

Aluminium Composite Panel



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# ALUPANEL FABRICATION GUIDELINES



...a **multitude** of applications



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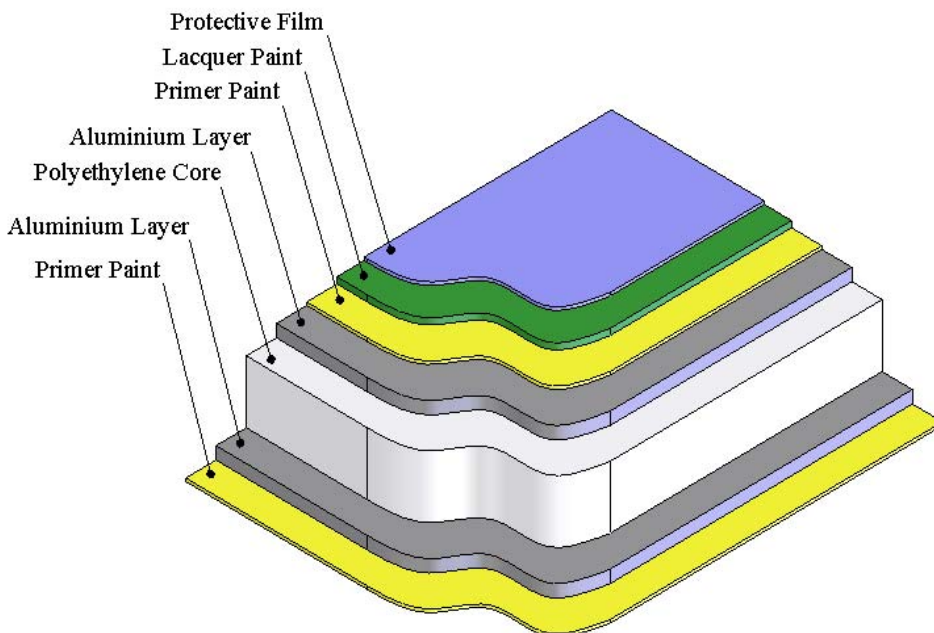
### Product Description :

Alupanel is a high-performance product consisting of two aluminum sheets permanently bonded to each side of an extruded thermoplastic compound core material. As a result of this technology we have ideal flat and very formable material with an excellent strength-to-weight ratio.

Alupanel is available with **2** types of core materials: a polyethylene (PE) core, or a fire-resistant (FR) core material based on aluminum hydroxide mineral component. Alupanel panels are supplied with PDVF paint or PE paint on front side available in standard and special colours; the rear side of the panels is covered by a protective paint layer. Also both side painted panels are available. Unique characteristics make Alupanel composite panel ideal material for designers, sign makers, architects, fabricators and installers.

Some of these advantages are: exceptional rigidity; outstanding strength to weight ratio; simple fabricating technique due to which routing and folding can even be performed on a construction site; easy and quick installation; high resistance to atmospheric factors; easy maintenance and a perfect appearance which keeps for many years.

We have developed this manual to assist fabricators and installers to work with Alupanel in the most efficient manner possible. These recommended suggestions and product data are based on information which is, in our opinion, reliable. However, since skill, judgment, and quality of equipment and tools are involved, and since conditions and methods of using Alupanel are beyond our control, the suggestions contained in this manual are provided without guarantee. We recommend that prospective users determine the suitability of both the material and suggestions before adopting them on a commercial scale. In no event shall Multipanel UK Ltd., have any liability in any way related to or arising out of said suggestions and product data for direct, special, consequential or any other damages of any kind.



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**Safety :**

Normal health and safety precautions practiced in any fabricating environment should be used when fabricating Alupanel Material. Goggles or other face protection, as well as hearing protection and gloves should always be worn.

Alupanel FR (fire resistant) core material may produce fine airborne particles when cut or routed, and we recommend breathing protection be worn during these operations.

MSDS for Alupanel is available from our sales offices and dealers on request.

**Packaging :**

Heavy duty masking, nominally 80 microns with ultra violet barrier, is available to help protect the panel finish during fabrication and installation.

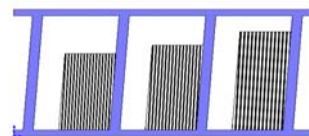
Although the strippable masking is UV stabilized, it should be removed as soon as possible after installation, especially in the case of architectural panels exposed to sunlight and weather.

**Storage :**

**When storing unpacked Alupanel observe the following guidelines :**

- ◆ To prevent warping or bending, place it horizontally on pallet or other stand.
- ◆ Avoid stacking Alupanel of different sizes together, as the surface or panel can be scratched by the edges of the smaller pieces.
- ◆ Preferably, store them by size in racks.
- ◆ If storing panels by leaning them against a rack as shown below, lay a rubber mat underneath and lean the Alupanel closely against the fixed back-up material.
- ◆ Alupanel is packed in wooden crates and can usually be stacked up to four crates high.

Racking system.  
Angle within 10 °



It is advisable to store Alupanel in a clean dry area with a minimum temperature of 15°C for a duration of 24 hours before use. After 24 hours of storage you will be able to start the processing requirements for each panel. After Alupanel has been removed from the stack it must be protected from any penetrating moisture.

**Handling :**

You should handle any Alupanel with a degree of care and where there are long lengths involved it is advisable that a team of you carry out the handling.

When removing panels from a pallet / stack never drag the panel, always lift clear above the remaining panels on the stack. This will require two or more operatives.

**Visual consistency :**

Each of our product types has special characteristics that can affect the visual consistency from lot to lot and even from panel to panel. It is important that these characteristics be considered when planning how to use and install the AlupanelXT panels.

**Solid colours :** The industry standard for allowable variation for panel to panel and lot to lot is Delta E 1.0 or less in a hunter colour space. Brighter colours, such as reds, yellows, blues, etc, which tend to be less opaque and which depend somewhat on film build (paint thickness) to achieve their appearance, will be more likely to exhibit more variation than subdued colours.

**Metallic colours :** The industry standard for colour variation with metallic is Delta E 2.5 or less, much larger than the standard for solid colours. In coating the flakes will tend to align in one direction.

This greatly increases the directionality of the panel's appearance. For these reasons the panels must be installed with the directional arrows all aligned in the same direction and lots should not be mixed on a building face without first contacting Multipanel UK Ltd for a confirmation that the lots are visually similar enough to be used together.

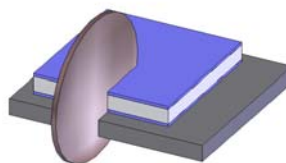
Before fabrication, remember to use a felt tip pen to draw arrows to indicate the coating direction on any small pieces that might be cut out from areas without the directional arrows.

**Sawing :**

Sawing Alupanel panels is relatively easy process 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.

Prior to processing large quantities trial saw cuttings should be done to evaluate both the tool working conditions and the recommended cutting speeds. For marking the panels the use of a soft pencil is adequate. Hard marking tools should be avoided as they can fracture the Aluminium surface. The chips formed during saw cutting should be taken away with compressed air. Due to the nature of the Alupanel material it is best to move the saw blade rather than the material as no scratch will remain on the panel. If good saw cutting practices are applied and recommendations followed the result should be clean cuts with little bur. If despite following the recommendations, ragged cuts are produced check the following causes; poor tool support, tool vibration, blunt cutting edges, high frictional heat at the cutting edge.

As Alupanel has low thermal conductivity it cannot be cooled easily with compressed air or any other means. Thus it is recommended to select the tool geometry and cutting conditions in such a manner so as to minimize the frictional forces developed at the cutting point and keep the resulting heat at a low level.





**Saw cutting can be accomplished with the following cutting equipment :**

**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 a panel saw is 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.

**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.

**Table Saws :** Table saws are not recommended for big sheets .

**Portable Circular Saws :** Cutting Alupanel with portable circular saws is another effective method. As mentioned, this equipment should also be production/industrial type equipment.

**Jig Saws :** Jig saws work well for cutouts. Care should be taken with portable jig saws to prevent damage to the Alupanel 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 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.



**Blade Recommendations :** Consult the table below for recommended blades and cutting speeds for various types of saws.

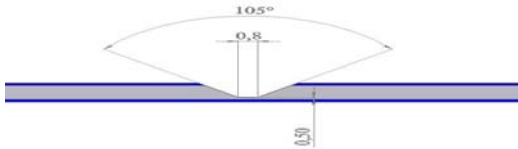
Working method	Cutting Material	Blade or Band Geometry	Tooth Geometry	Max. Cutting Speed	Max. Cutting Feed
Circular saws	Carbide tipped or high-speed steel	20 x 35mm blades with maximum number of carbide teeth available, designed for cutting nonferrous material. The blade should be ground thinner from the rim towards the center to prevent pinching	Angle or circular tooth, alternate beveled, triple ground. Tooth gap wall rounded. Chip angle: 5° to 15°. Clearance angle: 10° to 30°. Tooth spacing: 4 mm to 25 mm, fine spacing preferable.	5500 RPM	40 mm/sec
Band saws	Tempered spring strip steel.	Thickness: 0.8 mm to 1.2 mm. Width: 15 mm to 25 mm. Use racket or straight set.	Skip teeth, designed for nonferrous and ferrous materials (light metals and plastics). Tooth spacing: minimum 4 teeth per cm.	10000 RPM	25mm/sec
Reciprocating saws	High speed steel.	Thickness: 0.8 mm to 1.2 mm. Width: 5 mm to 15 mm).	Hook or circular tooth with alternate angles, set or waved. Tooth spacing: 2 mm to 6 mm		10 mm/sec

**Routing & Folding :**

Alupanel can be routed by using conventional equipment (horizontal and vertical routing machines). For accurate and precise manual folding of the Alupanel composite panels, resulting in a good finish, we recommend to route the rear side of the panels and extract the aluminum sheet and a part of polyethylene core (2,5 mm thick for V groove). Normally the panel is grooved and folded 25-70mm from the edge.

In order to route Alupanel panels the following mechanical equipment is necessary.

**Vertical panel saw:** equipped with specially shaped routing saw blades.



The equipment needed is the same vertical saw as the one used for the cutting, but with a different saw blade and relevant equipment for adjusting the routing thickness.

Exactly as with the cutting process with the vertical saw, vertical, horizontal or even angular on the axes of the panel routing can be made provided that Alupanel panels are placed. The use of a chip collector is essential.

**Portable circular saw :** A portable circular saw equipped with a suitable routing disk can be used only for a limited number of processing's. Note that special care should be given to the stability of the portable circular saw during the processing of the material, as well as the precision of the routings with the help of the chosen guided system.

**Hand operated router with routing bits :** These tools consist of routers that are available in the market and are used for wood processing. If they are equipped with special routing bits -carbide tipped cutter- the hand operated router can be used for a limited number of processes. In this case the stability of the tool and the guide-system considerably affect the quality of the routing.

**Work directions :**

For shaped elements with radius between 2 to 7 mm proceed as follows.

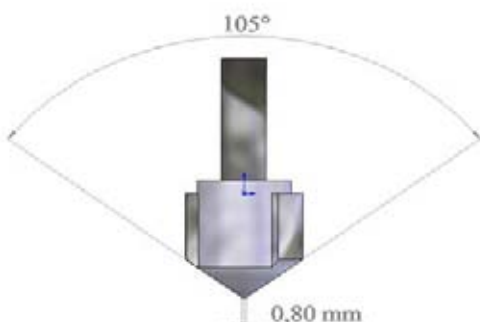
First a V-shaped or rectangular groove is routed by a milling cutter on the inside of the fold,

ensuring 0.3 to 1.00 mm of core material is left on the lower cladding sheet.

The shape of the groove and its respective depth determines the folding radius.

Note that smooth bending

(shape forming of elements) cannot be obtained without uniform thickness of polyethylene remaining.



**Grooving equipment :**

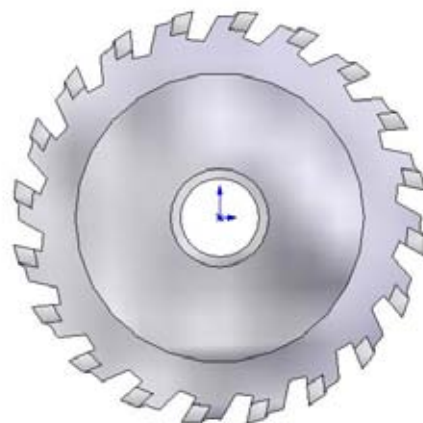
For processing small quantities of panels a router and trimmer can be used. For processing large volumes of U-grooving as standard industrial production then a circular saw and a grooving cutter are needed along with a lifter.

Technical characteristics of carbide saw-tip:

Outside diameter: 305

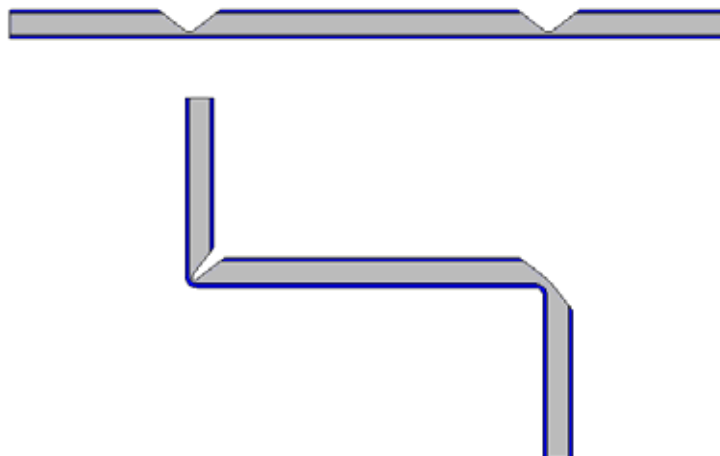
No of the teeth: 24

RPM: 3 000 to 5 000

**Carbide Saw**

By routing only one side, Alupanel can be bent either upward or downward to create both an inside or outside corner.

When a U-groove is bent at 90° angle the bending radius of the final product will be 3-3.5 mm and the element will elongate by 0.5 to 1mm. As such the original panel should be cut shorter by that proportion.



**Corner cutting, notching :**

Two methods are normally used for cutting out corners to allow the forming of a cassette.

**Punching :**

This technique is the most productive, with the corners being cut out and the corner fastening holes being put in a single operation.

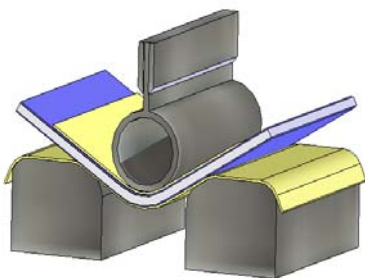
**Wood chisel.** A sharp hammer blow to a wood chisel allows you to cut out the small thickness at the bottom of a routing groove with no difficulty. The wood chisel must be wider than the part to be cut out. With a little experience, good clean joints can quickly be made.

**Curving :**

The minimum bending radius for Alupanel without routing the back skin is fifteen times the thickness of the panel being curved i.e., 4 mm = 60 mm minimum radius. Alupanel can be cold formed in a pyramid roller, a press brake or over a clamped pipe. The process is similar to the forming of aluminum; however, due to the sensitive surface, care should be taken to ensure rollers are clean, smooth and free of defects to avoid damage to the surface finish.

**Pyramid Roller :**

As an extra precaution, a film should be used between the panel and the rollers to further protect the panel surface. Do not pinch the Alupanel between the rollers. Roll the panel 3° to 5° tighter to allow for a small amount of Spring back that will occur. Once the sheet is curved; however, it will remain curved.

**Press Brake :**

When forming with a press brake, use a top die (tubular) with the radius desired and open the bottom die (jaws) approximately two times the thickness of the material plus film wider than the top die.

The lower die should always have a protective pad of not less than 3mm film.

Some adjustment of the lower jaws may be necessary to allow for varying bending properties between anodized and painted finish and for varying thicknesses.

The radius of the top die will be the approximate inside radius of the finished panel (Reference Figure 13).

**Bending Over a Clamped Pipe :**

Alupanel may be formed over a pipe of the proper diameter that is securely clamped to a work table. A hinged "leaf" attached to the end of the table will bend the material easily.

**Drilling :**

Alupanel can be drilled with standard twist drills used for aluminum and plastics.

**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.

**Joining :**

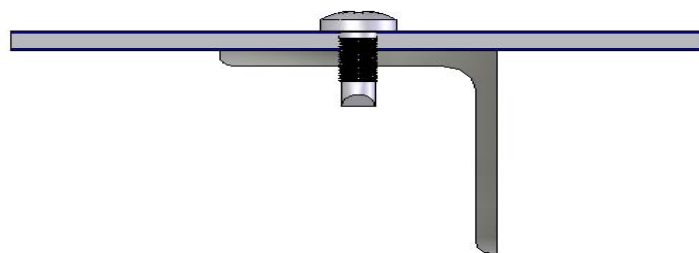
A variety of different fasteners are used to fabricate and install Alupanel panels. Structural adequacy and selection of these fasteners are the responsibility of qualified engineers and in most instances where architectural panels are used, certified calculations will be required by the Building Official. You may successfully use specific fasteners for panel load testing purposes in obtaining building code recognition.

Please find below some important general information about joining techniques. Use the following guidelines when other elements come in direct contact with the surface of Alupanel Material:

1. Acceptable joining element materials: aluminum, plastic, stainless steel, plated or coated steel with cadmium, zinc or aluminum.
2. Unacceptable joining element materials: copper, brass, bronze, iron, raw steel. Unacceptable materials cause corrosion of joining surfaces due to electrolysis of dissimilar materials.

Therefore, use "heavy" or "red" metals only with an electrically insulating intermediate layer. When joining elements are to be anodized, assemble the materials after the anodizing process. Proper consideration should be given to the thermal expansion characteristics of Alupanel Material when using any of the joining techniques.

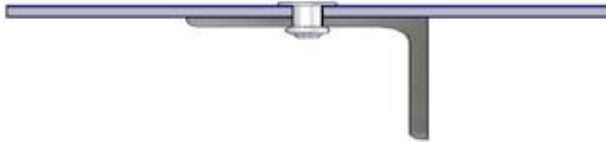
Pop rivets are often utilized to attach aluminum clip angles and other structural or ornamental elements to Alupanel. Because the rivet body will be in contact with the aluminum skins of the panel, it is recommended that either aluminum or stainless steel rivets be used to avoid dissimilar metals contacting. 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 :**

Screws are also used to perform many of the same applications as rivets. Stainless steel screws are industry standard and are appropriate to avoid corrosion and dissimilar metal contact. Because screws are customarily installed through pre-drilled holes and because the Alupanel aluminum skins are nominally 0.5 mm thick, 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. Occasionally, Alupanel is face fastened directly to supports or sub-grids. 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.

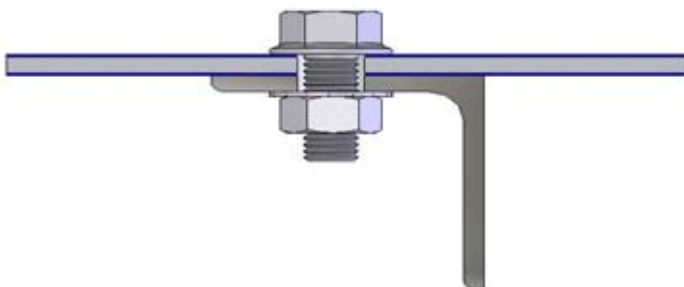
Testing is advisable to determine the performance of any fastening system.



**Through bolts :** provide an excellent way to join Alupanel panels to other Alupanel panels, or to other elements.

Galvanized, stainless steel or aluminum bolts, nuts and washers should be used to avoid dissimilar metal contact.

Caution is recommended in tightening the nut onto the bolt. Because the plastic core material is compressible, over tightening can deform the metal skins. Use lock nuts or double nuts with washers to prevent the nut from loosening over time.



**Welding :**

This method is frequently used to assemble Alupanel panels. The filler rod and the polyethylene core are welded together after heating by a jet of hot air projected by an electrically heated welding gun.

**For good quality welding, you need :**

- Good preparation of the edges to be welded together
- Adequate filler rod quality
- A good welding speed
- Pressure evenly applied
- Clean hot air
- An appropriate temperature.

**Welding by the to-and-fro method :**

Hold the filler rod at a right angle whilst exerting regular pressure on the rod, make to-and-fro B-B (non-circular) movements. The filler rod and the edges to be welded must be heated in a similar way.

**Welding using a high-speed nozzle :**

Normal hot air guns fitted with a removable high-speed welding nozzle allow the edges to be welded and the filler rod to be heated at the same time. This makes for better quality welding. The filler rod is pushed by the constant pressure of the high-speed nozzle, and is therefore pressed between the edges to be welded.

**Preparation of the edges to be welded :**

- Butt welding : the edges must be beveled,
- Corner assembly : only one of the panels is beveled.
- T-assembly : remove the narrow strip of metal skin to free the areas to be welded.
- Welding of a fold : bevel the edges to be welded first of all using a shaped milling cutter.

The polyethylene core oxidizes relatively quickly once exposed to the air. It must be welded at the most 24 hours after it is beveled. After it has cooled, it is possible to remove the welding flash using a knife or scraper. We recommend that this operation be carried out in a clean, oil and water-free area.

**The specific welding qualities of the filler rod are :**

Polyethylene low density

Colour: unpigmented

Density: 0.9 g/cm<sup>3</sup>

Diameter of rod: 3, 4 and 5mm

Immediately before welding, remove the outer layer of oxide from the filler rod.

**Adhesive Bonding :**

In addition to structural adhesives, double face tape can be used for fastening Alupanel on flat surfaces such as wall, ceiling, furniture, coverings etc.

The use of double face tape is for temporary adhesion.

Extreme care should be given when

selecting the adhesive so as to ensure it is chosen according to the application and the environmental conditions. It is important that the manufacturer is consulted prior to the usage of the adhesive for further instructions.

The substrate surface should be clean before the application of the structural adhesive.

**Off-line Coating :**

Alupanel can be off-line coated, if necessary. It is advisable to follow instructions as specified by the manufacturer of any paints to be used. For off-line coating observe the following guidelines:

- ◆ Surface should be lightly abraded to provide a better coating surface. The Surface should then be cleaned of all contaminants i.e. dust, dirt and oil etc. A soft cloth with a non-petroleum based solvent (e.g. rubbing alcohol) should be used to clean the surface area.
- ◆ Curing should be done at room temperature since temperatures above 175.F can cause deformation of the Alupanel panel.

**Screen Printing :**

Printing can be done on Alupanel with an epoxy base or urethane base two-part type ink/paint. When selecting an ink, confirm its weather ability and adhesion with the ink manufacturer. It is recommended to test the ink's adhesion on the surface of the Alupanel before production.

*For printing on Alupanel, observe the following guidelines*

Remove all dust and dirt on the surface of Alupanel. Oily dirt causes splintering, splitting, or other defects of the paint. It must be completely removed with a soft cloth dipped in alcohol, N-hexane, etc.

If storing or drying is not proper, the adhesion or other performance may be adversely affected. Therefore, observe the storing condition of each paint as specified by the manufacturer.

Since storing in high temperature may cause deformation, keeping the storing temperature under 175°F and hold Alupanel horizontally.

**Cleaning :**

The cleaning of Alupanel surfaces can be generally described as wall cleaning.

While Alupanel may in fact be used in a variety of applications and design elements, there is little to distinguish the process from more traditional types of wall cleaning.

The most common soils to be removed from Alupanel surfaces are common dust, dirt and other airborne particulates. In the case of exterior surfaces, various hydrocarbons from airborne exhaust are also likely to need removal.

It would also be possible that surfaces could be contaminated with synthetic hydrocarbons from other exhaust: synthetic grease, oil, hydraulic fluids or lubricants or stains from vegetation like plant or animal matter.

**Material Compatibility:**

Alupanel is an extremely durable material that has been designed to withstand significant exposure to environmental conditions. It is unlikely to be compromised by any cleaning process that would conceivably be used on the material. However, in the interests of maintaining the finish of the material, the prudent user will select products with a pH of 10 or less and which do not contain bleaches, ammonia or caustic ingredients such as sodium hydroxide, potassium hydroxide or sodium metasilicate. It is also recommended that users avoid abrasive materials or tools such as scouring powders, fiber pads or brushes.

**Cleaning Method :**

We recommend recommends a 4-step cleaning method:

1. Flush Alupanel with water from a hose.
2. Wipe lightly with a soft cloth.
3. Use pressure washer.
4. Use detergent in a power wash or with a soft cloth for hand wiping and flush with water.



### Alupanel strength calculations :

Composite technology makes Alupanel very light and rigid material. That is why it can be successfully used for architectural projects of different height with essential wind load and wind suction conditions.

We offer the following guide to enable you making easy calculations for your Alupanel projects.

Actually, Alupanel presents a kind of truss where characteristics of the panel are determined by characteristics of its upper and bottom aluminum layers. Aluminum layers are made of aluminum alloy AA1100H18 with tensile yield strength of 22000psi. It is the maximum tension material can bear before deformations turn to be irreversible.

Alupanel is available in different thicknesses so, please refer to below formula and table to calculate apparent thickness of your exact Alupanel type.

$T$  – apparent thickness of Alupanel

$$T = \sqrt{\frac{T_{panel}^3 - T_{core}^3}{T_{panel}}}$$

$T_{panel}$  – total thickness of Alupanel

$T_{core}$  – thickness of core material

For example, if we use Alupanel 4mm with thickness of aluminum layers 0,5mm, we can calculate apparent thickness as follows:

$$T = \sqrt{\frac{4^3 - 3^3}{4}} = \sqrt{\frac{64 - 27}{4}} = \sqrt{9,25} = 3,04\text{mm} = \frac{3,04}{25,4} = 0,1197\text{m}$$

Apparent thicknesses for Alupanel types:

Product	Panel thickness, mm	Aluminum layers thickness, mm	Apparent thickness,
Alupanel 2	2	0,3	0,0638
Alupanel 3	3	0,3	0,0827
Alupanel 4	4	0,3	0,0976
Alupanel 4	4	0,5	0,1197
Alupanel 6	6	0,5	0,1531

The next things to be accounted are loading and support conditions.

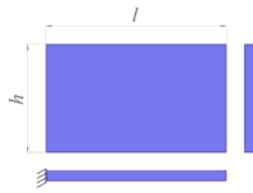
Support conditions are determined by installation methods of the panels.

Wind pressure and suction loads are determined by height on which panels are going to be installed and situation of the building. Local building and wind codes should be referred for this information.

Depending on support conditions different calculation methods should be used. Please choose your support conditions from the table below and use appropriate formula from the next column to calculate exact figure of the stress.

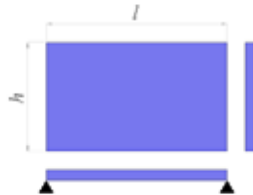
$W$  – unit area load, psf

1 1 side fixed, 3 sides free; evenly distributed load



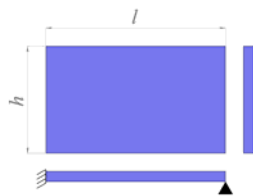
$$\sigma = \frac{3wl^2}{T^2}$$

2 2 sides simply supported, 2 sides free; evenly distributed load



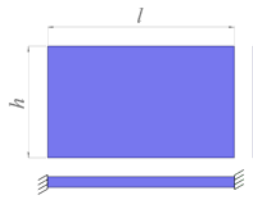
$$\sigma = \frac{3}{4} \times \frac{wl^2}{T^2}$$

3 1 side fixed opposite side simply supported, 2 sides free; evenly distributed load



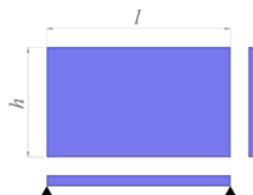
$$\sigma = \frac{3}{4} \times \frac{wl^2}{T^2}$$

4 2 sides fixed, 2 sides free; evenly distributed load



$$\sigma = \frac{1}{2} \times \frac{wl^2}{T^2}$$

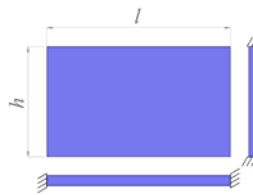
5 4 sides simply supported; evenly distributed load



$$\sigma = \beta \times \frac{wh^2}{T^2}$$

$l/h$	1	1,2	1,4	1,6	1,8	2,0	3,0
$\beta$	0,2874	0,3762	0,4530	0,5172	0,5688	0,6102	0,7134

6 4 sides fixed; evenly distributed load



$$\sigma = \beta \times \frac{wh^2}{T^2}$$

$l/h$	1	1,2	1,4	1,6	1,8	2,0	$\infty$
$\beta$	0,3078	0,3834	0,4356	0,4680	0,4872	0,4974	0,5

7 Longer sides fixed, shorter sides simply supported; evenly distributed load

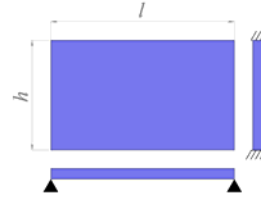


$$\sigma = \beta \times \frac{wh^2}{T^2}$$

$l/h$	1	1,2	1,4	1,6	1,8	2,0	$\infty$
$\beta$	0,4182	0,4086	0,4860	0,4968	0,4971	0,4973	0,5



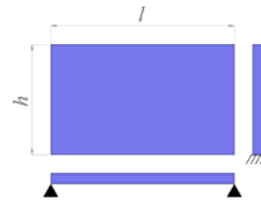
- 8** Longer sides simply supported, shorter sides fixed; evenly distributed load



$$\sigma = \beta \times \frac{wh^2}{T^2}$$

$l/h$	1	1,2	1,4	1,6	1,8	2,0	$\infty$
$\beta$	0,4182	0,5208	0,5988	0,6540	0,6912	0,7146	0,75

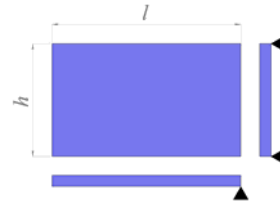
- 9** 1 longer side fixed, another longer side free, shorter sides simply supported; evenly distributed load



$$\sigma = \beta \times \frac{wh^2}{T^2}$$

$l/h$	1	1,5	2	3	$\infty$
$\beta$	0,714	1,362	1,914	2,568	3

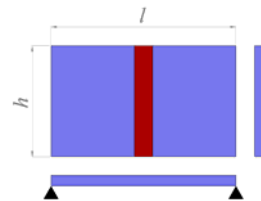
- 10** 1 shorter side free, other sides simply supported; evenly distributed load



$$\sigma = \beta \times \frac{wh^2}{T^2}$$

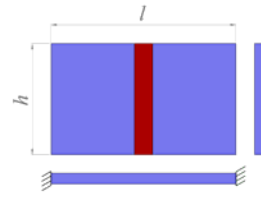
$l/h$	1	1,5	2	4
$\beta$	0,67	0,77	0,79	0,8

- 11** 2 sides simply supported, 2 sides free, center load



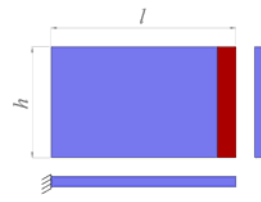
$$\sigma = \frac{3}{2} \times \frac{wh}{lT^2}$$

- 12** 2 sides fixed, 2 sides free, center load



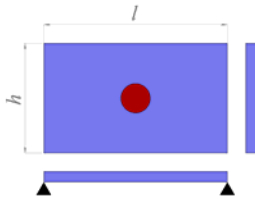
$$\sigma = \frac{3}{4} \times \frac{wh}{lT^2}$$

- 13** 1 side fixed, other sides free, tip load



$$\sigma = 6 \times \frac{wh}{lT^2}$$

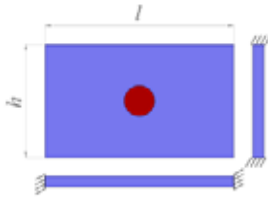
- 14 4 sides simply supported, concentrated center load



$$\sigma = 0,145 \times \frac{W}{T^2} \times (4,3 \log \frac{2l}{\pi r} + 1 - 3,3\beta)$$

$l/h$	1	1,2	1,4	1,6	1,8	2,0
$\beta$	0,565	0,350	0,211	0,125	0,073	0,0072

- 15 4 sides fixed, concentrated center load



$$\sigma = \beta \times \frac{W}{T^2}$$

$l/h$	1	1,2	1,4	1,6	1,8	2,0
$\beta$	0,7542	0,8940	0,9624	0,9906	1	1,004

#### Example :

Calculation of possibility to apply Alupanel 4mm with aluminum layers 0,5mm on a project with wind load pressure (w) equal to 70 psf with all 4 sides fixed.

L=3'm

H=3'm

W= 70 psf

Solution:

From the above tables:

Apparent thickness T= 0,1197 in

$l/h = 1m/1m = 1$ , so  $\beta = 0,3078$

Formula to be used for present support conditions:

$$\sigma_{max} = \beta \times \frac{wb^2}{t^2} = 0,3078 \times \frac{70}{12 \times 12} \times \frac{(3 \times 12)^2}{14,3 \times 10^{-8}} = 13560,41 \text{ psi}$$

Next step is to compare our result with maximum allowable tensile yield strength of aluminum alloy 1100H48:

As 13560 psi is less than 22000 psi we make conclusion that our panel is strong enough to be applied on the project.

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**Sources of equipment and accessories :**

The following list of products and sources is for your reference, and is not intended as a complete listing of either satisfactory products and materials or of possible sources of supply.

**Panel Saws :**

Striebig AG  
[www.striebig.com](http://www.striebig.com)

**Hand circular saws and routers :**

Festool  
[www.festool.com](http://www.festool.com)

**Hand routers with routing bits :**

Festool  
[www.festool.com](http://www.festool.com)

**Jig saws :**

Festool  
[www.festool.com](http://www.festool.com)

**Blades, Router Bits and Drill Bits :**

KWO Tools (UK) Ltd  
[www.kwo.co.uk](http://www.kwo.co.uk)

**Fabricating tables :**

Festool  
[www.festool.com](http://www.festool.com)

**Adhesive sealing components :**

Sika AG  
[www.sika.com](http://www.sika.com)

**Paints :**

Akzo Nobel  
[www.akzonobel.com](http://www.akzonobel.com)

**PPG Industries**

[www.ppg.com](http://www.ppg.com)

**Fasteners :**

(available through commercial sources)

**Hot air welding guns :**

Leister Process Technologies  
[www.leister.com](http://www.leister.com)

**Welding rods :**

Ketterer + Liebherr GmbH & Co KG  
[www.ketterer-liebherr.de](http://www.ketterer-liebherr.de)

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Alupanel is available from the following stockist:

Aluminium Composite Panel

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