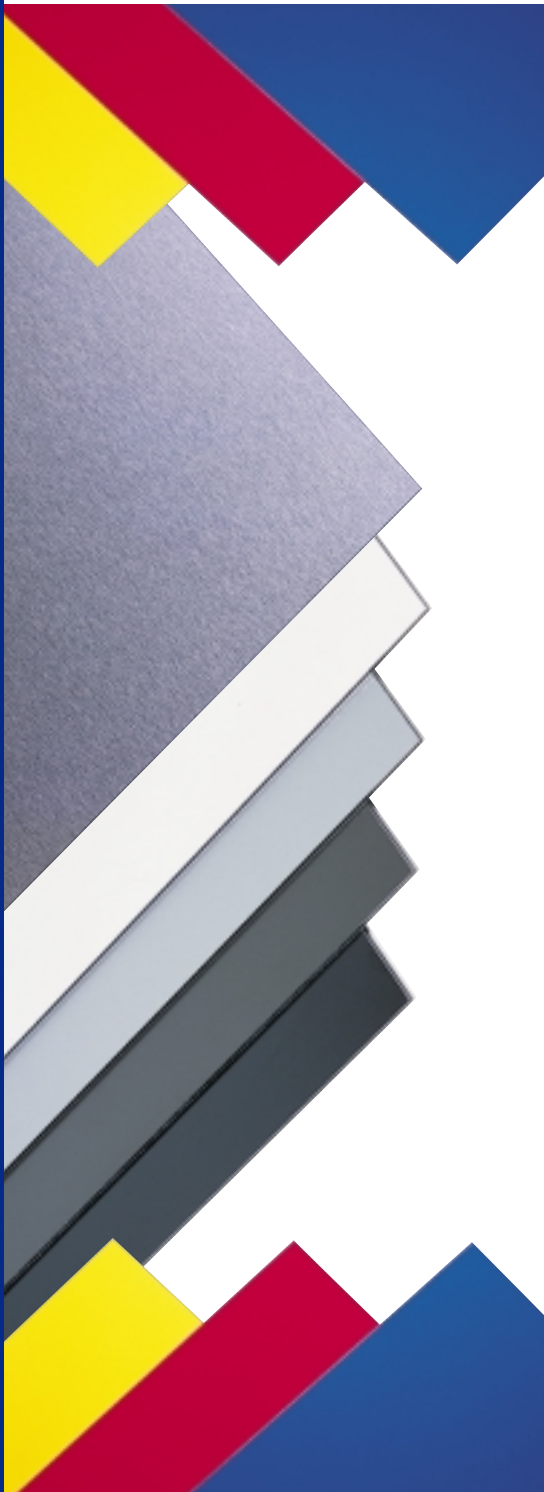


PROCESSING MANUAL

DIBOND[®]

MATERIAL



DIBOND[®]

MATERIAL

Dibond Material is an even more affordable, aluminum composite material (ACM) made of two lightweight sheets of .012" aluminum with a thermoplastic core. The material is intended for such applications as signage, large-format digital and electrostatic printing, screen printing, exhibit/display, point of purchase displays, metal awnings, direct inkjet printing as well as OEM industrial applications.

The sheets are pre-painted with a polyester paint finish applied to both sides of the sheet, and accepts paint, screen printing inks, vinyl and large-format digital printing to create graphics. Dibond Material is available in 2mm, 3mm and 4mm thicknesses in 4' x 8', 4' x 10', and 5' x 10' sheets. This composite material is now available in these colors: white, black, silver, bronze, blue, red, yellow and the Butler Finish (brushed aluminum look). Dibond Material is a UL (Underwriters Laboratories Inc.®) recognized component for electrical signage (UL 94V-0). All thicknesses of Dibond Material meet the criteria for ASTM E-84, and are Class 1 and Class A materials.

Dibond Material can substitute for:

- .032", .040", .063", .080", .090" & .125" aluminum sheet
- MDO Board/Laminated Boards
- Thick Gauge Plastics
- Wood/Plywood Products
- Expanded PVC

Applications

- Wall-mounted Signs
- Post & Panel Signage
- Column/Pole Covers
- Fascia/Sign Bands
- Point of Purchase Displays
- Transportation Applications
- Backing for Channel Letters
- Digital & Electrostatic Printing
- Custom Exhibit Booths
- Custom Architectural Signage
- Workzone, Traffic, Highway Signage
- Illuminated & Non-illuminated Signage
- Billboards
- Scoreboards
- Photomounting
- Routed Sign Faces
- Cart/Kiosk Mfg.
- Screen Printing
- Interior Signage
- Awnings
- Murals

A Dedication To Customer Relations

Dibond Material is carefully crafted in a strategically located manufacturing facility in Benton, Kentucky. Inherent in the Alcan Composites' approach to business is a constant dedication to unparalleled quality control and customer service. Alcan Composites' engineers and technicians stand ready to assist you in any processing or fabrication situation. Please don't hesitate to contact our customer service department at 800-626-3365 or 270-527-4200. We stand ready to serve you.

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A. Cutting and Sawing

Sawing (For Sizing Panels)

Dibond Material is manufactured with a polyester paint finish. It is best to move the saw blade rather than the material in most operations. Saw cutting can be accomplished with the following cutting equipment:

1. Table Saws –

Table saws are not recommended for cutting sheets larger than 4' x 4' in size.

2. Panel Saws –

Panel saws provide an effective method of cutting. These saws, whether standard equipment or custom made, perform well and have the added advantage of space savings. If panel saws are to be used as production equipment, an industrial model should be purchased in order to obtain adequate cutting tolerances and increase the longevity of the equipment.

3. Multiple Operation Rip/V-Grooving Saws –

In high production operations, equipment that is capable of performing more than one operation with a single pass through the machinery may be used. This equipment can make multiple saw cuts (sizing the panel) and V-Grooves (rout) at the same time.

4. Portable Saws –

Cutting Alucobond Material with portable circular saws is another effective method. As mentioned, this equipment should also be production/industrial type equipment.

5. Reciprocating Saws –

Reciprocating saws work well for cutouts. Care should be taken with portable saws and reciprocating saws to prevent damage to the Alucobond Material surface. More than one sheet can be cut at a time by stacking panels. If center cutting (i.e., letter cutouts) is required, a foam pad may be placed under the material with the reciprocating blade cutting into the foam. The sheets may be clamped or secured with double-faced tape for the cutting operation. When clamping between jaws, protect the panel surface against damage.

Routing (For Sizing Panels)

1. Hand Held Routers

2. CNC Routers

Shearing

When Dibond Material is sheared, a slight roll-down of the aluminum cover sheet may occur on the impact side. In this area, the polyethylene core is compressed and can lead to increased stress between the core and the aluminum cover sheet.

To avoid damage of the surface of the Dibond Material, the hold down on the shear should be fitted with a shock absorbing rubber pad.



B. Routing: For Bending

Dibond Material can be accurately folded by hand after a simple routing operation is done on the back skin. This fabrication method is called Rout and Return. It is unique to composite panel fabrication.

Do not use a press brake for tight folds of Dibond Material. The material may be routed by using one of the two following methods:

1. Hand operated routers equipped with modified 90-105 degree "V" bits (See figure 1) can be used effectively to remove material for folding.
2. Table or circular saws can be equipped with a special blade (See figure 2); these blades referred to as "V" routing blades produce very close tolerances at a much faster rate than hand routers.

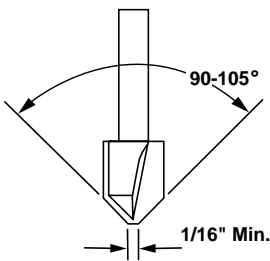


FIGURE 1 - 1/16" flat ground on bottom of commercially available wood working router bit.

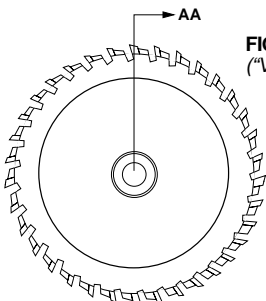


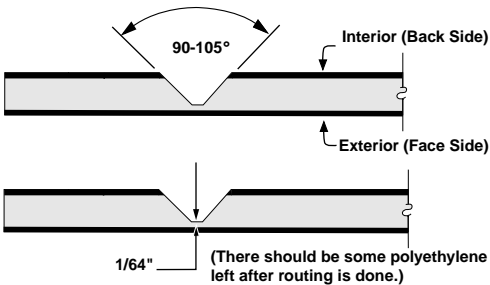
FIGURE 2 - Routing Saw Blade ("V" Routing Blade)

C. Small Radius Bending (By Routing)

A very small radius can be achieved by "V" routing and folding. The depth of the "V" rout is critical. As a general guideline, the exterior aluminum skin should be visible through the polyethylene core at the valley of the rout; this visual appearance should be consistent along the entire length of the rout (See figure 3). Constant depth of the rout ensures a good smooth line when the fold is made. Extreme care should be taken not to score the exterior aluminum skin with the cutter.

By changing the shape of the cutter used, a larger radius can be achieved. A flatter, wider cut will result in a smoother bend (See figure 4).

FIGURE 3 - Routing



"V" Routing

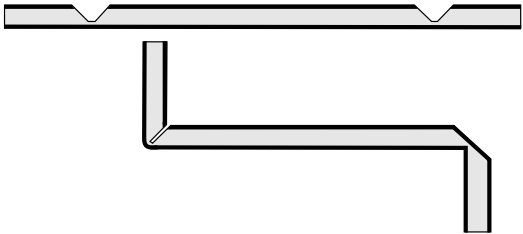
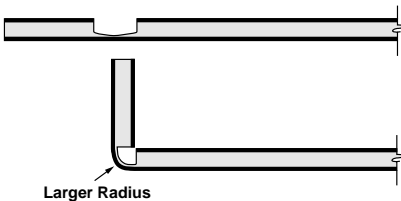
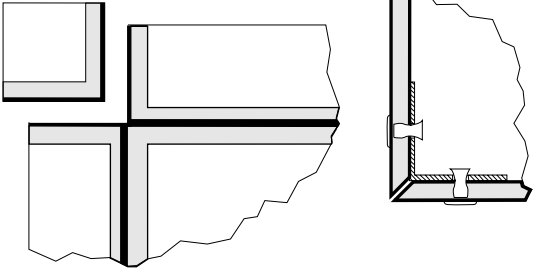


FIGURE 4 - Flat Routing

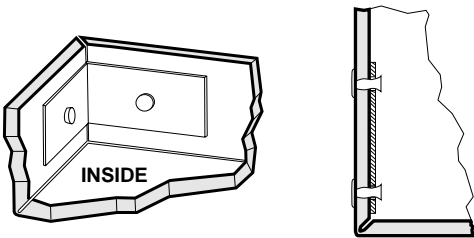


C. Small Radius Bending (By Routing) — Continued

Square Corner Cutouts



Envelope Corner Cutouts



D. Curving

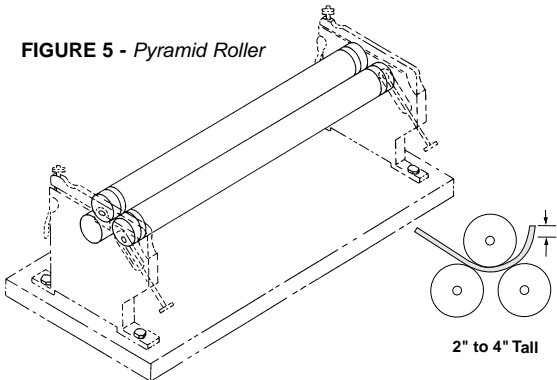
Dibond Material may be curved using one of the three methods common to the sheet metal industry, pyramid roller, press brake or over a clamped pipe.

The minimum curving radius of Dibond Material without routing the back skin is 30 times the thickness of the material, $2\text{mm} \times 30 = 60\text{mm}$ ($2\frac{3}{8}''$).

1. Pyramid Roller

The use of a pyramid roller to curve Dibond Material is an acceptable method of obtaining a radius. As a precaution, film should be used between the panel and the rollers to protect the panel surface (See figure 5).

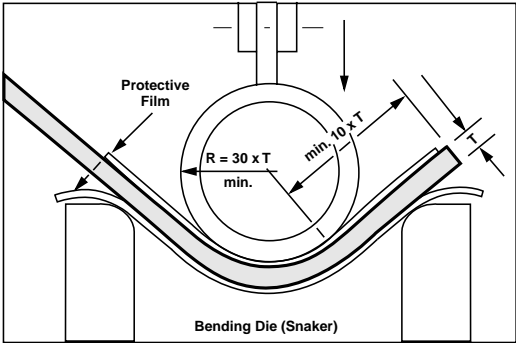
FIGURE 5 - Pyramid Roller



2. Press Brake

When forming with a brake press, use a top die with the radius desired. The lower die should always have a protective film of less than $\frac{1}{8}$ ". The radius of the top die will be the approximate inside radius of the finished panel (See figure 6).

FIGURE 6 - Press Brake



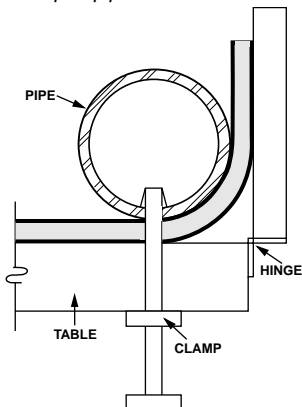
R = Radius

T = Thickness

3. Bending Over A Clamped Pipe

Dibond Material may be bent over a pipe of the proper diameter that is securely clamped to a table. A hinged "leaf" attached to the end of the table will bend the material easily (See figure 7).

FIGURE 7 - Bending over a clamped pipe



E. Drilling

Dibond Material can be drilled with twist drills usually used for aluminum and plastics, and on drilling machines customarily used for metals.

WORKING SPECIFICATIONS:

- Drill bit: Twist drill, high speed steel.
Tip Angle: 100-140 degrees, or counter-bore grind with centering tip.
Cutting speed: 164 RPM to 984 RPM.

Quick removal of chips can be achieved by a high RPM, slow feed speed and occasional lifting of the bit.

F. Punching

The punching of holes or flat-formed parts using Dibond Material is performed in the same way as for solid aluminum sheet. Evenly ground tools and the narrowest possible cutting gap will provide the best results. Dibond Material can be punched with a male-female die.

G. Joining Dibond Material

Typical methods of joining Dibond Material are the use of threaded fasteners, rivets, adhesives and double-faced high strength tapes.

Proper consideration should be given to the thermal expansion characteristics of Dibond Material.

Use the general guidelines listed below when other elements come in direct contact with the surface of Dibond Material.

1. ACCEPTABLE JOINING ELEMENT MATERIALS:

- Aluminum
- Plastic
- Stainless Steel

2. UNACCEPTABLE JOINING ELEMENTS:

- Copper
- Brass
- Bronze
- Iron
- Raw Steel

Unacceptable materials may cause corrosion of joining surface due to electrolysis of dissimilar materials.

Threaded Fasteners

Threaded fasteners will allow the removal of the panel if needed. The use of a large flat washer will aid to minimize surface pressure and possible compression due to cold flow of the core material. Placement of the threaded fasteners should not be less than .75" from the edge of the sheet. It is not recommended to torque fasteners due to the cold flow of the core material, one turn past finger tight is common practice.

Rivets

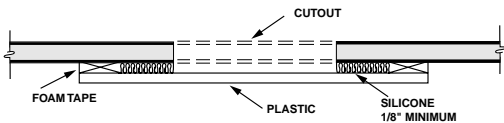
Panels of Dibond Material can be fastened together or joined to aluminum extrusion profiles with rivets common to aluminum construction. Rivet connections are well suited for parts that may be subjected to vibration. Colored plastic concealment caps can be used to conceal the exposed rivet head. Consult the rivet manufacturer for details.

Adhesives

For interior design purposes, high strength contact adhesives that do not require lengthy setting times can be used.

Where moderate cure times are acceptable, construction adhesives and silicones can be used to obtain a stronger bond than with contact adhesives.

When using an adhesive to hold dissimilar materials, select one that will allow thermal differential movement without shearing. Use a low modulus sealant where greater amounts of movement are expected (i.e., plastics to Dibond Material), and medium modulus sealants if minimum movement is expected (i.e., bonding aluminum to Dibond Material).

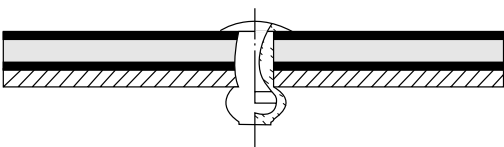
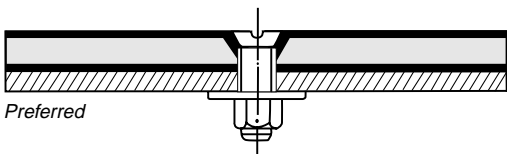
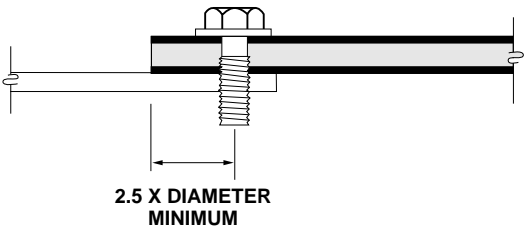
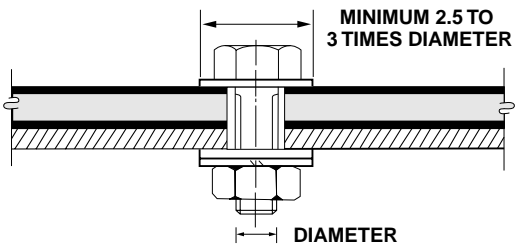
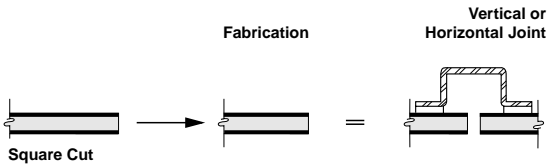


Tapes

For stress-free applications and to hold parts while the primary adhesives cures, double-faced foam tapes are effective. Both surfaces to be bonded must be clean and dry. It is important that the tape manufacturer's directions are followed for best results.

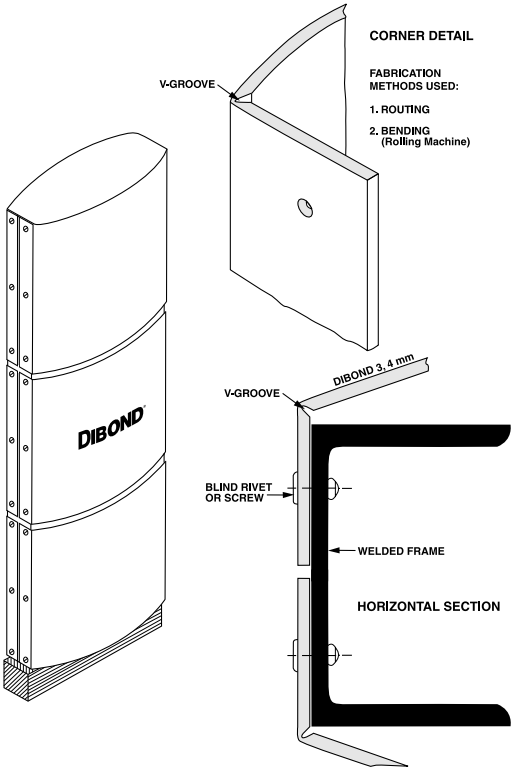
H. Concepts

The following details are provided for conceptual purposes only. These are not the only methods that can be used to attach Dibond Material, nor can they be used generically without consideration for each individual application. Good design for thermal expansion should influence the choice of details used.



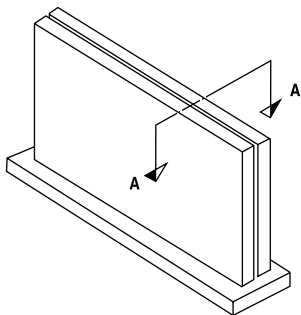
H. Concepts — Continued

SIGNS (TOTEM)

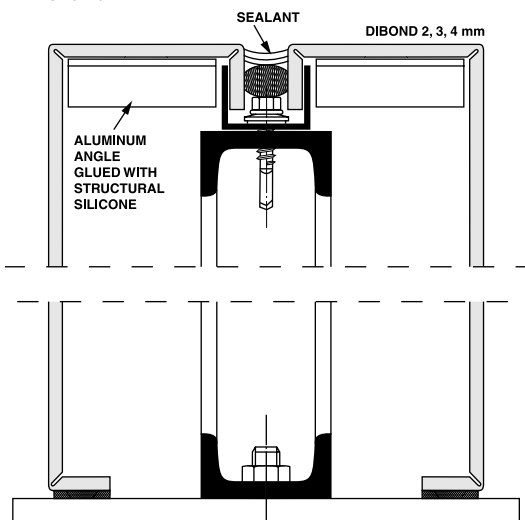


H. Concepts — Continued

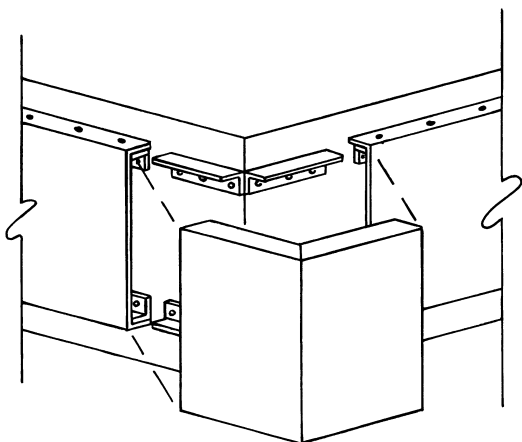
SIGN BOX/MONUMENT SIGN



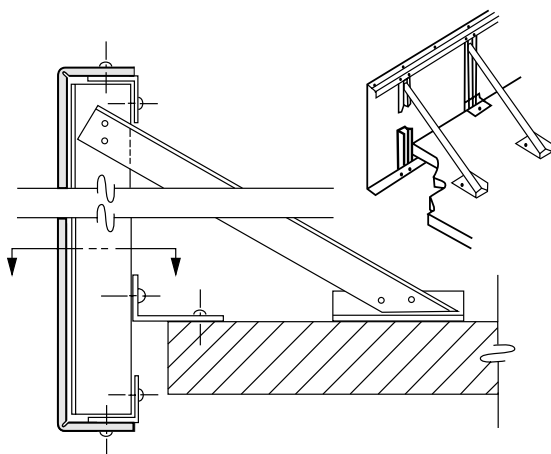
SECTION A—A



H. Concepts — Continued

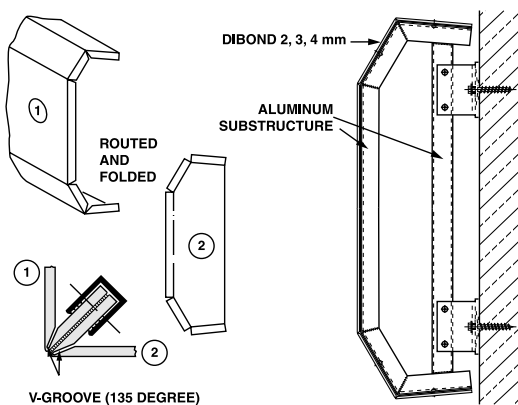


SIGN BAND / CANOPY / FASCIA

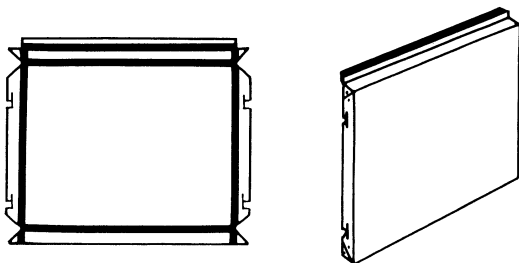


H. Concepts — Continued

SIGN BOX/SHOP FRONT



PAN FACES



I. Painting

Dibond Material can be easily painted by experienced and qualified professional panel painters. Any painting operation must be of the type that is cured by chemical action or by air drying. Never use a paint system that must be baked in an oven for curing. The drying time may be speeded up with heat provided that heat does not exceed a maximum of 140°F.

It is essential that the paint manufacturer be consulted to evaluate their paint systems compatibility with the polyester paint on Dibond Material. Proper selection of primers (if needed), top coats, colors, etc., should be done according to the direction of the paint manufacturers.

For off-line coating and repaint operations, proper substrate preparation is important, from sanding and scuffing to proper primer selection. Best adhesion will occur when the coating is applied over the existing polyester substrate, following the precise selection of compatible materials.

A urethane based paint is recommended for use with Dibond Material since it provides very good adhesion.

The use of lacquers is not recommended, and any coating material under consideration should be tested for performance over small pieces of Dibond Material prior to full scale production.

J. Screen Printing

Dibond Material can be easily screen printed. Any screen printing inks used must be cured by air drying, jet drying under 40 seconds at a maximum temperature of 175°F or UV cured. Temperature or dwell times in excess of these limits may cause warping or distortion of the panel.

It is recommended to contact the ink manufacturer to determine the products best suited for compatibility with polyester paint.

Proper surface preparation prior to screen printing is essential. Wipe the surface with isopropyl alcohol to remove any surface residue; allow isopropyl alcohol to dry (visual inspection) and screen print as usual.

K. Dibond Material

(ENGINEERING SPECIFICATIONS)

Panel-Thickness:		2mm	3mm	4mm	
Thickness of Aluminum Cover Sheets		0.012 in			
Weight [lb/ft ²]		0.60	0.79	0.98	
Technical Properties:					
Tensile Yield	ASTM D638	PSI	8450	5580	4390
Ult. Yield	ASTM D638	PSI	8500	6220	5000
Elongation	ASTM D638	%	7.6	12	13
Tensile Modulus	ASTM D638	PSI x 10 ⁶	2.13	2.5	1.81
Ult. Flexural	ASTM D790	PSI	20120	15050	12180
Flexural Modulus	ASTM D790	KSI	1391	1430	1440
Flatwise Comp.	ASTM C365	PSI	1026	739	790
Shear Strength	ASTM C273	PSI	1637	1030	920
Thermal Cond. (K)	ASTM C177	BTU-in/hr.ft ² -°F	0.953	1.221	1.532
Thermal Rest. (R)	ASTM C177	Hr.ft ² -°F/BTU	0.084	0.097	0.103
Deflection Temp.	ASTM D648	°F	ABOVE 350	303	188
Moment of Inertia		[in ⁴ /in]	.00003	.000075	.000141
Section Modulus		[in ³ /in]	.00079	.00126	.00172
Alloy of Cover Sheets			3003 H24		
Linear Thermal Expansion			0.000012 in/in/°F		

L. Thermal Expansion

Thermal expansion should always be considered in designs using Dibond Material. Dibond Material has been tested and has a rate of expansion of .000156"/FT/°F. That translates into approximately an 1/8" movement in an 8' panel with a 100°F temperature change. Temperature differences must be considered between shop (fabrication) temperature and the highest or lowest panel temperature. Care should always be taken to avoid restricting thermal movement of the panel to eliminate unacceptable bowing or overstressing of the fasteners.

The coefficient of expansion for unlike materials should be considered in joint design.

M. Storage

Dibond Material should always be stored in a cool dry area where temperatures are relatively stable. Excessive temperature fluctuations may cause condensation to form on the stored sheets possibly resulting in permanent damage. Do not allow moisture to reach stored material.

The best way to store Dibond Material is to lay it flat. If a rack storage system is decided upon, use the base of the crate as a bottom support for the material to rest on. If Dibond Material is leaned on its side, it should be positioned to lean on the horizontal edge of the material only. Dibond Material panels should be handled carefully when removing the panels from storage so that they do not slide against each other or so they don't slide over the rough surface to avoid panel damage. Vertical stacking of Dibond Material is not recommended.

CAUTION: The information in this manual is based on experience gathered in our laboratory facilities in Benton, Kentucky and throughout the world. It must be understood, however, that conditions vary from shop to shop and the suggestions given in this manual must be considered as recommendations only, without warranties expressed or implied. It is the customers' responsibility to pretest the procedures prior to engaging in a production run.

No warranty, either expressed or implied, is made as to merchantability or fitness of the merchandise for any particular purpose, and the seller shall not be liable for any loss or damage, directly or indirectly, arising from the use of the merchandise, or for consequential damage.

Also, normal safety and health precautions practiced in any fabricating environment should be used when fabricating Dibond Material. Goggles or other face protection, as well as hearing protection should

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view case histories or look at
product application photographs,
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