General Information and Fabrication Guidelines
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Reynobond® aluminum composite material (ACM) is a high-performance wall cladding product from Arconic Architectural Products LLC (AAP), consisting of two sheets of nominal 0.020” (0.50 mm) aluminum, each permanently bonded to an extruded thermoplastic core. This is an elegant concept resulting in an extraordinarily flat and highly formable material with an excellent strength-to-weight ratio (see figure 1).

Reynobond® ACM, for architectural applications, is only available with a Fire Resistant (FR) core. Reynobond® ACM is available in a near-infinite variety of colors. We also offer several different skin materials, including brushed aluminum, zinc and stainless steel. The properties for each skin type vary, please consult with your AAP representative for the product properties for your project.

The versatility of Reynobond® ACM offers many distinct advantages to the designer, fabricator and installer: unique flatness for creating smooth, monolithic surfaces; virtual elimination of oil canning; exceptional load-bearing capacity and flexural strength. Strong, smooth, flat, lightweight, durable and attractive—all inherent characteristics of a product that is easy to fabricate and install.

Reynobond® is well suited for exterior, interior, industrial and specialty architectural applications. Reynobond® product applications include: exterior and interior cladding, corporate identity/retail programs, column covers, interior partitions, canopies, enclosures, kiosks, exhibits and displays.

**Tolerances**

Reynobond® products are manufactured to exacting tolerances with state-of-the-art equipment in a continual process. AAP has a reputation for manufacturing products of the highest quality, and Reynobond products are no exception. Reynobond® FR panels are manufactured to the tolerances shown (see figure 2).

**Packaging, Shipping & Handling**

Reynobond® sheets are cut to length and packed on cushioned, wooden skids. Each skid is enclosed with 1/4”± (approximately 7 mm)-thick OSB board (see figure 3).}

Reynobond® ACM sheets, without stiffeners or edge forming, should be handled carefully. Longer sheets will sag at the center; therefore, when lifted at each end
Figure 4
Reynobond® panel with Protective film masking

they should be supported at additional points within the length. A 6-mm-thick FR core panel weighs approximately 2.1 pounds per square foot (10.25 kg/m²). Protective film masking, nominally 2.8 mils (70 microns) with ultraviolet (UV) barrier helps protect the panel finish during transportation, fabrication and installation (see figure 4). Care should be taken to keep worktable surfaces clear of metal chips and shavings, etc., which could penetrate the masking and scratch or mar the panel surface. Although the protective film masking is UV stabilized, it should be removed as soon as possible after installation.

Colorweld® Finishes

Reynobond® ACM is offered in Colorweld® 500 opaque finishes, Colorweld 500 mica finishes and Colorweld 500XL metallic finishes. Custom color formulations, using opaque, mica and metallic finishes are available in virtually any color. Colorweld® paint finishes feature 70% Kynar 500®/Hylar 5000® polyvinylidene fluoride (PVDF) resins with Fluoropolymer technology, coil-coated to ensure the highest color uniformity and quality. They provide excellent flexibitily and film adhesion for radiusing and offer superior resistance to humidity, impact, salt spray, pollution and abrasion. Colorweld® coatings exhibit outstanding color and gloss retention and improved hardness and durability, and they are considered the premier architectural coatings for metal, exceeding AAMA 2605 performance requirements.

Prior to composite panel production, the aluminum skins are coil-coated. Coil-coating produces exceptional quality, efficiency, uniformity and economy compared to electrostatic spraying.

Standard opaque finishes offered on Reynobond® ACM are two-coat finishes typically consisting of a 0.2 mil primer and a 0.8 mil color coat, for a nominal dry film thickness of 1.0 mil. Standard mica finishes on Reynobond® ACM are two-coat finishes typically consisting of a 0.2 mil primer and a 0.8 mil color coat with mica flakes suspended in the finish for a nominal dry film thickness of 1.0 mil. Standard metallic finishes on Reynobond® ACM are three-coat finishes typically consisting of a 0.2 mil primer, a 0.8 mil color coat and a 0.5 mil clear top coat for a nominal dry film thickness of 1.5 mils. Mica and metallic coatings are reflective or pearlescent in appearance as a result of millions of micron-sized aluminum or mica flakes suspended in the paint mixture and subsequently oriented in one longitudinal direction during the coating process. The flakes are dried in position as the color coat is cured. The longitudinal orientation of the flakes may cause a lighter or darker reflective appearance of the finish in one viewing axis. Panels or trim pieces
turned in different directions may appear a slightly different shade. It is important that mica- and metallic-coated panels are fabricated and installed with this coating orientation in mind. Panel directionality must be maintained to avoid shading differences between adjacent panels on the wall. AAP prints directional arrows on the back surface of every panel during production. The number of the production lot or unit is inked along with the directional arrows to identify the production run. Each panel is also sequentially numbered, but it is not necessary to place consecutively numbered panels adjacent to one another on the wall. Additionally, the protective film is also printed with directional arrows to aid in the proper orientation of the panels.

All panels are directionally oriented in the packing skids. Should any panel’s direction be lost, it is possible to determine this by inspecting the panel ends. The shear that cuts the panels to length at the end of the line will leave a slightly turned-down top skin along the leading edge. The trailing end top skin will be square cut by the shear.

Paint coating systems using either mica (mica flake) or metallic (aluminum flake) to provide a more pearlescent or reflective surface, respectively, have characteristics that may cause a variation in the perceived visual look of the panels when mounted on vertical surfaces. Use panels manufactured from one coil of material to minimize variability of panel color. Forming Reynobond® panels at or below ambient temperatures of 60° F (15.5° C) may adversely affect the appearance and performance of the Colorweld® finish.

Sawing & Routing
Sawing and routing Reynobond® panels are relatively easy processes that can be done with ordinary commercial metal and woodworking equipment.

Saw blades and router bits are available through independent distributors who handle cutting tools. A list of potential manufacturers is located on the last page of this guide.

Reynobond® FR core material may produce fine airborne particles when cut or routed, so we recommend breathing protection be worn.

Line cuts
We recommend 8” (203 mm) diameter, extra fine, carbide-tipped, 60 tooth,
combination rip and crosscut blades. These blades can be used in both table and circular hand saws to successfully cut Reynobond® composite material. Longevity of the cutting edge is dependent on the number and length of cuts performed (see figure 5).

**Routed cuts**

Circular Saws: AAP recommends working with a custom tooling supplier. A special circular saw blade should be acquired that is wide enough to accommodate the special tooth design necessary to cut the correct groove, per figure 6. A tool steel saw is adequate for machining aluminum- or zinc-skinned Reynobond composite material. Carbide blade teeth, or inserts, are recommended for stainless steel and copper Reynobond® composite material. Ideal grooves are 105°, with a 1/32” flat to allow the proper clearance when the panel is bent to 90°.

The saw-type cutter should be at least 4” in diameter. The cutter should operate at an rpm and feed rate to yield approximately 500 surface feet per minute as a beginning target. This can be increased for aluminum or decreased for other metals such as stainless steel. A chip thickness of 0.002” or less should be targeted. Too aggressive a feed may cause delamination of the skin. A sample cutter could be 8” in diameter with 18 insert-type teeth. The cutter would be operated at 250 rpm (revolutions per minute) and 10 ipm (inches per minute) to attain 524 sfpm (surface feet per minute) with a chip thickness of 0.0022”. This cutter would be used to machine stainless steel-skinned Reynobond composite material.

Note: The groove must be cut to remove the back metal skin and part of the core material. A recommended 0.020”, but no less than 0.010”, of core material must be left with the front metal skin to ensure a proper bend radius when the 90° bend is made. This is true for all types of Reynobond products and for any type of cutter used (see figure 6 for a detail of the groove).

Router Bits: Router bits may be used to machine the 105° V-groove in aluminum- or zinc-skinned Reynobond®. The cutter should have an included angle of 105° and have the end ground to provide the 1/32” flat cut necessary for the proper groove (see figure 6). This type of cutter does not have a very good tool life when machining other types of Reynobond® products. A saw-type cutter has better capacity to machine the product while dissipating the heat generated at a more rapid rate. Should the cutter get too hot, the core chips will stick and overload the
Reynobond® FR core products.

Panel Saws: 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. Reynobond® 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. Reynobond® FR core material may produce fine airborne particles when cut, so we recommend breathing protection be worn.

Radiusing or Curving
Reynobond® ACM 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” rollforming machine, which consists of three motor-driven adjustable rollers. You can successfully radius or curve Reynobond® panels using machines with minimum 6” (152 mm) diameter rolls. The operator normally makes multiple passes of the panel through the rollers to gradually obtain the desired radius (see figure 7).

Reynobond® FR core panels are offered in a standard thickness of 4 mm. The FR core material has a minimum recommended curving radius of 12” to 15” (305 to 381 mm). Note that the first 1” to 2” (25 to 50 mm) of the panel edge may not be curved as it travels through the rollers. AAP does not recommend stretch forming or heating the Reynobond® panel in any fashion to enhance formability.
Bending
Reynobond® composite material can be brake formed from 0° (flat) to 90° (right angle). AAP recommends that RB120, 3 mm panels, be bent with a minimum inside radius of 5/8” (16 mm) and RB160, 4 mm panels, be bent with a 3/4” (19 mm) inside radius. The tests were done in a hydraulic brake press using an open-air, bend-bottom die with an inside opening of 2” (51 mm) and an edge radius of 3/4” (19 mm). To avoid damaging the aluminum skin, it is recommended that the center part of the die be filled with 60 durometer rubber up to the top edges of the die. As with any fabrication technique, experiment with scrap material prior to production (see figure 9). Note: If the metal temperature is too low, damage can occur while bending.

A variety of fasteners are used to fabricate and install Reynobond® panels. Fastener selection is the construction project engineer’s responsibility. You may successfully use specific fasteners for panel load-testing purposes in obtaining building code recognition. We can provide this information upon request.

Pop rivets are often utilized to attach aluminum clip angles and other structural or ornamental elements to Reynobond® panels. Because the rivet body will be in contact with the aluminum skins of the panel, it is recommended that either aluminum or stainless steel rivets be used, to avoid dissimilar metal contact. We have successfully used two 3/16” (5 mm)-diameter rivets to attach aluminum clip angles to the return leg of a rout-and-return panel system (see figure 10). Ultimate shear and tensile strengths of various rivets are available from the rivet manufacturer. Please be advised that some building code jurisdictions do not endorse the use of pop rivets for structural connections.

Screws are also used to perform many of the same applications as rivets. Stainless steel sheet metal screws are recommended for attaching Reynobond® panels. It is recommended that sheet metal screw-thread-type fasteners be used, especially when the screw is under tension load and this load is resisted by the aluminum skins (see figure 11). Occasionally, Reynobond® panels are face fastened directly to supports or subgirts. The type and thickness of the support metal, as well as the applied load, will dictate the size and thread type of the correct fastener. Testing is advisable to determine the performance of any fastening system.

Through bolts may join adjacent Reynobond® panels to each other or to other elements. Galvanized, stainless steel or aluminum bolts, nuts and washers...
should be used to avoid dissimilar metals contact. Caution is recommended in
 torqueing the nut onto the bolt. Because the plastic core material is compressible,
 over-torquing can deform the metals skins. Use lock or double nuts with washers
to prevent the nut from loosening over time (see figure 12).

Installation Methods

Reynobond® panels can be easily installed for both exterior and interior
applications. Wet-seal and dry-seal systems are available from our global network
of qualified architectural dealers. Most installations use the rout-and-return
method.

Rout-and-Return System

<table>
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<tr>
<th>Panel Type / Thickness</th>
<th>Design Load*</th>
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<tr>
<td>Panel size (nominal) 4' x 12' x 1' (1220 mm x 3658 mm)</td>
<td></td>
</tr>
<tr>
<td>RB160FR / 4 mm</td>
<td>63.2 (psf) / 3.0 (kPa)</td>
</tr>
<tr>
<td>Panel size (nominal) 5' x 15' x 1' (1525 mm x 4572 mm)</td>
<td></td>
</tr>
<tr>
<td>RB160FR / 4 mm</td>
<td>51.8 (psf) / 2.5 (kPa)</td>
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*Tested Values
Rout-and-return begins with a flat sheet of Reynobond® ACM. Typically, a continuous V-shaped routed groove is made around the entire panel perimeter at a constant distance of 1” (25 mm) from the Reynobond® panel edge. The face skin and a minimum thickness of 0.020” (0.51 mm) of core material are all that 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 Reynobond® panel unit (see figure 13).

Prepunched aluminum clip angles are then attached at approximately 12” (305 mm) on center to the returned pan edges. These clip angles transfer the wind load on the panel into the structural supports. Clips are staggered from one panel to the next to allow sequential installation. Rout-and-return joints should be at minimum 5/8” (16 mm) wide to allow for thermal movement. Slotted holes may be required in the aluminum clip angles at fastener connection points to accommodate this thermal movement (see figure 14). Rout-and-return joints are then caulk sealed to prevent air and moisture infiltration. For interior applications, Reynobond® composite panels may be installed with lightweight extrusions (see figure 14) or in partition systems. Reynobond® panels are also well suited for glazing into storefront and curtainwall applications.

Silicone Sealants
Silicone sealants are often used in rout-and-return panel applications to caulk horizontal and vertical Reynobond® panel joints. This creates a primary weather seal between the exterior panel system and the interior of the building. Silicone sealants demonstrate excellent compatibility and adhesion to the Colorweld® finishes of Reynobond® panels.

We do not recommend the placement of silicone sealants directly against Reynobond FR core material. Incidental contact of silicone sealant with the core material should not present any short- or long-term detrimental effects to the panel as a whole. Care must be taken to avoid staining of the painted panel face with these sealants during installation.

Silicone sealant is also used to structurally adhere perimeter extrusions and stiffeners to the back of the panel. Compatibility of any sealant to either painted surfaces or mill-finish aluminum 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.

Post-Painting & Panel Repair
Reynobond® panels are available from stock with a washcoat that is suitable for post-painting by qualified painters. Proper surface preparation and pretreatment may be required to successfully apply the various air-dry paint systems that are available. Touchup paint should be applied with an artist’s brush. Consult the paint manufacturer’s application instructions for specific details. Paint systems that require oven heat for curing should not be used. It is recommended that a full-size sample be test painted before large-scale painting is undertaken.

Panels may occasionally become scratched or nicked during fabrication and installation. Small scratches can easily be repaired with matching air-dry touchup paint. Small dents may be repaired with automotive-type body putty and then post-painted. As stated previously, proper surface preparations such as sanding and priming may be required to achieve satisfactory results.

Thermal Movement
Reynobond® panels will thermally expand and contract the same as solid aluminum sheet or plate material. Reynobond® 4 mm panels have an expansion coefficient of 1.31 x 10⁻⁵ in/in/°F (2.36 x 10⁻⁵ mm/mm/°C). We suggest that architectural wall panel joints be a minimum 5/8” (16 mm) wide to account for thermal movement of the panels, unless design calculations prove otherwise. The expected increase in length of a 10' (3050 mm)-long panel will be about 3/16” (4.8 mm) for a rise in temperature of 100° F (38° C). Assuming this panel is fixed at its center with connections that allow thermal growth in both directions, a 100° F temperature increase would reduce a 5/8” wide joint to 7/16” (11 mm). Thermal growth or contraction can occur in any direction on the panel and is always greatest along the longest panel dimension (see figures 14).
Panel Reinforcement

Reynobond® panels can be stiffened by various means to resist wind loads and reduce panel deflection. Stiffeners are usually 1” to 1-1/2” (25–38 mm)-deep aluminum extrusions and are adhered to the nonexposed back side of the panel at 24” (610 mm) on center. Stiffeners act like miniature beams and are most effective if used across the shortest panel dimension (see figures 16 and 17). Because stiffeners act as support beams, the applied wind load to the panel is transferred to the stiffener and the stiffener “reacts out” to the panel edge. Therefore, support clips should be located as close to the stiffener as possible (see figure 17).

The fasteners used to attach the panel to the structural supports should be placed at or close to the stiffener end locations so that loads are transferred from panel to stiffener to support in the most direct manner. Stiffener spacing is a design decision that involves a number of variables such as stiffener strength, stiffener span, design wind load, allowable specified deflection, panel thickness, fastener strength and support spacing (see figures 15, 16 and 17). Because the maximum panel deflection is at the geometric center of the panel, a stiffener should be placed there. Any remaining stiffeners should be parallel and equally spaced before applying adhesive for stiffeners. It is recommended (or required) that the back side of the Reynobond® ACM should be lightly sanded and wiped with isopropyl alcohol to enhance the bond.
Panel Cleaning

Reynobond® panels have factory coil-coated skins with multiple finish options. Depending on the geographic location of the building and the atmospheric conditions, routine maintenance may be required to clean the surface of the Reynobond® panels to restore them to their original appearance.

In industrial areas where thorough cleaning is necessary, or for stains resulting from tree sap, insecticides, chimney fumes, etc., the finish should be washed with a sponge or soft-bristled brush and a solution of mild detergent and water (1/3 cup mild detergent per gallon of water). Immediately rinse surfaces thoroughly with a hose. To minimize streaking, wash from bottom to top. An adequate rinse should be assured to cleanse the finish and also further dilute the solution so as not to harm shrubbery. It is also advisable to test the solution or cleaner on a small, inconspicuous area before applying it to larger exposed areas. Mineral spirits may be used sparingly to remove caulkling compounds or tar from the finish. Rinse with clear water. We recommend the American Architectural Manufacturers Association’s (AAMA) “Voluntary Guide Specification for Cleaning and Maintenance of Painted Aluminum Extrusions and Curtainwall Panels,” Publication No. 610.1, as a suitable cleaning reference.
Thermal Movement Examples

5’ x 20’ Panel (Example 1)
Summary: For a 5’ x 20’ (1525 mm x 6096 mm) panel, a 90° F (32° C) change in skin temperature could result in expansion or contraction of 0.28” (7.2 mm) along the longest panel dimension.

4’ x 10’ Panel (Example 2)
Summary: For a 4’ x 10’ (1220 mm x 3048 mm) panel, a 90° F (32° C) change in skin temperature could result in expansion or contraction of 0.14” (3.5 mm) along the longest panel dimension.

4’ x 4’ Panel (Example 3)
Summary: For a 4’ x 4’ (1220 mm x 1220 mm) panel, a 90° F (32° C) change in skin temperature could result in expansion or contraction of 0.06” (1.5 mm) along either panel direction.
Sources of Equipment & Accessories

The following is a list of material and equipment sources related to the fabrication of Reynobond®, Profile Products and panels. 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 or guarantee the quality of 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: 800 323 7133
Fax: 805 634 4966
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: 419 289 6171
www.atlasfasteners.com

SFS Intec, Inc.
Spring St. and Van Reed Road
P.O. Box 6326
Wyomissing, PA 19610
Tel: 800 234 4533
Tel: 610 376 8531
Fax: 610 376 8531
www.sfsintecusa.com

High Bond Tape
3M Specialty Tape Solutions
Tel: 800 362 3550
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
311 W. Washington St.
Chicago, IL 60606
Tel: 312 920 6300
www.alumitecltd.com

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

HOLZ-HER
5120 Westinghouse Blvd.
Charlotte, NC 28273
Tel: 704 587 3400
www.holzher.com

Komo Machine, Inc.
1 Gusmer Drive
Lakewood, NJ 08701
Tel: 800 255 5670
www.komo.com

Rollforming Equipment
Watson Hegner Corp.
160 Gibson Court
Dallas, NC 28034
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.dowcorning.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

Panel Saws
Disclaimer

Laws and building and safety codes governing the design and use of AAP’s products, and specifically aluminum composite materials, vary widely. AAP does not control how AAP products are selected, fabricated, transformed or otherwise configured or used, nor how AAP’s products are combined with other materials. AAP assumes no responsibility for any of the foregoing. It is the responsibility of the owner, the architect, the general contractor, the installer and the fabricator/transformer, consistent with their roles, to make these determinations in strict conformity to all applicable national, regional, state, provincial and local building codes and regulations and interpretation, including without limitation those relating to building construction, safety and any other applicable regulations. REYNOBOND IS COMBUSTIBLE; IT COULD CATCH FIRE AND BURN. SEE AAP WEBSITE FOR PRODUCT WARNINGS. ANY LABORATORY TESTING INFORMATION PROVIDED BY AAP APPLIES ONLY TO THE PARTICULAR PRODUCT OR ASSEMBLY TESTED AND DOES NOT NECESSARILY REPRESENT HOW PRODUCTS WILL ACTUALLY PERFORM IN USE, AND 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.

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