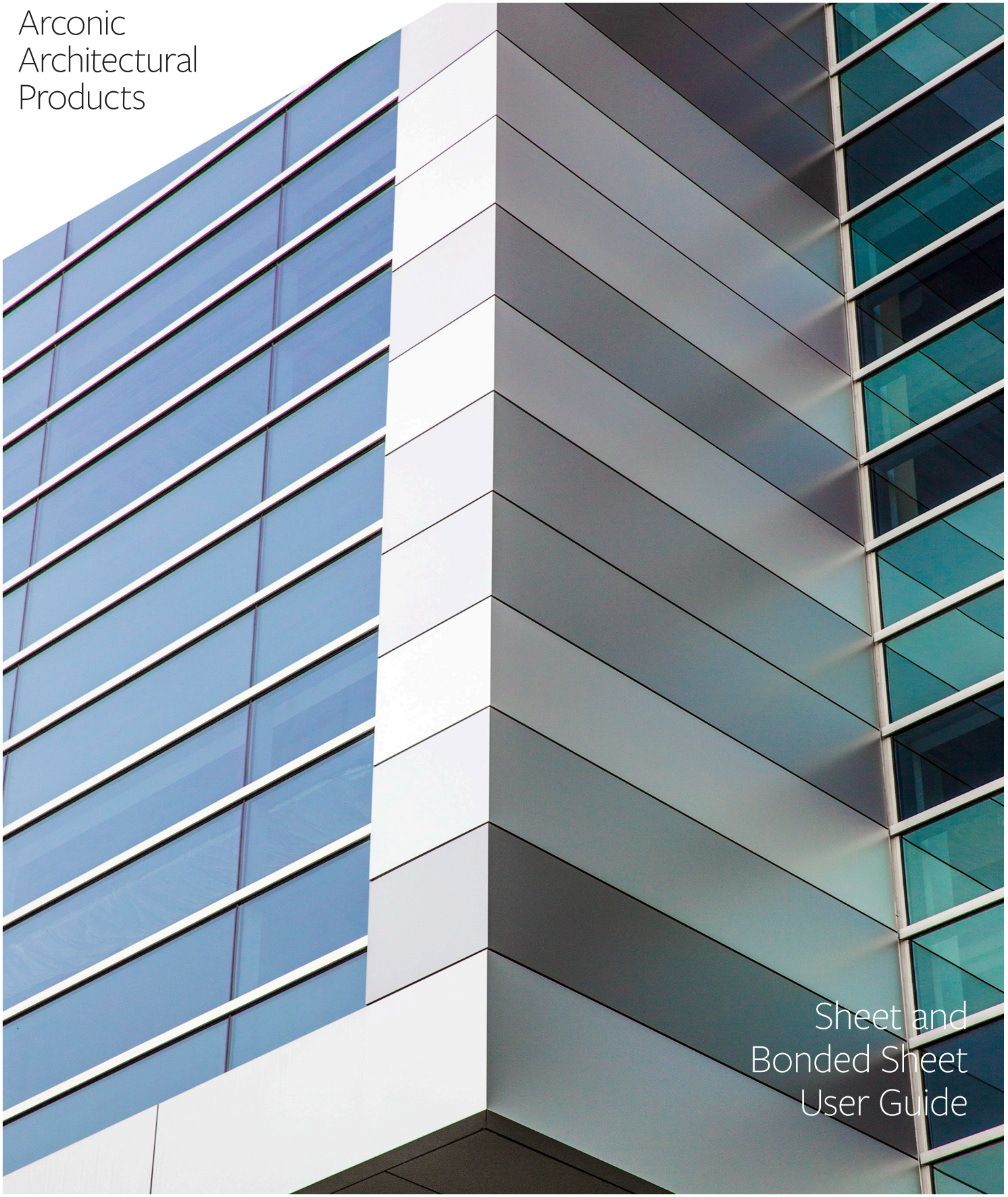
Arconic
Architectural
Products



Sheet and Bonded Sheet User Guide

ARCONIC

General

AS3000B 3mm Bonded Sheet is a pre-painted, bonded aluminum sheets for building facades that possess supreme flatness and long-term durability. **AS3000B** panel weight is 1.62 lb/ft2 and is composed of two 1.5mm (0.059″) sheets bonded together in Arconic Architectural Products LLC's (AAP) aluminum bonding technology. The **AS3000B** panels are capable of being fabricated with similar methods used in plate aluminum and MCM panel fabrication. These panels combine many of the benefits of MCM with those of plate material to provide the building owner with a unique product that can be installed in rout-and-return MCM systems or face fastened attachment systems.

AS2000 (0.080″), **AS1500** (0.060″), and **AS1000** (0.040″) are pre-painted aluminum sheets for building facades that possess supreme flatness and long-term durability. **AS2000**, **AS1500**, and **AS1000** flat sheet and coil materials provide durability, design flexibility and enduring performance. These products are ideally suited for a broad range of commercial and industrial uses – and are often used as design elements in architectural applications our **AS2000** can be used for forming cassettes and our **AS1500** and **AS1000** may be used for building accessories and trim.

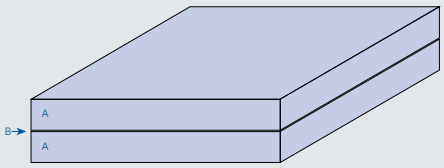
Storage & Handling

AS3000B 3mm Bonded Sheet as well as **AS2000**, **AS1500**, and **AS1000** flat sheets are cut to length at the manufacturing facility and are packed on cushioned wooden skids. These skids are banded in both directions in order to minimize movement during shipment.

AS3000B panels, **AS2000**, **AS1500**, and **AS1000** flat sheets must be stored in a cool, dry place for twenty-four hours before fabrication occurs as their finishes can be sensitive to localized pressures. No miscellaneous materials should be stacked on top of the panels after transport in order to minimize the risk of ghosting on the surface of the panels. Also, the panels and sheets should be handled with caution from multiple locations along their length and should be protected from other materials during the fabrication process.

AS3000B panels and **AS2000**, **AS1500**, and **AS1000** flat sheets will expand and contract with the same expansion coefficient as solid aluminum; therefore, ambient temperature and the operating temperature range of the installed panels should be considered during fabrication. The usable temperature range for **AS3000B 3mm Bonded Sheet**, **AS2000**, **AS1500**, and **AS1000** flat sheets is -40°F–180°F. The panel coating directionality should be taken into consideration to avoid variations between panels on the same building surface. Always Follow directional arrows on protective film when installing panels. The paint finish should

FIGURE 1
AS3000B 3mm Bonded Sheet



A. 1.5mm (0.059″) Aluminum skin
B. 0.16mm (0.006″) Tie layer between aluminum skins

FIGURE 2
Manufacturing Tolerances

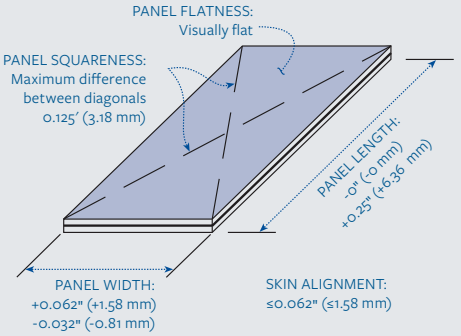
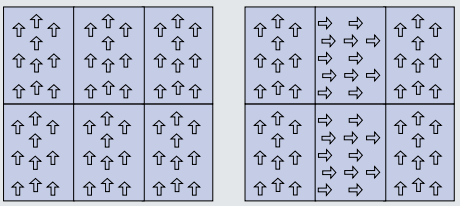
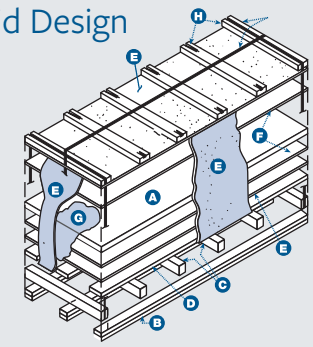


FIGURE 3
Panel Orientation



Correct Orientation | Incorrect Orientation

FIGURE 4
Skid Design



TYPICAL AS SERIES SKID

A. AS Series Sheets
B. 2x4 planks – doubled if skid is longer than 12′ (3658 mm)
C. Double 2x4 and 4x4 at 24″ on center
D. 1x4 plank
E. 1/2″ (13 mm) OSB sheet
F. 1/2″ foamed plastic sheet for cushioning material
G. Water-resistant waxed paper wrap
H. 2x4 cross member stiffness

cover any exposed surfaces of the product as well as any contact points with attachment materials. Installed panels should always be protected from other dissimilar metals with a barrier of some sort in order to minimize galvanic reactions.

AS3000B Cutting

AS3000B panels can be machined and formed according to the same methods used for forming Reynobond® FR core composite panels. Sawing and routing can be performed with ordinary commercial metal equipment. Cutting blades and router bits are available through independent distributors. A list of these potential distributors is listed at the end of this guide.

Cutting **AS3000B** sheets can be performed with either a circular saw or a milling bit. When cutting panels using a milling bit, a single flute upcut carbide milling bit at 24,000 rpm spindle speed at a feed rate less than or equal to 3 feet per minute a cutting fluid may be necessary to achieve a quality cut and extend tool life. To determine processing speeds with your particular machinery, you should perform testing before large scale fabrication of panels. The panels can be cut with a metal-cutting circular saw used to cut aluminum sheets. In order to maintain a long tool life, only one **AS3000B** sheet should be sawed during a cycle of the saw blade. Line cuts should be made with an 8″ diameter, 80 tooth, carbide-tipped combination rip and crosscut blade.

When performing a cut with a circular saw, the panels should be placed on their back side with the protective film facing opposite the frame of the saw. Automated vertical and horizontal panel saws are available through equipment manufacturers and distributors. These panel saws allow multiple vertical and horizontal routs and cuts to be made on one sheet at a time. **AS3000B** panels are usually mounted vertically in the fixture, and the cutting operation performed in this manner requires less shop floor area than if the panels are placed flat on a table. Panel saws can streamline the fabrication process.

Flat Sheet Cutting

AS2000, **AS1500**, and **AS1000** sheet can be cut using a manual or powered shear or circular saw with common aluminum cutting blades. An 8" diameter, extra fine, carbide tipped, 60 tooth combination rip and crosscut blade is recommended to successfully cut **AS2000**, **AS1500**, and **AS1000** sheet material.

FIGURE 5
Rout & Return

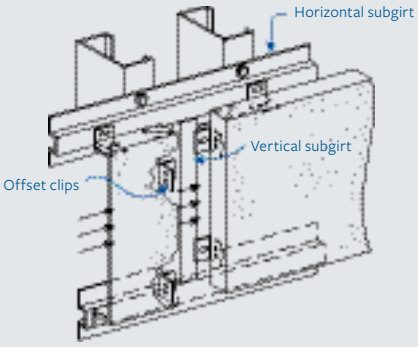
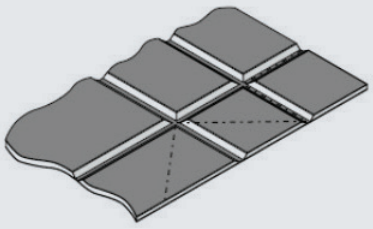
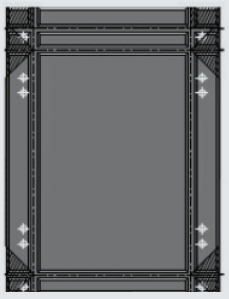


FIGURE 6
Panel Routing & Layout





Grooving and Return Leg Bending

Grooved cuts can be performed with standard **AS3000B 3mm Bonded Sheet** by using a 110° tungsten-carbide bit with a 1/16″ wide flat-nose traveling at a feed rate less-than or equal-to 3 feet per-minute and spinning at 23,000 rpms. This method gives the best results for producing a 90° fold, which can be used for a return leg. The plunge depth of the bit should leave no less than 0.7mm or 0.032″ of metal remaining in the groove. Return legs should be turned using a U-shaped jig with a manual lever and should not be bent more than one time. If the return leg is longer than four feet multiple jigs should be used at the same time to perform the bend in one motion. In order to ensure full bending, bend the leg at least 10° past the intended angle and to allow it to relax back to the desired angle. Bit angles for v-groove cutting should be between 90° to 135°, but the bit should always have at least a 1/16″ wide flat-nose. You should conduct small scale fabrication trials before performing any large scale manufacturing to ensure adequate tooling and settings are being used.

AS3000B Folding

AS3000B 3mm Bonded Sheet can be folded like aluminum plate with a metal folding machine. When performing folds, tooling should allow for a 2-T bend to avoid crazing the finish or cracking the paint. Folds can be made up to 90° angle. Knife dies and other punching machines should not be used for folding **AS3000B** panels as they will harm the finish and cause bowing around the bent edge. Corners should be mitered with a 90° sharp-nose grooving bit when folding return legs together.

FIGURE 7
Fold Breaking

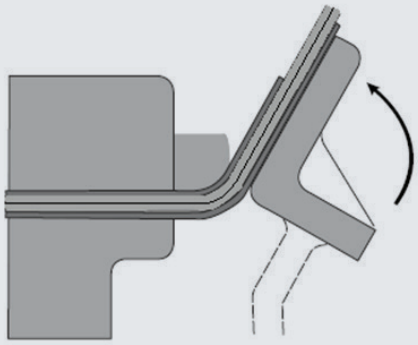
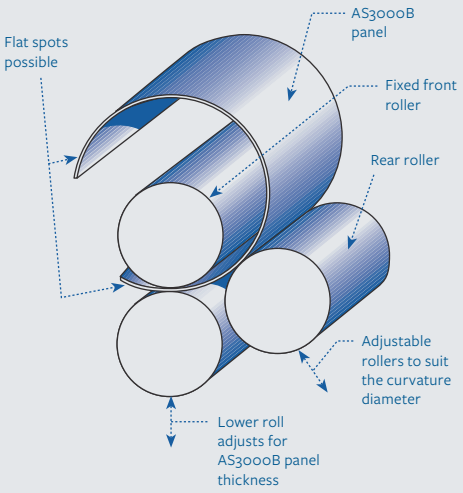


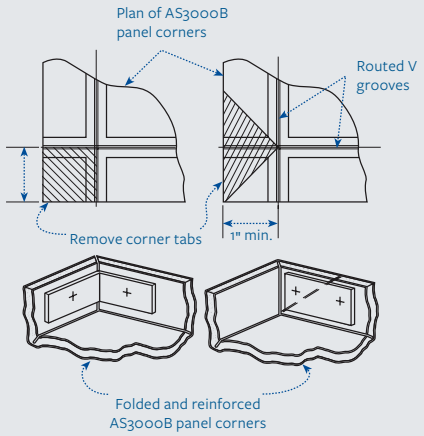
FIGURE 8
Radiusing



Bending

AS2000, **AS1500**, and **AS1000** sheet can be brake formed from flat sheet. In order to do so, use press brakes with automatic crowning to keep pressure equalized across the workpiece. To avoid damaging the aluminum skin, the die should be covered with PVC tool protection to avoid scratching the material finish and to provide a barrier for metal on metal damage. As with any fabrication technique, experiment with scrap material prior to production. Note: Material should not be fabricated below a temperature of 600F to avoid cracking or crazing of finish. Particular attention must be taken regarding bending in order to prevent crazing/cracking of material finish. A 2.5T inner bending radius is required to avoid any crazing of material finish. Do not bend **AS3000B** panels without routing.

FIGURE 9
Panel Corners

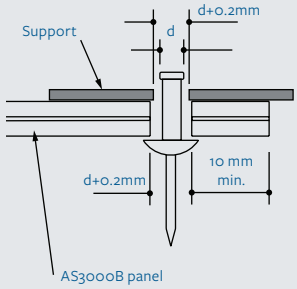


Attachment & Assembly

AS3000B panels can be easily installed for both exterior and interior applications. Wet-seal and rainscreen systems are available from our North American network of fabricators. Most installations use rout-and-return method. The rout-and-return installation method is accomplished with a continuous V-shaped routed groove made around the entire panel perimeter at a constant distance of 1″ (25 mm) from the panel edge. A minimum thickness of 0.032″ (0.81 mm) of face material must remain after routing. The corners are removed, and the edges are folded to create a 1″ (25 mm)-deep "pan" or cassette.

The corners are reinforced with riveted aluminum angles to stiffen the panel unit. Rivets commonly used for aluminum are suitable for fastening the panels to the aluminum angles. Rivets must be placed at a distance of at least 10 mm from the edge of the sheet. This value may change according to the loading requirements of the **AS3000B 3mm Bonded Sheet** material and varies with the thickness of the material to be joined to the panels. When selecting a rivet, a safety coefficient of at least 2.5 times the tensile and shear strength of rivet being used. The manufacturers recommended pressure applied to attach the rivet on the **AS3000B** panels should be followed to avoid unbuttoning of the rivet.

FIGURE 10
Riveting with Expansion



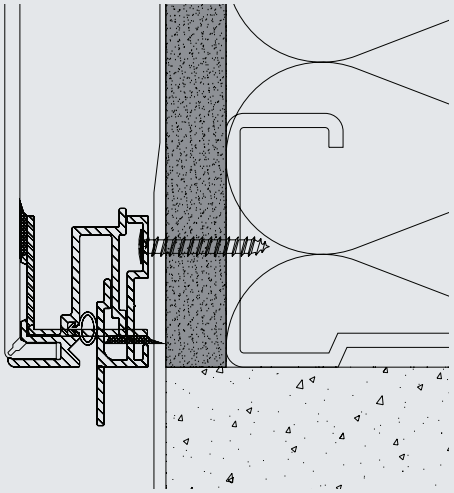
When used outdoors, it is necessary to provide a running clearance of 2 mm between the minimum diameter and the diameter of the rivet hole of the **AS3000B** panel to reflect the linear expansion coefficient of 1.1x10-5 in/in/°F (0.0236 mm/m/°C). Attachment using countersunk screws with bolts is a secondary method of attachment, but this method does not accommodate for expansion or contraction at fastening points. Large washers should be used to distribute the clamping loads..

Assembly without washer could cause a creep and significantly reduce the clips' performance It is possible to install panels into specially designed extrusions which pinch the panel into a specially designed channel. Depending on the shape of the profile, it may be possible, before assembly, to tighten the flanges of the profile to improve the strength of the mounting system. For mounting outdoors or for large panels, use additional fastening rivets hidden under the extrusion to provide extra support.

AS3000B panels can be radiused to curved configurations for column covers, architectural bullnoses, radius-building corners and other applications requiring radius forming. This process can be accomplished with a "pyramid" rolling machine, which consists of three or four motor-driven adjustable rollers. The multiple layers of the **AS3000B** panels causes a spring-back effect, that is more pronounced than with aluminum sheet. In 3-roll formers, the leading and exiting edge of the panel will be flat. It is a good idea to have 3-5″ of extra length depending on the desired radius. The minimum radius for the panels is 6″ and can be achieved through multiple passes through the rollers.

FIGURE 11

Captured Edge Extrusion



Perforation Guidelines

AS3000B, **AS2000**, **AS1500**, and **AS1000** sheet is an excellent choice of material for perforated applications. The following guidelines should be followed to ensure adequate product performance and eliminates any unwanted material deformation. Warranty is available on a case by case basis based on perforation design and environmental factors. Please contact customer sales representative for information.

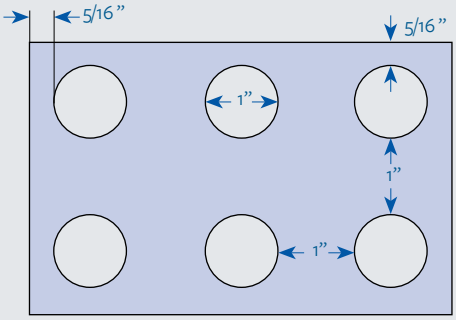
- Perforation can be performed using Standard punch tooling or CNC routing.
- A minimum of 5/16" (8mm) from panel edge to first perforation edge.
- Minimum perforation spacing of 5/16" (8mm) between outer edge of each perforation.
- Perforations larger than 5/16" (8mm) must have a spacing equal to the diameter of the perforation.

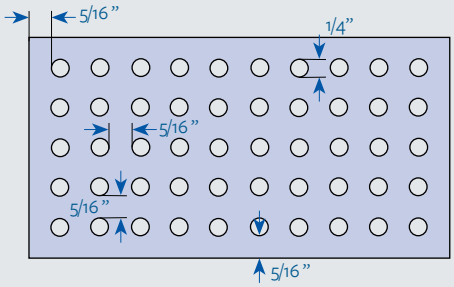
Ex 1. A perforated hole less than 5/16" in diameter must maintain a minimum spacing of 5/16"
Ex 2. A 1" diameter perforated hole must have a minimum spacing of 1" from outer edge of perforation to the next outer edge.

- Perforation should not be fabricated on panels being used in adverse environments such as near salt/brackish water or in areas with high air pollution (near power plants/manufacturing facilities)
- Particular consideration should be taken in regard to expansion joints.
- Punching of material may produce a shiny exposed aluminum appearance caused by shearing

FIGURE 12

Perforation





Thermal Expansion

When fabricating **AS3000B 3mm Bonded Sheet** panels particular consideration should be taken in regard to thermal expansion. Thermal movement is particularly important to not put excess stress on fasteners and to prevent unacceptable panel bowing and distortion.

Thermal Movement Example - Expansion
Example Panel Size: 10' x 4' @ 68oF (panel skin temp) Coefficient of thermal expansion: 1.1 x 10-5 in/in x oF
With an increase in panel temperature of from 68oF to 180oF panel expands from a length of 120" to 120.148"
Length Expansion Calculation: (0.000011 in/inxoF)(120 in)(112oF) = 0.148" With an increase in panel temperature of from 68oF to 180oF panel expands from a width of 48" to 48.059"

Width Expansion Calculation: (0.000011 in/inxoF)(48 in)(112oF) = 0.0591" Notice in the above example that thermal expansion has a direct correlation to size of the panel (ie. Larger panel means more expansion) this must be considered when dealing with large areas of **AS3000B** panels.

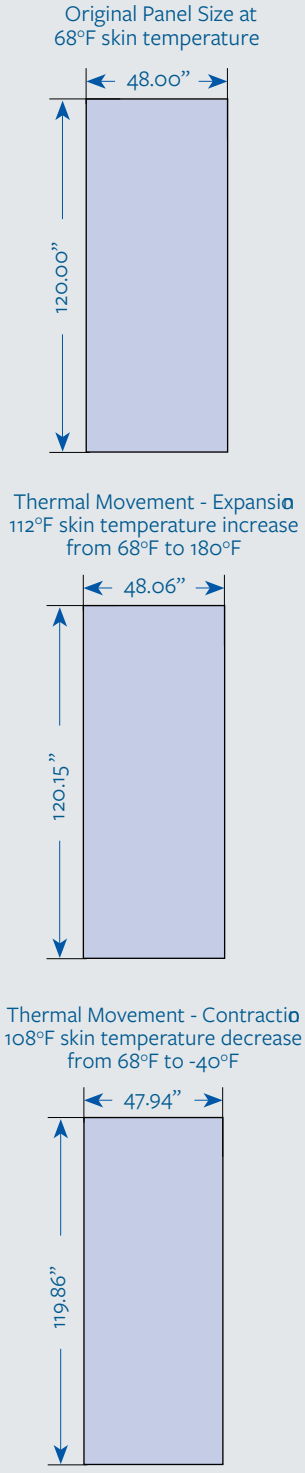
Thermal Movement Example – Contraction
Example Panel Size: 10' x 4' @ 68oF (panel skin temp)
Coefficient of thermal expansion: 1.1 x 10-5 in/in x oF With a decrease in panel temperature of from 68oF to -40oF panel contracts from a length of 120" to 119.857"

Length Contraction Calculation: (0.000011 in/inxoF)(120 in)(-108oF) = - 0.143"
With a decrease in panel temperature of from 68oF to -40oF panel contracts from a width of 48" to 47.943"

Width Contraction Calculation: (0.000011 in/inxoF)(48 in)(-108oF) = - 0.057" As noted with thermal expansion, contraction must also be considered when dealing with large spans of **AS3000B** panels.

The above examples are based on the extremes of the panel's temperature resistance being between -40oF to 180oF however any temperature range can be calculated depending on environment. **AS2000**, **AS1500**, and **AS1000** Sheet will expand and contract at the same rate as **AS3000B** panels.

FIGURE 13
Expansion



Panel Reinforcement

AS3000B panels can be strengthened in various ways to resist wind and reduce deflection. The stiffeners are generally in the form of 1″ to 1.5″ aluminum extrusions whose size depends on the support required. At minimum, one stiffener should be used per 25ft2 of panel area.

These extrusions are bonded to unexposed backside of the panel at regular intervals and act as supporting beams. Wind or pressure differential force on the panel is transferred to the stiffeners, which transfer the force outwardly to the edge of the panel. Stiffeners are most effective if they are attached in parallel with the shortest panel dimension.

Fasteners used to attach the panel to the structural supports should be placed as close to the stiffener end location as possible, so that the loads can be transferred from the stiffener to the support in the most direct manner. Stiffener spacing depends on variables such as the strength of the stiffeners, their spacing, the wind load, the maximum deflection, the strength of the attachments and the spacing of the supports. Since the maximum deflection of the panel is located at its geometric center, it is necessary to place a stiffener in the middle of the panel, and then position the other stiffeners at regular intervals.

Structural silicone sealant and structural adhesive tape are commonly used to adhere stiffeners to the back of panels. Compatibility of any sealant to painted aluminum surfaces should be confirmed by actual tests. Painted surfaces require a solvent cleaning prior to the application of any sealant. In some cases the painted surface may also require the application of a primer or adhesion promoter. Please contact your sealant provider for assistance with regard to your specific application.

Cleaning & Maintenance

A systematic maintenance program must be instituted by the Customer or owners to prevent the build-up of dirt and salt deposits on the painted surface. The frequency of cleaning and choosing the right product depends on the location of the building and the degree of soiling. The washing should be done in stages, from the bottom to the top. Cleaning should be either manually or using special equipment at moderate to light pressure.

Only appropriate cleaning products may be used, and after cleaning the panels should be rinsed systematically with clean water to remove residual cleaning

FIGURE 14

Rear View of Stiffened Rout-and-Return Panel

See section thru stiffener below (Figure 11)

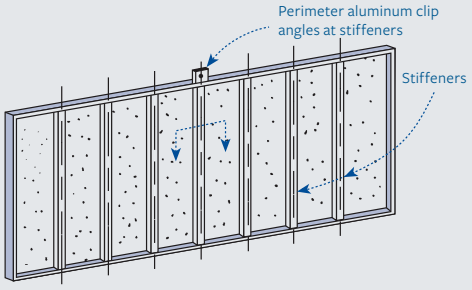
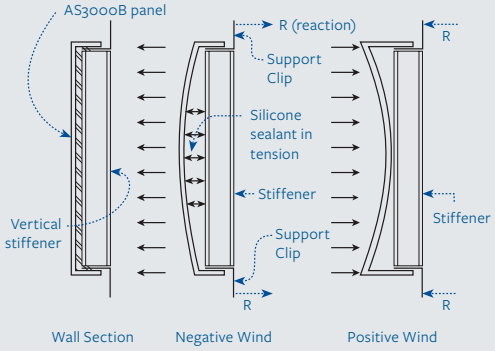


FIGURE 15

Stiffener Behavior Under Wind Load



products. Excess rinse water should be wiped from the surface with a sponge, squeegee or chamois to prevent mineral deposits from accumulating. Cleaning products to avoid are high alkaline products, acids, and solvents prohibited in our cleaning technical bulletin. In all cases a small inconspicuous spot should be chosen for testing the effect of the cleaner. In the case that panels are scratched during fabrication or installation. Small scratches can be touched up with air-dry paint in combination with an artist's brush. Small dents can be repaired with body filler prior to their painting. A suitable surface preparation, for example blasting and applying a primer layer, may be required to obtain satisfactory results.

The surface must be cleaned in accordance with American Architectural Manufacturers Assocation's (AAMA) Publication no. AAMA 609 & 610 "Voluntary Guide Specification for Cleaning and Maintenance of Painted Aluminum Extrusions and Curtainwall Panels," to prevent accumulation of harmful deposits.

Sources of Equipment & Accessories

The following is a list of material and equipment sources related to the fabrication of AS3000B 3mm Bonded Sheets. This list can be used by customers and fabricators to locate materials, equipment or accessories. These sources are for reference only and do not represent a complete list of available suppliers. AAP does not endorse, guarantee, or in any way warrant their materials and/or services.

Cutting Tools

AXYZ International
5330 South Service Road
Burlington, ON L7L 5L1
Canada
Tel: 800 361 3408
Tel: 905 634 4940
Fax: 905 634 4966
www.axyz.com

G. C. Peterson Machinery
2300 Myrtle Avenue – 100
St. Paul, MN 55114
Tel: 651 789 5360
Fax: 651 789 5369
www.gcpeterson.com

MSC Industrial Supply Co.
20 Parkway View Dr.
Pittsburgh, PA 15205
Tel: 800 645 7270
www.mscdirect.com

Hypneumat, Inc.
5900 West Franklin Drive
Franklin, WI 53132
Tel: 800 228 9949
Tel: 414-423-7400
www.hypneumat.com

Extrusion Bending

Techniform Metal Curving
723 E. Mason St.
Mabank, TX 75147
Tel: 903 887 2363
Fax: 903 887 6050
www.techniform.com

Fasteners

Atlas Fasteners
1628 Troy Road
Ashland, OH 44805
Tel: 800-321-6846
www.atlasfasteners.com

SFS Intec, Inc.
Spring St. and Van Reed Road
P.O. Box 6326
Wyomissing, PA 19610
Tel: 800 234 4533
www.sfsintecusa.com

High Bond Tape

3M Specialty Tape Solutions
Tel: 888-364-3577
www.3M.com

Tesa®
tesa tape NA
5825 Carnegie Blvd.
Charlotte, NC 28209
Tel: 800 426 2181
Fax: 800 852 8831
www.tesa-acxplus.com

Panel Cleaning

Alumitech Limited
411 West Grand Ave.
Chicago, IL 60651
Tel: 312 920 6300
www.alumitecltd.com

Panel Saws

Colonial Saw, Inc.
122 Pembroke Street
P.O. Box A
Kingston, MA 02364
Tel: 781 585 4364
www.csaw.com

HOLZ-HER
124 Crosslake Park
Mooresville, NC 28117
Tel: 877-548-0929
www.holzherrusa.com

Komo Machine, Inc.
One Komo Drive
Lakewood, NJ 08701
Tel: 732-719-6222
www.komo.com

Rollforming Equipment

Watson Hegner Corp. 160
1006-C Union Rd.
Gastonia, NC 28054
Tel: 704 922 9660
Fax: 704 922 9841 www.
watsonhegner.com

Silicone Sealants

Dow Corning Corp.
2200 W. Salzburg Rd.
Midland, MI 48686
Tel: 989 496 4400
www.dow.com

G E Silicones Headquarters
187 Danbury Road
Wilton, CT 06897
Tel: 800 255 8886
www.gesilicones.com

Tremco, Inc.
3735 Green Rd.
Beachwood, OH 44122
Tel: 216 292 5000
Tel: 800 321 7906
www.tremcosealants.com

Disclaimer :
Laws and building and safety codes governing the design and use of AAP's products, including aluminum composite, bonded and flat sheet materials, vary widely. It is the responsibility of the owner, the architect, the general contractor, the installer and the fabricator/ transformer, consistent with their roles, to determine the appropriate materials for a project in strict conformity to all applicable national, regional and local building codes and regulations.

REYNOBOND© FR AND AS3000B HAVE SUCCESSFULLY PASSED US NFPA 285, E84 AND CANADA S134 TESTS AS A PART OF AN ASSEMBLY. ENSURE THE PRODUCT IS USED IN A SYSTEM THAT COMPLIES WITH ALL APPLICABLE REGULATIONS. REYNOBOND© PE IS COMBUSTIBLE; IT COULD CATCH FIRE AND BURN. ANY LABORATORY TESTING INFORMATION PROVIDED BY AAP LLC APPLIES ONLY TO THE PARTICULAR PRODUCT OR ASSEMBLY TESTED AND DOES NOT NECESSARILY REPRESENT HOW PRODUCTS WILL ACTUALLY PERFORM IN USE. REPORTS AND TEST DATA CORRESPONDING TO A PARTICULAR TESTED PRODUCT SAMPLE OR ASSEMBLY ARE NOT A GUARANTEE THAT THE SAME PRODUCT OR ASSEMBLY WOULD ALWAYS ACHIEVE THE SAME TEST RESULT.

Slight variations in color, gloss and texture can occur between different paint production batches. Paint variations within a specific color, especially for mica and metallic colors, can and do occur that are visible to the human eye, but are within industry tolerances.

ARCONIC

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