Reynoclad®
Reynodual®

Hoover™
Architectural Solutions

USER GUIDE



BUILD BOLDER.

Reynodual® is a pre-painted, 3mm bonded aluminum sheet for building facades that possess supreme flatness and long-term durability. Reynodual® panel weight is 1.62 lb/ft2 and is composed of two 1.5mm (0.059") sheets bonded together in Hoover Architectural Solutions LLC's (HAS) aluminum bonding technology. The Reynodual® 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.

Reynoclad® is a pre-painted aluminum sheet for building facades that possess supreme flatness and long-term durability. Reynoclad® .080", .063", .059", and .040" flat sheets 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 Our Reynoclad® .080" pre-painted sheets can be used for forming cassettes while our coil-coated Reynoclad® .063", .059", and .040" sheets may be used for building accessories and trim.

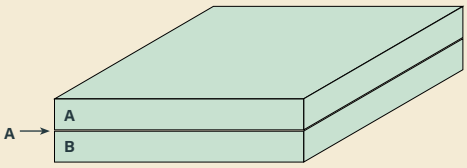
STORAGE & HANDLING

Reynodual® and Reynoclad® flat sheets are cut to length at the manufacturing facility and are packed on wooden skids. These skids are banded in both directions in order to minimize movement during shipment.

Reynodual® and Reynoclad® 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.

Reynodual® and Reynoclad® 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 Reynodual® and Reynoclad® .080", .063", 0.59", .040" 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 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.

FIGURE 1
REYNODUAL® 3MM BONDED SHEET



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

FIGURE 2
MANUFACTURING TOLERANCES

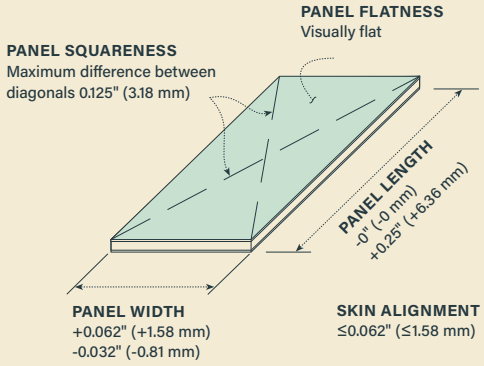
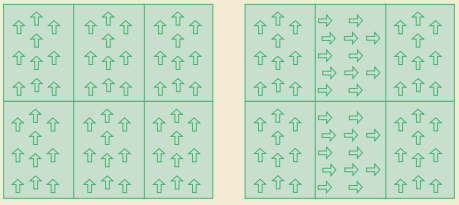


FIGURE 3
PANEL ORIENTATION



Correct Orientation | Incorrect Orientation

REYNODUAL® CUTTING

Reynodual® 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 Reynodual® 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 Reynodual® 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. Reynodual® 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.

REYNOCLAD® CUTTING

Reynoclad® .080", .063", .059", and .040" sheets can be cut using a manual or powered shear or circular saw with common aluminum cutting blades. An 8" diameter, extra fine, carbide tipped, 80 tooth combination rip and crosscut blade is recommended to successfully cut Reynoclad® sheet material.

FIGURE 5
ROUT & RETURN

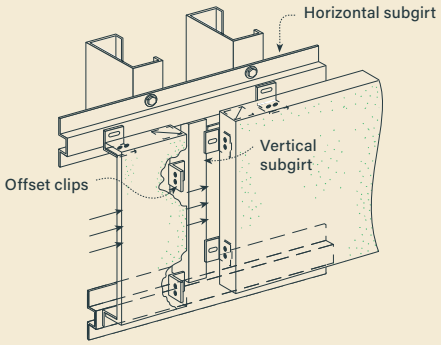
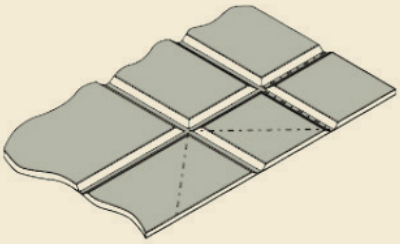
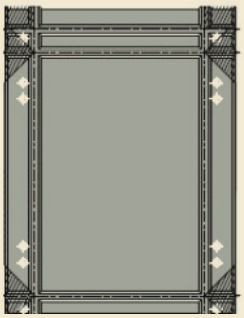


FIGURE 6
PANEL ROUTING & LAYOUT





GROOVING AND RETURN LEG BENDING

Grooved cuts can be performed with Reynodual® 3mm Bonded Sheets 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 with a spindle speed of 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 standard panel folding equipment and should not be bent more than one time. For longer return leg bending, be sure to use an appropriately sized bending apparatus 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.

REYNODUAL® FOLDING

Reynodual® 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 minimize crazing the finish or cracking the paint. Folds can be made up to a 90° angle. Knife dies and other punching machines should not be used for folding Reynodual® 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.

BENDING

Reynoclad® .080", .063", .059", and .040" sheets 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 60ºF to minmize cracking or crazing of finish. A 2.5T inner bending radius is required to minimize crazing of material finish. Do not bend Reynodual® panels without routing.

FIGURE 7
FOLD BREAKING

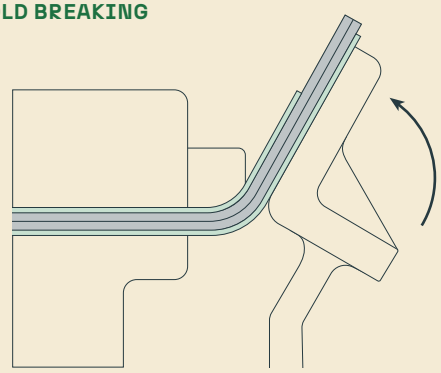
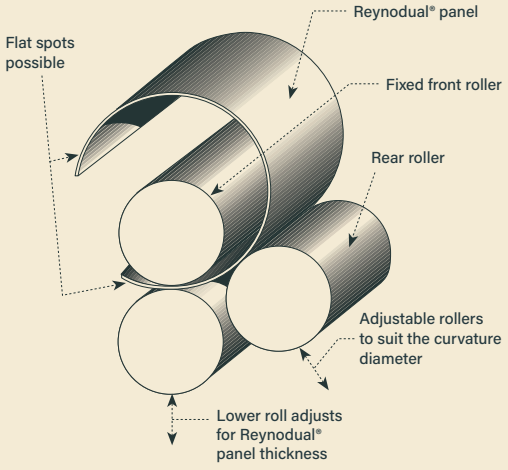


FIGURE 8
RADIUSING



ATTACHMENT & ASSEMBLY

Reynodual® 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 can be reinforced with riveted aluminum angles to stiffen the panel unit. Fasteners commonly used for aluminum are suitable for fastening the panels to the aluminum angles. Fasteners must be placed at a distance of at least 5/16" from the edge of the sheet. This value may change according to the loading requirements of the Reynodual® 3mm Bonded Sheet material and varies with the thickness of the material to be joined to the panels.

Reynodual® 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 Reynodual® 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 9
PANEL CORNERS

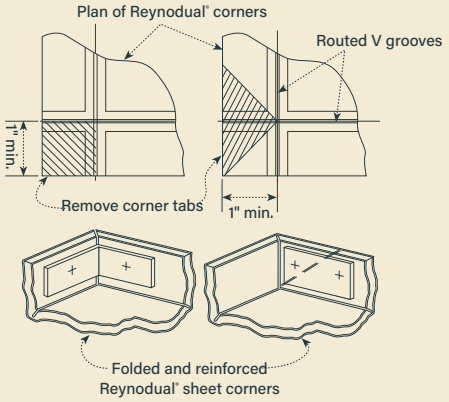


FIGURE 10
RIVETING WITH EXPANSION

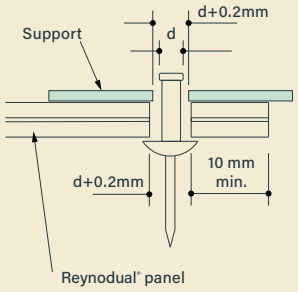
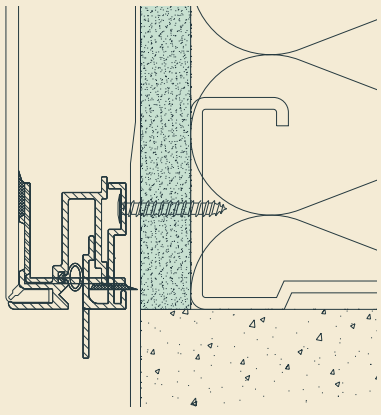


FIGURE 11
CAPTURED EDGE EXTRUSION



REYNODUAL® PERFORATION GUIDELINES

Reynodual® is an excellent choice of material for perforated applications. The following guidelines should be followed to ensure adequate product performance and eliminate 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.

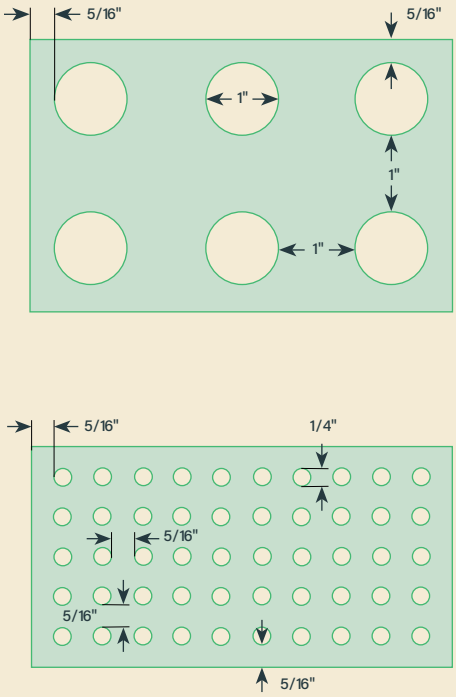
- Perforation can be performed using Standard punch tooling or CNC routing.
- A minimum of 5/16" (8mm) from panel edge to first perforation edge.
- Minimum perforation spacing of 5/16" (8mm) between outer edge of each perforation.
- Perforations larger than 5/16" (8mm) must have a spacing equal to the 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 Reynodual® and Reynoclad® 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 (i.e. larger panel means more expansion) this must be considered when dealing with large areas of Reynodual® panels.

Thermal Movement Example – Contraction

Example Panel Size: 10' x 4' @ 68ºF (panel skin temp)

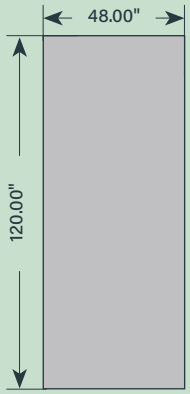
Coefficient of thermal expansion: 1.1 x 10-5 in/in x ºF With a decrease in panel temperature of from 68ºF to -40ºF panel contracts from a length of 120" to 119.857"

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"

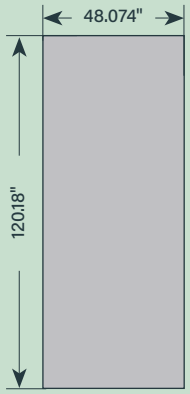
Width Contraction Calculation: (0.000011 in/inxºF)(48 in)(-108ºF) = - 0.057" As noted with thermal expansion, contraction must also be considered when dealing with large spans of Reynodual® and Reynoclad® panels.

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.

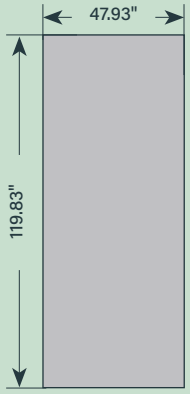
FIGURE 13
EXPANSION



Original Panel Size at
68°F skin temperature



Thermal Movement – Expansion
112°F skin temperature increase
from 68°F to 180°F



Thermal Movement - Contraction
108°F skin temperature decrease
from 68°F to -40°F

PANEL REINFORCEMENT

Reynodual® 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.

FIGURE 14
REAR VIEW OF STIFFENED ROUT-AND-RETURN PANEL

See section thru stiffener below (Figure 11)

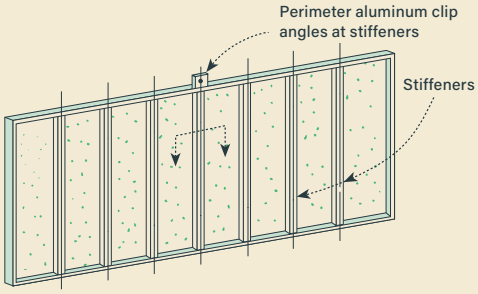
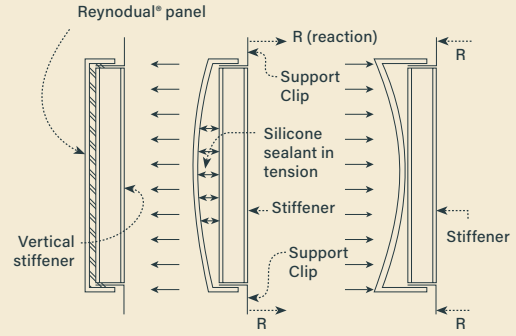


FIGURE 15
STIFFENER BEHAVIOR UNDER WIND LOAD



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 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 Reynobond® and Reynoplate® Cleaning Instructions document at hooveras.com/resources/technical-downloads. In all cases a small inconspicuous spot should be chosen for testing the effect of the cleaner. In the event 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. A suitable surface preparation is required to obtain satisfactory results.

The surface must be cleaned in accordance with American Architectural Manufacturers Association'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.

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Laws and building and safety codes governing the design and use of HAS'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 REYNODUAL® 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 HAS 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.

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