

M-BOND TECHNICAL & FABRICATION MANUAL

TECHNICAL INFORMATION M-BOND

		FABRICATION GRADE	DIGITAL PRINTABLE GRADE		MIRROR PANELS
			White	Primer	
ALUMINIUM	Unit	3mm	3mm		3mm
Aluminium skin thickness	mm	0.20 0.30	0.12	0.21	0.30
Aluminium thickness deviation/tolerance	mm	±0.02	±0.02		±0.02
Alloy temper/grade		1100	1100		1100, 3003, 5005
WEIGHT & SIZE TOLERANCE					
Panel weight	kg/m²				≥4.40
Tolerance in length	mm	±2	±2		±3
Tolerance in width	mm	±2	±2		±2
Tolerance in thickness	mm	±0.10	±0.10		±0.2
TECHNICAL PROPERTIES					
Bending strength	MPa	≥50	≥40		≥50
Nail-head pull through	kN	≥3	≥2	≥3	≥5
Shear strength	MPa	≥12	≥8	≥12	≥12
Tensile strength of aluminium	Rm/MPa	≥145	≥130		≥145
0.2% proof stress	Rp0.2/MPa	≥115	≥115		≥115
Elongation	A50mm %	≥3	≥1	≥3	≥2
Linear thermal expansion	m/m/°C	≤4.0 × 10 ⁻⁵	≤5.0 × 10 ⁻⁵	≤4.0 × 10 ⁻⁵	≤0.00004
Heat distortion temperature	°C	≥85	≥75	≥85	≥85
Peel strength 180°	N/mm	≥5.0 average ≥4.0 minimum	≥3.5 average ≥3.0 minimum	≥5.0 average ≥4.0 minimum	≥5
Temperature tolerance		No change, reduction rate of stripping force ≤10%	No opening, no cracking, no falling off		
Boiling water resistance		No change	No opening, no cracking, no falling off		No change
Bending radius	mm	≥300	Bending not recommended	≥300	
CORE					
Core material		Light Density Polyethylene, LD PE	Light Density Polyethylene, LD PE		
Core density	g/cm³	1.18- 1.24	1.18- 1.24		1.15- 1.20
Fire rating classification					EN13501-1 Class C-s1,d0
COATING					
Coating		Polyester	Polyester		
Thickness of coating	µm	≥17 to 21	≥17 to 21		
Surface		Coil coating	Coil coating		
Colour variation tolerance	ΔE	≤2.0	≤2.0		
Gloss	%	20%- 95%	20%- 95%		≥25
Pencil Hardness		HB-F	HB-F		≥HB
ACOUSTIC AND THERMAL PERFORMANCE					
Sound absorption factor	α				0.05
Sound insulation factor	Rw (dB)				25
Heat transfer coefficient	W/mK				5.65

PROCESSING METHOD

M-Bond panels are very easy to process. All cutting, milling, punching, slotting, side-folding and curving can be easily fulfilled by simple tools used for processing timber and metal. It can be shaped into various shapes such as curved, reserved curves, corner and sharp curves, according to requirements of building design. It is incomparable to other decorating materials.

CUTTING

1. Saw cutting

M-Bond Panels can be cut and processed with various types of saws including vertical panel saw, circular saw or jig saw. Suitable saw blade is carbide-tipped blades for aluminum or plastic use.

Example of suitable saw blade

Blade diameter	225mm
Number of teeth	80 to 100
Cut width	2.0 to 2.6mm
Rake angle	10°
Tip	Carbide

Operating Conditions

Rotation of saw blade	2000-4000rpm
Feed Speed	10-30m/min



Notes on saw cutting:

- Do the cutting operation with facing the effective side upward to prevent the panel from scratch and the protective film peeling off.
- Remove cutting chips from panel carefully after cut, to avoid dent during storing or assembling.
- Sharpen or replace the saw blade, when it becomes dull. Dull blade will result in large burr or distortion at cut edge.

2. Shear cutting

M-Bond Panel can be sheared with a conventional guillotine. A shearing angle of $\leq 1,5^\circ$ and minimum clearance (paper test) are the prerequisites for the best possible quality of the cut. To prevent damage to the cover sheet, it is appropriate to provide the down-holders of the guillotine with protective rubber pads.

Note on shear cutting:

- Cutting or shearing M-Bond panels not recommended for decorative applications where cut edges are visible (e.g. riveted facades).



3. Trimming

In saw cutting, burr appears on both sides of edges. In shear cutting, either droop or burr appears on each edge. If we install the panel with exposed cut edge, we have to take notice of the edge conditions. With saw cutting we should keep the saw blade sharp to have a sharp cut. In shear cutting we should adjust the clearance of die properly.

Generally, the condition of edge is more important for interior than exterior. Sometimes we have to trim the edge after cutting. For trimming, we use trimmer, plane or sandpaper. For solid and metallic colors, deep trimming like chamfering has a visual effect use a trimmer with a ball bearing chamfering bit or a plane for woodworks. In working with plane, a guide ruler will help to ensure a uniform edge.

5. Punching

M-Bond panels of any thickness can be punched using conventional sheet metal punching machines. For clean cuts use sharp tools and dies with minimal cutting clearance (0.1 mm). This cutting process will cause a slight deflection of the cover sheet.

4. Perforating (for interior applications only)

M-Bond panels can be perforated using CNC punching machines. This is often used for interior and ceiling design. Holes of a minimum diameter of 4 mm can be punched. The minimum width of web between hole edges is also 4 mm. The best results will be obtained using a punch die for single punching. Multi-station machines are more economical. After punching, the flatness will possibly require further processing.

- Turret puncher

Turret puncher, also computer-controlled, can be used for perforation of M-Bond panel. The suitable clearance between punch and die is 0.1 mm or smaller (material thickness x approximately 2%). Small droop will appear at punched edge.



6. Curving cut

Hand router and trimmer can cut M-Bond panel in curving lines. Guide template will help you to stabilize this work. Jigsaw is also useful for cutting complex shapes.

Notes on the use of guide plate

- Put an appropriate guide plate (template) on the effective side of M-Bond panel to do the routing working through the guide plate.
- Particles caught between the template and the effective surface of M-Bond panel may cause dent or scratch.

7. Water jet cutting

Water-jet cutting: Plunge cut (piercing at the starting point) in water-jet cutting may cause a certain extent of de-lamination between aluminum skin and core material. Therefore, we have to plunge at a disposable area or start at panel edge. After penetrating through the panel, water jet can cut M-Bond panel.



According to our test, we so far conclude that M-Bond panel is not suitable for laser cutting, because the fume generated from M-Bond panel might harm the sophisticated optical instrument of laser system.

BENDING

1. Bending with press brake

M-Bond panel, like sheet metal, is easily formed with a brake press. The air-bending process is used when forming with a brake press.

Bending Direction	Minimum bendable radius
Traverse	50mm
Parallel	80mm

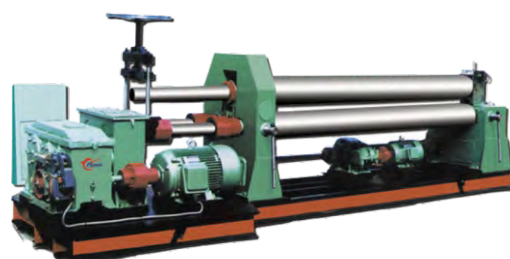
Notes on press brake bending

- "Traverse" and "Parallel" show the bending direction toward the rolling (coating) direction, printed on the protective film.
- The minimum bendable radius means the limit with which visible wrinkles appear on the aluminum surface of M-Bond panel.
- Use the top die (punch) with the similar radius to the desired radius. If the radius of the top die is too small, it is possible the bending radius becomes partially smaller than the above limit.
- Use a urethane pad for the bottom die, or place a rubber mat between M-Bond panel and the bottom die.
- Use a scratch-free top die. Polish and wipe the top die. Do the bending work without peeling off the protective film.

2. Bending with 3-roll bender

We can use manual or electric-drive 3-roll bender for bending M-Bond panel. The minimum bendable limit is normally 250mm in radius, but it depends on the length of the bender and the type of the machine. The following is an example of relationship between the length of bender and the minimum bendable limit.

Roll length (mm)	Minimum radius (mmR)
500	120
1000	150
2000	180
2500	200



Notes on 3-roll bending

- Prior to bending operation, wipe the roll surface carefully.
- Remove the burr at M-Bond panel edge that may cause dent with rolling.
- Remove the cut particles stuck on M-Bond panel and rectify the wrinkles of protective film, which may cause dent.
- Do not tighten M-Bond panel with rolls. If the roll clearance is rigid in the machine, adjust the clearance to panel thickness plus approximately 0.5mm.
- If notch is required in a curving panel, make the notch before (top) and after edge bending after bending. Making the notch before bending will result in a distorted curving.
- When bending to small radius, gradual bending is necessary by adjusting the elevation of bending roll.
- We can reduce the straight portion near edge by means of a subsidiary sheet material but it remains to some extent. If a consistent curving line is needed near the edge, we have to do additional edge bending after the regular bending.

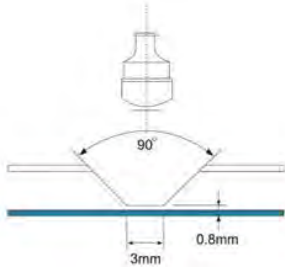
3. Bending with a folding machine

When working with folding machines, the panel to be bent is clamped between two cheeks. The projecting edge is bent around the upper clamping cheek or former using the movable swivel bar. The bending radius is determined by interchangeable formers attached to the upper clamping cheek.

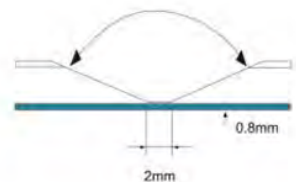
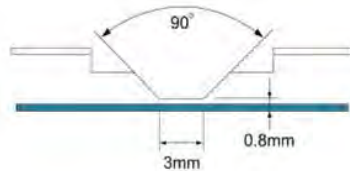
ROUTING AND FOLDING

M-Bond panels can be routed and folded using a flat bed CNC routing machine, a Vertical Panel Sawing Machine or a hand held router "V-Grooving" tool. The panels can be bent and formed into cassette trays and be integrated onto exterior facade or curtain wall systems.

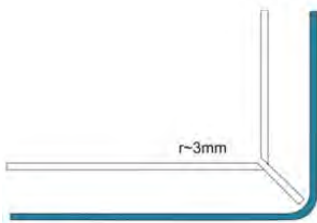
A "V" shaped or "Rectangular" shaped groove should be routed on the reverse side of the panel along the proposed folding edge. When routing, the groove should not be made all the way to bottom, a thin layer of core (0.8mm) must be retained at the base allowing enough room for easy folding. This is to prevent the paint on coated surface and the aluminum from cracking or crazing during the folding process.



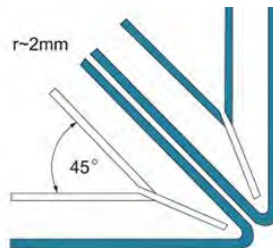
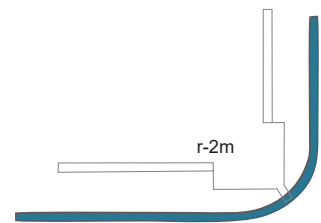
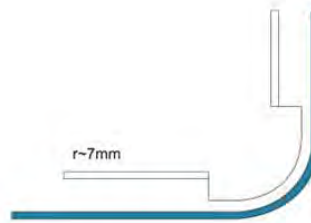
Groove 90° (V-shape for folding up to 90°)



Groove 135° (V-shape for folding up to 135°)



Not suitable for rectangular groove folding up to 150° (depending on the panel thickness)



Notes regarding the routing and folding technique.

- Processing temperature:
During folding, the ambient and material temperature should not be below 16°C.

1. CNC router

CNC router can cut and groove M-Bond panel. As a series of processing is controlled by a computer program, CNC router is suitable for repetition of the same processing. The suitable bit and operating conditions are the same as hand routers.

2. Hand grooving machine

Hand grooving machine can groove M-Bond panel. An example of the suitable cutter blades and operating conditions are as follow:

Cutter Blade



Blade

Outside diameter	110-120mm
Number of teeth	4-8
Material	Carbide tip

Operating condition

Rotation	5,000-9,000rpm
Feeding speed	5-20m/min

Hand Router



Router bit

Number of teeth	2-4
Material	Carbide tip

Operating condition

Rotation	20,000-30,000rpm
Feeding speed	3-5m/min

Panel Saw

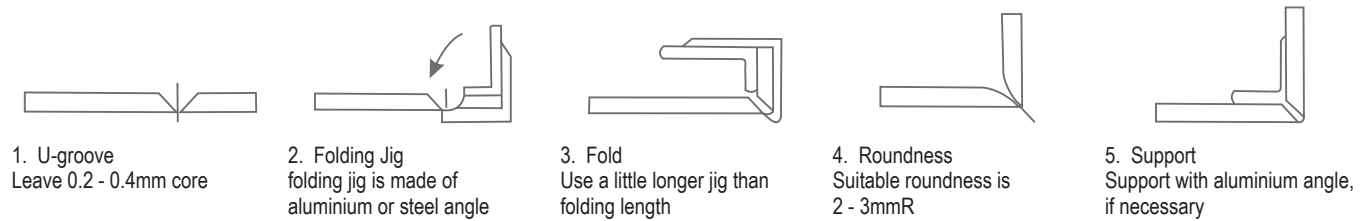


Blade	
Outside diameter	220mm
Material	Carbide tip

Operating condition	
Rotation	2
Feeding speed	30m/min

3. Folding

After V-groove, we can fold M-Bond panels with a folding jig. The typical folding procedure are as follow:



Notes when folding M-Bond

- Folding M-Bond panel on a flat and steady work table. If we fold the fold the panel with warping, the folded line will not be straight.
- The folded corner should have a suitable roundness of 2-3mm in radius. If the roundness is too small, the coating may have a crack on the folded corner. This tendency becomes apparent when we carry out the folding work at low temperature (fold at 10°C or higher.)
- Folding after U-grooving entails slight elongation. The elongation is 0.5-1.0mm depending on the roundness of the folding corner. Therefore the position of grooving lines must be pre-adjusted when the fabrication drawings are prepared.

PROCESSING

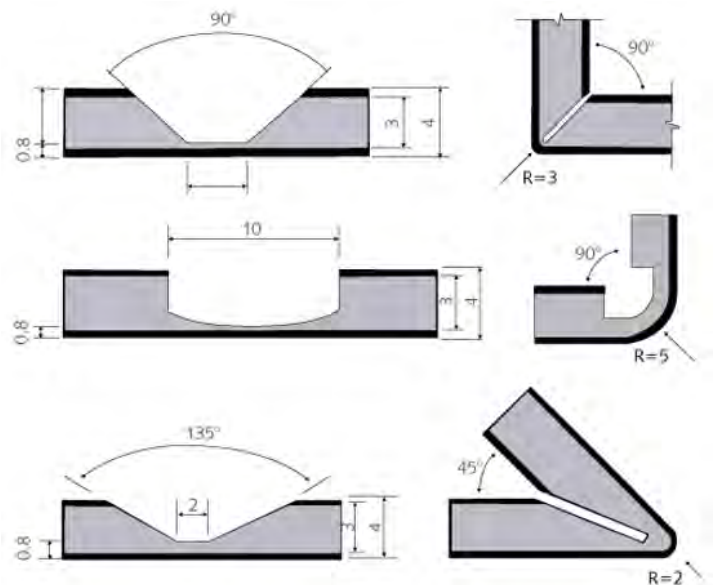
When processing, it is necessary to pay attention to the ambient temperature. When the ambient temperature is too low (generally below 10°C), it will be more likely to cause abnormal phenomena such as cracking in the processing of the plate. Therefore, in order to ensure the reduction of abnormal occurrence in the processing process, it is recommended to process at the ambient temperature of about 20C and above.

1. Slotting

When Aluminum composite panels are constructed, it should be slotted at the folding. According to the folding requirements, V-shaped groove and U-shaped folding can be adopted generally. Several typical slotting methods are as pictures shown below.

Special slotting machine for aluminum composite panels should be used to ensure that the slotting depth does not damage the opposite aluminum and 0.3mm thick plastic layer should be reserved.

Reinforcement measures such as edge reinforcement can be adopted at the slotted position as required. Slot bottom width: 2.5~4 mm, the blade must be sharp. Speed: stainless steel composite panel using 2000-4500 RPM, aluminum composite panel and copper composite panel using 5000-30000 RPM. Feed: 3-5 m/min, to avoid stripping of the bottom panel caused by excessive temperature melting adhesive during slotting. The center of the slot should be more than 20mm far from the edge.

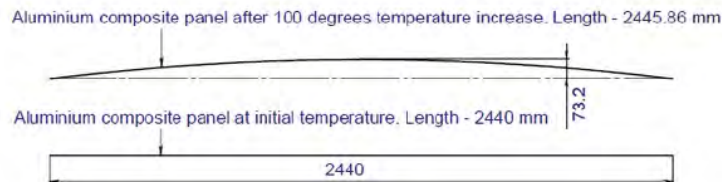


Notes for processing and installation

- Since the surface coating of aluminum composite panel is produced by roll coating process, the color of the coating may have certain directionality (especially metal color). From different angles, there may be some differences in the perceived color of aluminum composite panel. In order to avoid this difference, aluminum composite panel shall be installed with the same production direction.
- For those aluminum composite panels that needs slotting and flanging application, the flanging procedure shall be considered in advance. The flanging shall be performed with uniform force and formed at one time. Do not use too much force and do not bend repeatedly. For those aluminum composite panels that needs to be directly bent without slotting, it shall be processed with bending equipment, and the composite panels shall be bent for many times to reach the required curved degree gradually. It is recommended that the radius of curvature of general composite panels shall not be less than 300mm, and that of incombustible aluminum composite panels shall not be less than 600mm.
- The sealing material used for aluminum composite panels should have good weather resistance and good compatibility with aluminum composite panels. The sealing materials should also meet the corresponding national or industrial standards. Because the inferior sealing materials are easy to pollute or even corrode the aluminum panels, it is necessary to test the compatibility between the sealing materials and the aluminum panels in advance.
- The design and installation of aluminum composite panels shall comply with relevant design and installation specifications, fully considered the building height and structural design. The wind pressure resistance of the panel is related to the installation interval within the unit area of the panel and the shape of the panel. At the same time, the possibility of thermal expansion and cold contraction shall be fully considered to avoid adverse effects on the project and the flatness of the panel surface.

2. Thermal Expansion

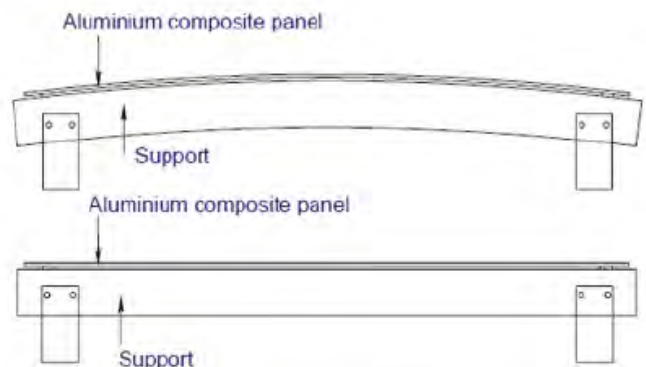
Thermal expansion: that is, thermal expansion and cold contraction, which refers to the expansion and contraction of materials due to temperature change. All materials used for construction and identification will expand when exposed to high temperature and contract when the temperature drops. Each material has its own rate of thermal expansion. In the metering system, it is measured in C-1 to show how many millimeters the material will expand when the temperature changes.



For example, for a standard panel with size 1220x2440mm, when the expansion coefficient is $2.4 \times 10^{-5} \text{ } ^\circ\text{C}^{-1}$, the normal temperature at the installation place is 18°C , the panel maximum temperature in the day is 80°C , the panel minimum temperature at night is -20°C , so the temperature difference is $80 + 20 = 100^\circ\text{C}$, then the expansion size of this panel is $1220 \times 100 \times 2.4 \times 10^{-5} = 2.9768\text{mm}$; $2440 \times 100 \times 2.4 \times 10^{-5} = 5.856\text{mm}$. Therefore during installation, about 3mm expansion and contraction space for each panel shall be reserved in the width direction of the plate, and about 6mm expansion and contraction space for each panel shall be reserved in the length direction.

Take the standard size (1220x2440mm) as an example, if the edge of the panel is fully fixed during installation, the expansion and contraction of the panel will lead to the bending. In this case, the bending deflection will be 73.2mm. So, it is very important to design reserved fasteners or gaps to ensure the expansion and contraction gap between panels before installation.

In addition, it may sometimes occur that the base panel designed to install aluminum composite panel is rigidly fixed without considering thermal expansion. In this case, the substrate may bend and deform, which will result in bending deformation of the aluminum composite panel subsequently fixed on the substrate. To prevent this, carefully check the coefficient of thermal expansion of the substrate to be installed with aluminum composite panel. When the thermal expansion coefficient between aluminum composite panel and base plate (i.e. lining plate) is quite different, the installation mode used between aluminum composite panel and base plate shall be considered to eliminate this possibility.



INSTALLATION

When installed outdoors under direct sunlight, the maximum temperature of dark-color aluminum composite panel surface can reach 75°C. The minimum winter temperature in northern countries shall be -35°C. Before any installation, the possible expansion and contraction distance shall be estimated in advance, and reserve enough space. It is very important to consider the material of the sub-frame, the temperature during installation, the minimum and maximum temperature in the installation area.

Thermal expansion compensation means that when fixing the aluminum composite panels, take the allowable fixing point as the center and add some space in the same direction, so that when the shrinkage or expansion of the panel is different from the sub-frame, the panel can slide along the sub frame independently to avoid the camber deformation of the panel.

When composite panel is fixed on the sub-frame with rivets or screws, the problem of thermal movement often occurs. To prevent this, special tools shall be used during such installation.

When composite panel is fixed with rivets, a special adjustable step drill and riveting gun can be used. The step drill cut a hole with a diameter of 5.2mm on the outline of the sub-frame, and a hole with a diameter of 8.5mm or greater on the panel. It should be paid attention to prevent damaging the panel surface during processing. During installation, leave a small gap between the panel surface and the rivet head to allow the panel to move freely. Larger head rivets are recommended, usually 14 or 16 mm head rivets.

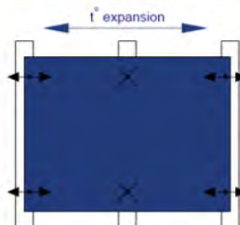
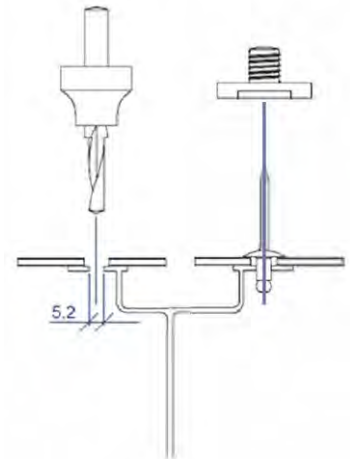
When composite panel is fixed with screws, a step drill with a first drill radius of at least 1mm smaller than the screw shaft can be used. Another option is to cut screw holes on the composite panel before installation. The radius of these holes shall be calculated according to the project to allow the panel to move freely. Generally, 5mm screws shall have at least 8.5mm holes. During installation, the screws should be carefully concentrated in the holes. The screws shall not be tightly fixed or blocked on the composite panel. It is recommended to turn the screw 180° to ensure that it is not tight. Screws with countersunk heads shall not be used.

1. Installation

Sometimes the length of the panel is too long and the hole with larger diameter can not compensate for the thermal movement. In this case, a special drill can be used to cut a rectangular ellipse with an arc on the panel. At the same time, the number and position of holes shall be reasonably allocated to maintain the accurate installation position of composite panel. When a composite panel is fixed to more than two keels, it is recommended to tightly fix the center of the panel, and keep a space for expansion and contraction on both sides of the panel.

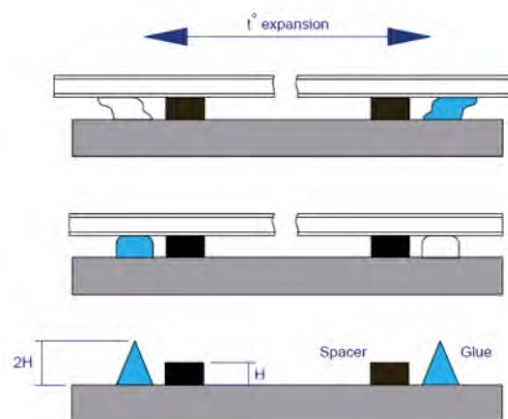
2. Flat Installation

In order to ensure the construction quality during flat installation, it is recommended to pre-install the lining panel after leveling, paste the composite panel and the lining panel with neutral engineering structural adhesive, fix the panel with tools before curing to prevent displacement before curing, remove the fixing tools after fixing and curing. It should be paid attention to leave a reserved gap of thermal expansion $\geq 3\text{mm}$ around the panel during installation. The gap can be closed with elastic glue.



During installation, the selection of structural glue needs to consider compensating thermal movement. The selected glue should be flexible glue, usually neutral polyurethane based glue, with braking elasticity of 300% or more. Professional glue manufacturers should be sought for consultation on relevant matters. In case of uncertainty it is necessary to conduct compatibility test and elongation test for confirmation, to prevent the panel from being polluted by inferior glue and corroding the back; to prevent unqualified glue stretching and aging resistance, resulting in plate degumming or falling off.

During the installation process, the operation shall be carried out in strict accordance with the instructions of the glue machine. Generally, the glue thickness should be at least 3mm to get flexible joints. This can be achieved by using double-sided tape or other shims with the necessary height. It is recommended to apply glue with a special nozzle to form triangular glue beads. Generally, the height of the glue beads should be at least twice as high.



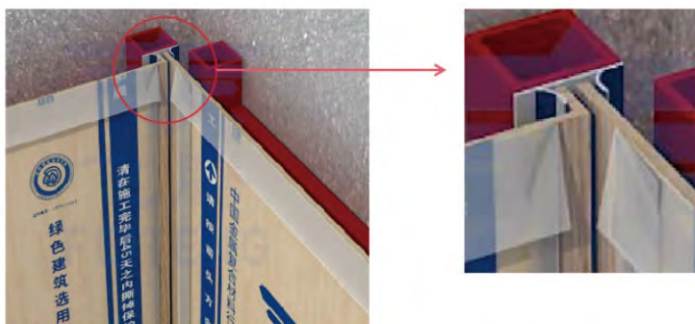
3. Slotting and Bending Installation

During construction, slotting shall be carried out as required. During installation, the length of one panel shall not exceed 1.0m. After processing, the length of panel surface shall be within 1.5m and the width shall be controlled within 1.2m. At the same time, each interval of 600mm in the length direction of the panel back, place a square pass close to the internal width after slotting and bending along the width direction as the stiffener, bond and fix the square pass with the back of the panel and the long side after bending with glue, and connect and fix the stiffener with the keel when installing on the wall, so as to achieve the function of supporting the panel. If there are high requirements for the flatness of the panel, when installing the stiffener, L-shaped metal connectors can be used to fix the stiffener and the panel, and further, the subframe can be used for installation;

If the angle code is used for installation, it shall be installed by using the angle code with reserved expansion gap or by using the subframe. The subframe method is to place a square pass on the back of the panel after slotting and bending according to the edge on both sides of the length direction to connect with the long side and the panel back, and then the stiffener installed every 600mm and connect the square pass in the length direction with L-shaped metal connectors. When the angle code is used for installation to the keel, The corner code is connected with the square pass.

4. Card-slot Installation

After leveling and installing the keel at both ends and middle stiffeners according to the design requirements, the slot shall be fixed on the metal keel with bolts or screws after ranging, and the slot shall be slotted according to the requirements during construction. During installation, the length of panel surface shall be within 1.5m and the width shall be controlled within 1.2m; each interval of 600mm in the length direction of the panel back, place a square pass close to the internal width after bending along the width direction as the stiffener and fixed with adhesive or L-shaped metal connectors. The square pass thickness shall take the height of the clamping slot into account, so that when both ends are clamped into the clamping slot, the preset keel can be connected with the stiffener to form an effective support for the panels.



JOINING METHODS

1. Rivets

We often use rivets, bolt/nut and tapping screws for junction between M-Bond panel and aluminum extrusions. Use aluminum blind rivet. We can do riveting work from one direction. Use bolt/nut and tapping screw made of aluminum or stainless steel.

2. Adhesive

We can use commercial adhesives for joining and assembling of M-Bond panel. We can use wide variety of adhesives except for some types of adhesives that may corrode aluminum metal. For example, vinyl acetate type, widely used for timber and styrene foam, corrodes aluminum metal. Main adhesives applicable to an adhesion between M-Bond panel and other materials are as follows.

Adhesives applicable to M-Bond panel

Adhesive Type		Epoxy	Chloroprene	Silicone RTV	Cyano-acrylate
Suitable Material to be adhered	Meta	OK	OK	OK	OK
	Timber	OK	OK	OK	OK
	Gypsum Board	OK	OK	OK	OK
	Sytene Foam	OK	OK	OK	OK

*Notes on adhesives

- Prior to adhesion work, remove all the foreign matters such as dust, partide, grease, water, etc. from the area to be adhered.
- Select the mast appropriate adhesive that ensures the necessary adhesion power in the atmospheric conditions. The adhesion power depends on the surface conditions of the substrate. Follow the adhesive manufacturer's instructions.
- When M-Bond panel is adhered to different material, it is possible that the panel shows a deflection due to the thermal expansion different or dimension change of the material. Pre-test the adhesive before fabrication and installation.
- Some adhesives may cause a distortion after hardening due to shrinkage of the adhesive, as shown m the diagram. Therefore, pre-testing is necessary for some types of adhesives. Generally, some of epoxy adhesives, polyurethane adhesives and silicone adhesives may show this kind of distortion. This distortion is usually very slight and sometimes it is not visible in low gloss and matte finished.

3. Welding of core

One end of M-Bond panel can be adhered to another end of the panel by welding the core with hot melt adhesive (glue).

Prior to heating a glue stick, we have to pre-heat the core surface for good adhesion. Normally, mechanical reinforcement is necessary after welding.

4. Double-sided tape

Double-sided tape like 3M's VHB tape is effective in joining M-Bond panel to other materials. VHB tape simplifies the joining work and the sticker ones allow a movement of the adhered two materials to some extent.

5. Hook/loop fastener

Hook/loop fasteners like Velcro tape is useful for guide signs and displays. This type of fastener is removable and restorable.

6. Sealant

In order to ensure waterproofing of joints between panels, normally a sealing material is used. The sealing material shall meet the performance required for the atmospheric conditions. Silicone, modified silicone, poly sulfide and polyurethane sealant are used. General performance of these sealing materials is as follow: the joint design such as joint width and thickness, please follow the sealant manufacturer's specifications.

SURFACE TREATMENT

1. Direct-to-substrate digital printing

As the polyester lacquered M-Bond panel surface is very flat and homogeneously smooth is provides outstanding ink adhesion and is printable on all standard flat bed printers. All standard panel colors as well as most of the decorative panel surfaces (silver, mirror or decor) are ideal printing substrates and have proven excellent printing result during the past decade. Since M-Bond panel is resistant to temperatures from +80°C to -50°C, resistant to water and UV, yellow or distortion through UV lamps does not occur hence, digitally printed signs can be used long term and keep their color quality even outside.

Regarding the pre-treatment we recommend the same process as mentioned for screen printing. To avoid fingerprints on the surface gloves are the easiest solution. Various processing techniques such as routing, folding or bending are possible with M-Bond panels even after printing with solvent based inks.

2. New idea with new dimensions

The creative potential of M-Bond becomes obvious when processing the material. Small sizes, large formats and even 2000mm widths M-Bond offers many possibilities and even after printing with adapted inks each format can be cut to size, shaped, formed, bent or folded.

Especially for flat applications: M-Bond digital printing panel

High quality imaging and very efficient at the same time: M-Bond digital comes with an optimized lacquer system for direct-to-substrate digital printing showing excellent ink adhesion which allows advanced printing speed. The higher performance means higher output and lower costs!

Applicable for flat application such as:

- Indoor and Outdoor signage
- Hoardings
- Photo mounting and laminating

Overview of direct digital print advantages

- Temperature resistant up to 80°C
- No distortion caused by UV lamps
- Weather resistant for exterior use
- Water retardant and UV resistant
- Thickness tolerance + / - 0.2mm
- Allows limited clearance of print heads
- Cuts easily
- Clean edges, no deburring necessary
- Low weight combined with high rigidity
- Allows wide effective spans
- Smooth surface optimized for digital printing
- Excellent print quality - even with very fine detail
- Extremely flat, strong and rigid
- No distortion at fixing points
- Lacquer system optimised for direct to substrate digital printing
- Excellent ink adhesion

Touch-up coating method

Commercial or custom acrylic paints are suitable for repair coating of all finishes of M-Bond panel. Typical procedures are as follows.

- a. Clean the surface and remove dirt, if any.
- b. Stir the paint well, apply paint with brush or pencil-type container.
- c. Dry and cure at room temperature, as in the instructions from the manufacture

Normally acrylic paints show good adhesion after cured, however the touched-up portion may show a slightly different appearance. As appearance of coating depends on coating method, even an exactly matched paint may show a slightly different appearance to some extent.

In Stone and Timber Finishes, use an intermediate solid color diluted with clear paint for touch-up. The suitable dilution rate is, depending on the color, 10-90% of clear content. Munsell Number attached to each color may become a guide to find the intermediate color.

CLEANING METHOD

1. General cleaning

Firstly, try water rinse using soft sponge with modest pressure to remove the stain. If the stain remains after dry, then use neutral detergents or household cleaners diluted with water. Typical cleaning procedure are as follows:

- a. Dilute a detergent or a cleaner to 1-5% with water.
- b. Apply the solution and spread on M-Bond panel surface with soft rags or sponges. Wait for 1 minute, then the foam will blacken.
- c. Dry the solution with a squeegee and wipe the remaining solution with wet cloth containing clean water.

According to our test, dilute Magiclean is suitable for all finishes of M-Bond panel. Magiclean is a household detergent with pH8 from Kao Corp. If you use other detergent, pre-test it in a small area.

2. Stubborn stain

According to our test, alkali cleaners such as Sharpshooter and Windex are applicable to strong stain, however Metallic

Colors of M-Bond panel requires good rinsing with water afterward. It is because in Metallic Colors, non-rinsing may cause a color change due to remaining alkali. In Solid Colors, Stone and Timber Finishes, rinsing with water is unnecessary especially.

Note

Sharpshooter is a versatile cleaner from JM(alkali, pH 12), and Windex 1s a glass cleaner from Johnson (alkali, pH 11). As these are alkali solutions, prevent eye and skin contact. Follow manufacturer's safety instructions.

If you use other strong cleaners or stain removers, pre-test in a small area. Generally, strong acid and alkali may cause a gloss change, color change, or swelling of coating film. Do not use cleaners containing abrasives. Do not use strong solvents and paint thinners.

3. Cleaning and Curing

The surface of aluminum composite panel needs regular professional cleaning and maintenance. Such cleaning is not only to keep the building wall clean and beautiful surface, but also to regularly remove the harmful dirt accumulated on the surface to ensure the quality of the panel surface.

The cleaning cycle mainly depends on the environmental conditions of the project and the actual pollution degree of the panel surface. Our suggestion is that the external wall of the building should be cleaned at least once a year; and the indoor wall should be cleaned according to the actual pollution degree.

The curtain wall shall be cleaned from top to bottom manually or with appropriate cleaning equipment. Please do not use any abrasive objects to scrub the surface. It should be cleaned with a brush made of soft cloth and sponge. It is best to clean in one direction.

Do not clean the hot panel surface (when the temperature exceeds 40°C). because the rapid volatilization of water is harmful to the plate surface! In particular, please choose the appropriate detergent, and be sure to choose neutral detergent! Please do not use strong alkaline detergents (such as potassium hydroxide, sodium hydroxide or sodium carbonate), strong acidic detergents (such as nitric acid, sulfuric acid and other acid solutions), abrasive detergents and detergents that are corrosive to the paint (such as grinding paste, acetone, butanone, banana water, etc.).

The specific cleaning steps are as follows:

- Firstly, clean the panel surface with plenty of water
- Gently wipe the panel surface with a soft brush soaked in diluted detergent water
- Then wash the panel surface with a large amount of water and wipe away the dirt
- Check the panel surface, and focus on cleaning with detergent where it is not cleaned
- Clean the panel surface with clean water until all the detergent is washed off

Before large-scale cleaning, it is best to select a small panel surface for test, and then conduct comprehensive cleaning after it is confirmed to be safe and effective.

During the maintenance process, do not scrape or hammer with hard tools, and avoid the impact of hard objects to cause damage to the panel surface.