Maximum time not to exceed two-to-three minutes
- Panels in excess of 3/16" should be placed in the press and pre-heated prior to mounting
- Be sure to follow the adhesive supplier's recommendations.

1. Fome-Cor Heat-Activated

Fome-Cor Heat-Activated has a low activation temperature that is designed to protect the artwork/graphic from heat damage, so one does not need to increase heat to achieve proper adhesion. With this material, the heat and dwell times should remain at the recommended levels to get the best results. Too often, operators increase heat and boil out the adhesive. Increasing the temperature can damage the graphic, the laminate or Fome-Cor board.

Conditions can vary depending on: the thickness of the graphic, the type of graphic (paper, vinyl, cloth, etc.) to be mounted and the use of a laminate film over the graphic. Trialing Fome-Cor Heat-Activated with various types and thicknesses of graphic material and laminating film is recommended.

Type of Dry Mount Equipment	Temperature & Time Duration*
Vacuum Press	165°F to 170°F 2 to 2-1/2 minutes
Roll Laminator	Roller temperature 225°F to 230°F Roll speed 2-3 feet per minute

*Trialing graphic material and any laminating film is recommended for best results. Temperatures and speeds may vary depending on equipment.

2. Six Steps for Mounting with Fome-Cor Heat-Activated

a. Preheat equipment – keep your equipment calibrated to ensure proper temperature control.

b. Align the graphic to the Heat-Activated substrate. The adhesive faces the underside of the graphic.

c. Protect the graphic and press with the provided release liner. The release liner may be used more than once.

d. Set the temperature and determine dwell time before running the project. (Trialing the graphic material and any laminating film is recommended for best results.)

e. Run the mount.

f. For best results, allow the mounted graphic to cool approximately 30 seconds to enhance the bond. Place weight on the mounted panel during the cooling period to ensure the panel will lie flat as it stabilizes to room temperature.

Cold Mounting – General Notes

1. Getting Good Adhesion

a. To cold mount pressure-sensitive adhesives, you need sufficient pressure. You also must make sure that proper spacers are used. Because effective mounting depends on equal force exerted across the entire width of the substrate being mounted, the top roll must move down evenly left and right. Even contact between the top and the bottom mounting rolls is essential. It is recommended that the clearance of the mounting rolls be adjusted so that the substrate is compressed slightly (0.010" – 0.020") to assure a good bond.

b. Adequate pressure helps squeeze out air from between the adhesive, the substrate and the print.

c. The mount obtained after 3 hours will generally allow for processing. Maximum mount is usually obtained within 24 hours after mounting.

d. To test adhesion, flex the finished mount. It should not come loose in the center.

e. Moisture can become trapped between layers of porous material (such as paper) and cause blisters. The level of moisture in the atmosphere should be reduced before press work. Prints may even have to be pre-dried.

f. When tacking prints to the substrate, some shops will hang a number of tacked pieces in an upside-down position until they are ready to pass them through. As a precaution, it is advisable not to hold them any longer than 10 minutes or the prints may absorb moisture, change in dimension and cause bubbles and wrinkles.

g. Please contact the film manufacturer for recommendations concerning the use of their respective laminating material in conjunction with the substrate as film choice is the most important consideration.

h. It is advisable to use a film with a high "green tack" strength. When using pressure sensitive films, the substrate should be at room temperature to achieve optimal results.

2. Demounting Bad Mounts

a. Pressure-sensitive adhesives may be demounted if done within 5 minutes after mounting. The print will probably be ruined, but the substrate may be reused.

b. Beyond 5 minutes, the adhesive has set and other methods will have to be used, such as a hot air gun or a hair dryer to peel off the laminate. The remaining adhesive may be taken off with isopropyl alcohol or mineral spirits.

3. Avoiding Wrinkles and Surface Blemishes

a. Wrinkles can be caused by misalignment of adhesive roll, too much pressure, or unparallel rolls.

b. Small bumps, particularly visible with Cibachrome or glossy prints, are caused by trapped dirt or hardened adhesive. Good housekeeping and an ionizing static eliminator on the press are important to minimize dirt pick-up. During mounting, the back of the print should be checked and wiped down before it is processed. If bumps are caused by hardened adhesive (cut open to check), use a fresh roll or sheet of transfer adhesive. To prevent strikethrough, one might also consider using a print made with thicker paper (.007+).

c. Pressure roller applicators can compress the leading edge of the mounting substrate. In order to keep the leading edge from rounding as it goes through the roller, use a plastic lead or guide of the same thickness of the mounted substrate.

4. Clear Overlays

a. Clear high-gloss overlays enhance color and protect against fading indoors and outdoors. To avoid blistering, do not use overlays, clear coatings, or sprays which contain solvents.

Cold Mounting Procedures

There are several techniques for cold mounting to the substrate:

1. Cold Mounting by Hand Using Transfer Adhesive

a. Take a sheet of transfer adhesive (both sides covered by release paper) and fold back release paper on one side approximately 1/2" from one edge.

b. Tack on edge of print to exposed adhesive.

c. Lift the print slightly, remove the rest of the release paper and use a roller or squeegee to smooth the print onto the adhesive. The back of the print is now coated with an adhesive which is protected by release paper.

d. Before mounting to the substrate, remove excess air between print and adhesive. This is done by turning the print over so that the release paper is up and smoothing out from the center with a squeegee.

e. Now peel off approximately 1/2"–1" of release paper from upper edge and fold back.

f. Tack on to the substrate, lining up edges.

g. Using a hand roller or squeegee, closely follow the removal of the liner to eliminate bubbles caused by air entrapment. Work with a small surface at a time (approximately 12"). Continue this step until the mounting is complete.

2. Cold Mounting by Hand or Press Using Spray Adhesive

a. Select a spray mounting adhesive that is safe to use with polystyrene and the artwork to be mounted; solvent based adhesives should be used with caution.

b. Spray adhesive on the back of the piece to be mounted. Spray 6"– 8" away from the surface. A double coat is best, with the second coat applied in a cross direction to the first coat. For mounting most art materials, adhesive need only be applied to one surface, preferably the print. Avoid using excessive bonding adhesive

c. Before mounting, allow adhesive to dry to the touch; the adhesive must be aggressively tacky. If there are blisters due to trapped solvent, allow slightly longer than 4 minutes of drying time.

d. Carefully position piece on the substrate and smooth out if possible to eliminate any wrinkles and trapped solvent.

e. If using a press, simply turn on the press to complete the mount.

e. If mounting is done by hand, place a clean sheet of the substrate over the laminated piece and weigh down for 15 minutes to obtain the maximum bond. Depending upon the type of adhesive, allow 24 hours for maximum cure out before exposing the laminate to sudden temperature or humidity changes.

3. Cold Mounting by Roller Laminator with an Adhesive-backed Graphic

a. Adjust the rollers to slightly compress the substrate.

b. Peel off a 1/2"–1" section of release paper from the upper edge of the preprinted adhesive backed paper.

c. Tack on to the substrate, lining up edges.

d. Feed tacked edge into nip of rollers keeping printed piece bent away from the substrate.

e. As it passes through the rollers, strip away the release paper. (Make sure there are no wrinkles or trapped dirt.)

4. A Note on Cold Mounting Non-Porous Graphics

a. For non-porous material such as PVC, other plastics or metal, the following types of contact adhesive with solvent may be used.

   i. Neoprene, nitrile, polyurethane or other synthetic rubber types

   ii. Adhesive must be applied to both faces. Parallel beads of adhesive are often preferred because it allows evaporation of solvent providing faster cure.

   iii. For mounting the substrate to flexible PVC sheets, only plasticizer-resistant types of adhesives should be used.

5. A Note on Cold Mounting Porous Graphics

a. For porous materials such as paper, textiles, fabrics or wood, the following adhesives may be used.

   i. Contact adhesive with solvent: Same systems as for non-porous materials.

   ii. Construction mastic, structural silicone adhesives.

b. Considerations such as expected temperature ranges (expansion/contraction), porous material, and size of substrate should be taken into careful consideration when deciding on a method of attachment.

6. A Note on Cold Mounting with Pressure Sensitive Tapes

a. Pressure sensitive tapes can be used for:

   i. Less demanding applications that are stress-free.

   ii. Adhering parts during installation work.

   iii. Holding parts while the primary adhesive is curing.

b. Trial pressure sensitive tapes prior to use.

Section II: Repositioning Vinyl

Repositioning Vinyl

The substrate is not recommended for this fabrication method. Please see the fabrication guide on page 9 for choosing the best recommended product.

FOME-COR® BOARD
VALUBOARD™
ACID-FREE
SELF-ADHESIVE
HEAT-ACTIVATED
JETMOUNT®
FOAM-X® RECOVERY
FOME-COR®
FomeCorUSA.com

Section III: Direct Digital Printing

Direct Digital Printing – General Notes

Large format digital printing on flatbed printers has excellent application for the substrate. Although the substrate is available in a wide range of colors that all demonstrate excellent ink adhesion, the predominant substrate color is white when direct digital printing. However, colored variations of the substrate may provide vibrant color contrasts depending upon the availability of a white print head on the printer.

1. Surface Preparation

a. Surface should be cleaned and free of any surface contaminates (i.e. oils, dust particles, etc.) prior to commencing.

2. Suitable Inks

a. Actual ink type depends upon the printer make and model. Consult the printer owner's manual for recommendations. Trialing for ink compatibility is always recommended.

b. The substrate readily accepts all types of inks including:
   i. Aqueous
   ii. Solvent-Based
   iii. UV-curable

Section IV: Direct Screen Printing

Fome-Cor Acid Free, Fome-Cor Self Adhesive, and Fome-Cor Heat Activated are not recommended for this fabrication method. Please see the fabrication guide on page 9 for choosing the best recommended product.

Direct Screen Printing – General Notes

Large format screen printing has excellent application for the substrate. The substrate is available in a wide range of colors that all demonstrate excellent ink adhesion.

1. Surface Preparation

a. Surface should be cleaned and free of any surface contaminates (i.e. oils, dust particles, etc.) prior to commencing.

2. Suitable Inks

a. When screen printing with the substrate, the following inks may be suitable:
   - Solvent-based
   - Vinyl/Acrylic
   - UV-cured

b. Screen Printing inks should be tested in a manner which duplicates your printing process before initiating production. It is advised that you contact the equipment and ink supplier to provide you with specific recommendations to achieve maximum results. It is strongly recommended to consult the appropriate ink manufacturer regarding any required ink additives such as catalyst for proper adhesion and exterior use.

3. Ink Curing

a. The ink, once applied, must be given proper time and treatment to completely adhere and cure.

b. Oven temperature must be controlled to a maximum of 180°F to prevent deterioration of the foam and possible warping.

Painting – General Notes

Painting is a suitable fabrication option for the substrate, whether for artistic expression or more commercial applications. On some projects that involve the substrate, a small quantity of "custom color" may be required that is often not practical to obtain from the factory and post painting is a viable option.

1. Surface Preparation

a. Surface should be cleaned and free of any surface contaminates (i.e. oils, dust particles, etc.) prior to commencing.

2. Suitable Paints

a. The substrate readily accepts the following:
   - Poster colors
   - Acrylic paints
   - Tempera
   - India ink
   - Latex-based pigments
   - Lacquers
   - Vinyls
   - Some water-based paints may also be suitable, depending upon the application.

b. Lacquers, shellacs, and solvent-based paints should be used only when not allowed to penetrate the liner or contact the foam edge. The types of paints are likely to attack and deteriorate the polystyrene foam.

c. When coating the majority of one side of the substrate, the backside should also be coated to maintain more perfect long-term flatness. Place weights at the edges when allowing the substrate to dry. Heavy paint coating will warp the substrate; therefore, it is advisable to trial the paint coating to determine the proper coat thickness before proceeding to production.

3. Application

a. Paints can usually be applied with a brush or roller, although conventional air spray equipment will provide a more consistent appearance.

b. Consult paint manufacturer's literature for recommended application technique and thinning requirements.

4. Drying

a. For drying and cure times, consult paint manufacturer's literature.

b. Due to the wide variety of paint products on the market, testing is recommended for the initial use of any coating system before commercialization.

Cutting – General Notes:

There are many different methods in which "cutting" can be accomplished. This guide focuses on five primary cutting methods:

- Knife Cutting
- Shearing
- Saw Cutting
- Routing
- Die Cutting/Punching

When necessary, laying out a pattern on the surface of the substrate is best achieved with a soft pencil.

1. Knife Cutting

The substrate can be cut by hand with mat knives, utility knives, and razor blades. Mat cutters make smooth, excellent cuts, either right-angled or beveled. Cardboard and glass cutters also work well. The key to getting a smooth, clean cut is to use a very sharp thin blade held at as low an angle as possible to the board, which reduces friction and allows the foam to slice rather than tear. If a straightedge is being used as a guide, it may be practical to make the cut in more than one pass which also helps eliminate any foam tearing

2. Shearing

Large-scale straight-line cutting of the substrate can be done in several ways, including automated razor blade cutters or power shearing with guillotine cutters. Though not generally recommended because they can compress and fray the edges of the board, a guillotine cutter can be used to cut one or more sheets at a time. Caution must be observed to prevent the foot-clamp from indenting the board's edge. A stop block placed on each side of the foot-clamp may be necessary. A sheet of cardboard on top of the substrate may reduce compression. The blade must be maintained sharp and cut with a scissor-like motion.

3. Saw Cutting

Saw cutting is generally not recommended for paper-faced foam board cutting. However, some custom saw blades can be utilized. General Saw Company makes a blade for this use. Other manufacturers make thin-rimmed, high-speed carbide-tipped plastic cutting blades (72-80 25-degree alternating teeth on a 10" blade) acceptable for cutting the substrate.

1. Band Saws

a. Band saws with a similar tooth design and a linear speed approximating 9000 ft/min can be used.

b. Trialing this type of cutting is a must to ensure the cut meets the desired customer result.

2. Intricate Shapes

a. Cutting intricate curves and shapes can be accomplished with a Cutawl model K-11 power tool.

b. Cutawl 21D or 23D blades are available for cutting the substrate.

4. Routing

The substrate is not recommended for this fabrication method. Please see the fabrication guide on page 8 for choosing the best recommended product.

5. Die Cutting/Punching

Die cutting and/or Punching is a method for the rapid production of flat shapes or cutouts. Typical applications would include the die cutting of:

- Letters and shapes.
- Openings in a sheet used as part of an assembly
- Puzzle pieces
- 3D assemblies — die cutting part-way through to form hinges. Hinges can be reinforced by Mylar tape. The flat die-cut piece can be folded into a three-dimensional shape such as a picture frame or a display.

Die cutting and punching processes are similar in that they both can provide a curved shape by cutting through a substrate. Die cutting, however, uses one steel rule die that comes in contact with a flat platen, whereas, a punch has two designed shapes, a male and a female that cut the shape when pressed together.

Die cutting is typically used with lighter weight paper or foam type materials, where punches are used for heavier materials. The die cut process can utilize one of the unique features of the substrate; edge pillowing (not including Fome-X Recovery).

Prior to die cutting, the substrate can be painted or screen printed.

1. A Note on Punching

a. The substrate does not require "punching" tools, as die cutting works very well; please refer to the previous section on die cutting.

2. Steel Rule Die Cutting Process

a. The key elements to consider when die cutting are: the substrate, the press, the steel rules, and the ejection rubber. Each of these elements must be selected properly to yield satisfactory results.

b. Although various methods such as using punches and "high-dies" are applicable to die cutting the substrate, cutting with steel rule dies (SRD) is the most common.

c. SRD work basically the same way as a cookie cutter. They are made of a 1"-wide strip steel with one pre-sharpened edge. The cut strips are called "rules." The strip steel is typically made in a thickness range of .014"–.166". The strips are bent to the shape of the design's trim line and held in place in a block called a "die body."

d. In order to facilitate ejection of the part, strips of a compressible material such as neoprene are glued along the perimeter and protrude above the cutting edge of the rule. The strips can also be glued to the top or bottom platen to hold the substrate in position.

e. During die cutting, the SRD assembly is fixed under the top platen, and the substrate is placed on a steel bottom platen. Pressure is applied to force the rules of the SRD through the substrate.

f. The platens are then opened and the parts removed. In some cases, additional work such as finishing the cut edge might be required.

3. Substrate Considerations

a. The substrate consists of top and bottom linerboard layers and a polystyrene core. This laminated structure results in some unique considerations for die cutting, as each layer of the substrate is sequentially cut.

b. The paper is the critical part of the laminate, which creates challenges while die cutting. Linerboard is a rigid product, and as such, is not flexible or ductile. Linerboard does not tend to stretch easily, and as a result, the top liner can tend to crack if improperly die cut.

c. All machine-produced papers have a "grain". The grain runs along the length on the paper as it is manufactured. The grain direction is often referred to as the "machine direction". The opposite direction is referred to as the "cross machine direction". The properties of the paper are different in the machine direction vs. the cross machine direction. Paper is more rigid and will stretch less in the machine direction. Paper cuts more easily along the grain rather than across the grain.

d. The polystyrene foam core can compress during die cutting (not including Foam-X Recovery board). The substrate has the unique property that the crushed foam will remain crushed. The foam does not tend to assume its original thickness. This results in the die cut edges remaining closed (about 40 to 60 mil residual foam thickness). This provides an asymmetrically pleasing rounded effect at the die cut edges, called pillowing. This process can also be utilized to produce alternating raised and lowered areas (embossed or debossed).

4. Press Considerations

a. The substrate is typically die cut on flat bed presses, which can be either a "moving platen" type or a "clam shell" type. Either type may be utilized without affecting the quality of the die cut.

b. The key press consideration is proper "make ready", or preparing the press bed (anvil) to assure that the steel rule cuts evenly through the substrate without dulling the steel rules.

c. Typically, the substrate is cut on a "hard anvil." Make ready for this type of die cutting utilizes carbon paper. The press is lowered to the point where the steel rule just touches the anvil. The places where the rule fails to touch the anvil are built up with one-mil thick shim-tape. This process is repeated until a complete imprint of the steel rule is apparent.

d. Make ready is very important because the platen of the press does not necessarily close evenly. This can be caused by misalignment, uneven cutting loads or by deflection of the platen. As a rule of thumb, a four-post press will deflect one mil per foot. Steel rules that have been dulled by improper make ready will cut poorly, have increased cutting loads and can contribute to cracking problems.

e. Back-Up Plate
   i. One problem with steel plates is that the die might not completely penetrate the substrate which can result in fracturing at the base of the cut. An alternative to a steel plate would be to use additional substrate or chipboard as a back-up. This would allow the die to penetrate beyond the thickness of the substrate so that a cleaner cut could be obtained.

5. Steel Rule Considerations

a. Steel rules are flat strips of steel with a very uniform height. One edge of the steel rule is honed to yield a cutting surface. The key properties of cutting rules are hardness, flexibility, bevel type, thickness, uniformity of height and edge preparation

b. Steel rules that apply to this substrate are listed below:

   i. Cutting Rules
      1. Cutting rules are the most common when die cutting the substrate. These rules are used to cut and pillow the edge. Cutting rules are either center bevel or side bevel, which indicates where the cutting edge is located.

         a) Center bevel rules result in equal forces being placed on both sides of the piece to be cut and are used when both the inside and the outside of a cut needs to be saved, e.g., as in a puzzle. This distribution of forces can be important when attempting to minimize cracking

         b) Side bevel rules have one side that is essentially flat and the opposite side is sloped or beveled. The flat side should be placed toward the substrate that will be kept, with the bevel facing the scrap piece. This results in additional compressive force being placed on the scrap side. Cracking tends to be directed in this direction.

ii. Scoring or Creasing Rules
    1. Scoring or creasing rules are used to create a fold line in paper-faced substrates. Scoring rules are shorter than standard rules. These rules cut through the top liner, but leave the bottom liner intact. This technique is also referred to as slit scoring or "short knifing". This method is often used when additional materials are laminated to the substrate.

    2. Unique to the substrate, because of its foam structure, is the ability to crease cleanly. Creasing rules create a crease line on the top of the liner. Creasing rules should have curved edges and be shorter than cutting rules. The substrate is generally creased without the use of a matrix. Wider creasing rules make folding the substrate easier. Creasing rules can be used to emboss patterns in the substrate (see Section VII: Embossing).

iii. Serrated and Perforating rules
    1. Serrated and Perforating rules have "teeth", much like saw. The points of the teeth puncture the substrate, where as the lower points of the teeth do not. This leaves a perforated edge in the substrate that can easily be torn by hand.

c. Edge Preparation
    i. The edge of the steel rule can be prepared in either two methods:

        1. Grinding
            a) Ground edge rules have micro-scratches on the cutting edge. This can result in a blade that has a reduced cutting force.
            b) The disadvantage of this type of rule is that it is difficult to maintain the uniform blade height.

        2. Drawn Edges
            a) Drawn edge blades are made by drawing the blade through a die.

            b) This produces a uniform blade height and a smooth blade surface.

    ii. Although the knife has been hardened to 57-59 RC (Rockwell), after numerous die cuts, the cutting edge will become dull and may result in rough and/or incomplete cuts. Generally, it is not a good idea to resharpen the knives. Resharpening will often result in an uneven knife length. This in turn can cause uneven penetration or no penetration when the cut is made.

d. Length of Bevel
    i. A long bevel will result in less deformation as the substrate is sheared. The length of the bevel is defined as the distance from the tip to the point where the honed (beveled) portion ends. The bevel should be 3/16"–1/4" in length.

6. Strippers / Ejectors

a. Ejection and Stripping Rubber
    i. Ejection and stripping rubber is essential when cutting the substrate. It serves two purposes. The first purpose is to eject the part from the die after the press opens. The second purpose is to assist edge pillowing and to prevent cracking. Liner cracking problems need to be considered whenever coated products are die cut.

    ii. When designing the figure to be die cut into Fome-Cor, it is best to avoid sharp corners and narrow spaces. A minimum distance of 1 inch is recommended between pieces. When sharp corners cannot be avoided, additional, very soft, foam rubber should be added on top of the ejection rubber to avoid localized cracking.

Embossing – General Notes:

The substrate (excluding Foam-X Recovery board) can be embossed to create attractive 3-dimensional effects.

Embossing is done by using an embossing die on a flat bed die cutting press such as a clam shell, clicker or a fixed platen press. Sections of the substrate that are raised or higher than the rest of the surface are referred to as "embossed"; compressed or lowered sections are referred to as "debossed." However, for this document, embossing is defined as any designed deformation of the substrate achieved through the use of scoring bars or embossing dies.

Embossing utilizes the same substrate characteristics that allow edges to be closed or "pillowed" when die cutting. When compressed beyond a certain critical point, the substrate will retain the pattern of the compression, resulting in displays that are both unique and eye-catching. The effect is amplified for highly reflective finishes such as: foil laminates, glossy lithographs or high gloss screen prints. Posters and displays that have been laminated or screen printed can indeed utilize embossing as the next step in the fabrication process.

The embossing can be done as part of the die cutting step or if desired, as a separate operation. The decision to separate the operations may depend on the capability of the press to provide the required cutting power. If the press cannot provide sufficient power, the bottom edges of the substrate may not be cut through completely. This problem would require die cutting and embossing in separate operations.

1. Scoring Bars

a. Small, straight line areas can be embossed by using a scoring bar mounted in a standard dieboard. Simple "line shapes" can also be produced by bending the scoring bars. The score bars will produce pillowed sections in the center of the board.

b. It is best to use score bars with rounded edges to avoid liner cracking. The score bar should also be lined with soft ejection rubber if cracking is an issue. Straight score lines are easier to emboss in the grain direction than across the grain when this is an option. Score bars located less than 3/4 inches apart will compress the substrate area between the score bars slightly. Score bars should be at least 3/4" from the edge of the board.

c. Score bars should extend to the die cut, pillowed edge if possible. If this is not possible, the score bars should gradually taper off (less depth of compression) to avoid a sharp edge that would puncture the liner.

2. Embossing Dies

a. Embossing or compressing of large areas can be done by utilizing an embossing die. The embossing die is a plate, attached to die board that will compress additional areas of the substrate. The pattern of the embossing die is often matched to the screen print or lithograph. The depth of embossing can be varied; though, a typical embossing die would compress to a residual thickness of at least 60 - 80 mils.

b. The force required would be about 100 lbs. per square inch compressed. The embossing depth can be less if desired. The embossing force will vary depending on the configuration of the piece and the depth of compression.

c. The embossing die should be designed to avoid puncturing the top liner. To accomplish this, it is necessary to follow the same basic rules as die cutting. Sharp points or angles should be avoided and spacing should be adequate to avoid excessive liner stretch. The embossing die should be fabricated with smooth rounded edges. The angle of the edge should be no sharper than about 30 degrees.

d. Embossing dies can be made from various materials including metal (copper, brass, etc), rigid plastics, hard rubber or pressed board. The construction material of the die is usually selected based on: available fabrication techniques, complexity of the design and intended life.

Section VII: Embossing

3. Embossing of Fome-Cor Products in 1/8", 3/16" and 3/8"

a. All substrate thicknesses may be embossed including 1/8", though 3/16" produces the best embossed effects. Thicknesses of 3/8" require special considerations for embossing (see next section for recommendations).

b. Fome-Cor 3/16" can be compressed to a residual thickness of 30 - 40 mils, but will bounce back slightly from its maximum compression. The force to accomplish this maximum compression with a scoring bar is about 150 - 200 lbs. per linear inch. This force varies depending on the embossing geometry.

4. Embossing 3/8" ST

a. Several different methods can be used to emboss 3/8" ST. A hand-engraved hard rubber die can be used. Embossing dies can also be made from hard plastics or metal, which are more durable than hard rubber dies. Plastic and metal embossing dies should be lined with a thin layer of soft ejection rubber to avoid cracking.

b. The die should be designed to compress 3/8" ST to a thickness of no less than 60 mils in any place to avoid high cutting loads. When estimating the residual thickness, the soft ejection rubber should be assigned a value of 1/3 of its original thickness.

c. Simple patterns can be made in ST using rounded edge scoring rules. It is necessary to continuously line the scoring rules with soft to medium ejection rubber to avoid cracking.

d. The die should be designed with both rounded edges and rounded (vertical) contours.

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Section VIII: Forming Curves

Forming Curves

The substrate is not recommended for this fabrication method. Please see the fabrication guide on page 9 for choosing the best recommended product.

Appendix I: MSDS

Material Safety Data Sheet

Fome-Cor is an "article" and no MSDS is required for compliance with the OSHA Hazard Communication Standard (29 CFR 1019, 1200). The standard applies to "chemicals" but it does not apply to any substance, which is an "article." The term "article" is defined in the OSHA warning rule, as a manufactured item:

1) which is formed to a specific design during manufacture,

2) which has end use function(s) dependent in whole or in part upon its' shape or design use during end use, and

3) which does not release, or otherwise result in exposure to hazardous chemical under normal conditions of use.

Appendix II: Specifications

Adhesives

Adhesives suitable for bonding wood-fiber will adhere to Fome-Cor. Adhesives with high solids such as dextrin-based or resin-based should work well. Solvent based adhesives should not come in contact with the foam core of Fome-Cor. It is always advisable to trial your potential adhesives prior to production use.

Fastening

Information is being developed.

Storage Guidelines

Fome-Cor is to be stored inside in a dry and clean area. Material must be stored flat.

Appendix II: Specifications

FOME-COR® PRODUCT SPECIFICATIONS				
Physical Product Specifications	**1/8"**	**3/16"**	**1/4"**	**3/8"**
Target Thickness	0.135"	0.200"	0.250"	0.375"
Gauge (+ or -)	+ / - 0.020"	+ / - 0.020"	+ / - 0.020"	+ / - 0.020"
Sheet Size Tolerances				
Width	0" + 1/4"	0" + 1/4"	0" + 1/4"	0" + 1/4"
<66" Length 66" - 96" >96"	0" + 1/4"	0" + 1/4"	0" + 1/4"	0" + 1/4"
Diagonal	max 1/4"	max 1/4"	max 1/4"	max 1/4"
Squareness (Cut Straightness)	N/A	N/A	N/A	N/A
Warpage / Bow	max 1/8" per foot	max 1/8" per foot	max 1/8" per foot	max 1/8" per foot
Surface Energy (Dyne)	N/A	N/A	N/A	N/A
Color (ΔE)	N/A	N/A	N/A	N/A
Opacity	N/A	N/A	N/A	N/A

Definitions:

Target Thickness: The gauge that is to be focused on as optimum. The Gauge Range is then used to define the limits of the thickness that can be considered "in spec".

Gauge Range: The upper and lower limits in thickness that a product can be manufactured making it "in spec".
Example: Target of 250mils with a range of + or - 25 mils would be 225 mils to 275 mils.

Sheet Tolerances: We measure width, length and diagonal. Width is typically cross machine, length is typically machine direction and diagonal is the difference in the diagonals.

Squareness: The difference in the lengths of the machine direction sides.

Warpage / Bow: This is the measured by laying the sheet flat on a surface and measuring the amount of "smile" or "frown" in the center of the board in either the length or width. Should we have a problem described as "potato chip" this is a two direction warp, which is automatically "not in spec".

Surface Energy (Dyne): This is measured using standard dyne solution pens

Color (ΔE): This is measured using a standard color meter.

Opacity: This is measured using a standard opacity meter.

This Fabrication Manual has been developed to assist fabricators to work with the substrate in the most efficient and effective manner. The tips and suggestions contained in this manual are the result of many years of combined experience by fabricators in the U.S., Canada, South America, Asia and Europe.

These fabrication suggestions and product specifications are based on information which is, in our opinion, reliable. However, since skill, judgment, and quality of equipment and tools are involved, and since conditions and methods of using the substrate are beyond our control, the suggestions contained in this manual are provided without guarantee. We recommend that prospective users determine the suitability of both the material and suggestions before adopting them on a commercial scale. 3A COMPOSITES USA, INC., DOES NOT MAKE ANY WARRANTIES, EXPRESS OR IMPLIED, INCLUDING MERCHANTABILITY AND FITNESS FOR PURPOSE, WITH RESPECT TO ANY SAID SUGGESTIONS AND PRODUCT DATA. In no event shall 3A Composites USA, Inc., have any liability in any way related to or arising out of said suggestions and product data for direct, special, consequential or any other damages of any kind regardless of whether such liability is based on breach of contract, negligence or other tort, or breach of any warranty, express or implied.

Also, normal safety and health precautions practiced in any fabricating environment should be used when fabricating the substrate.

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