BEMO-BOND®

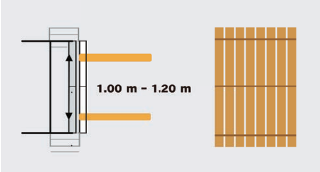
Metal Composite Panels

Product Fabrication

BEMO

Inspiring Metal Envelopes

Handling and Storage



Set maximum fork width

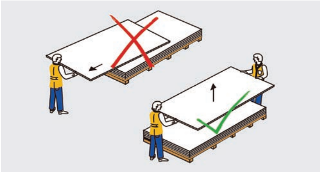
BEMO-Bond comes as a pre-made unit. Its surface is finished with lacquer, anodization, or a transformative film lamination. During transportation, storage, and handling, the surfaces are safeguarded by a protective film.

Unpack and pack

Handle and repack BEMO-Bond panels in a clean space, ensuring they're free of dust and debris to avoid surface damage.

Use a worktable instead of the floor. Two people should lift the panels from the four corners, keeping the finished side up to avoid scratches, do not slide panels on top of each other.

Always carry them vertically with gloves on.

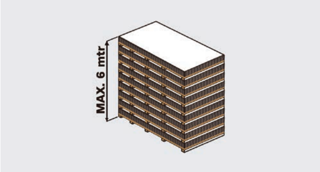


Transportation

Store the packaged BEMO-Bond flat and avoid placing heavy items on top of it.

Clearly mark the packaging with "Handle with Care," "Keep Dry," "No Hooks," and "This Side Up" labels.

Handle pallets gently during transit. Any moisture damage should be promptly reported and verified by the shipping agent.

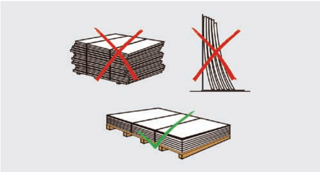


Set maximum fork width

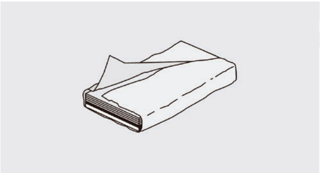
Protective Film

BEMO-Bond's protective film may degrade under direct sunlight and moisture. Keep panels in a dry place and remove the film right after installation, not storing them for over 6 months.

For panels with film on both sides, ensure both layers are removed, as they may be hard to notice. Avoid storage beyond 6 months to prevent hard-to-remove dirt build-up and film adhesion issues caused by temperature changes or sunlight exposure.



Do not use markers, tapes, or labels on the film, as solvents can damage the panel's finish. If the film loosens, it can attract dirt, making it hard to clean.



Always remove the film promptly post-assembly to avoid removal difficulties after prolonged outdoor exposure.

Storing

Store panels in a dry, clean, frost-free space on a level surface. Keep in original packaging, remove steel straps for long-term storage, prevent moisture between panels, and avoid placing paper layers between them.

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Processing Methods

Saw Cutting
BEMO-Bond can be precisely cut using a standard guillotine. For optimal cut quality, a shearing angle of ≤ 1.5° and minimal clearance (verified by a paper test) are essential. To protect the surface, equip the guillotine down-holders with rubber pads.

Shear Cutting
Position the panel with the finished side up to prevent scratches and the protective film from coming off. After cutting, carefully remove any debris from the BEMO-Bond Aluminum Composite Panel to prevent dents during storage or assembly. Maintain or replace the saw blade when it becomes dull to avoid burrs or distortions at the cut edge.

Additional Cutting Guidelines
Cutting BEMO-Bond panels, especially when the edges will be visible (like in riveted facades), may not meet decorative standards.

Important
BEMO-Bond Panels are compatible with various saw types, including vertical panel saws, circular saws, or jigsaws, with carbide-tipped blades recommended for aluminum or plastic.

Trimming
In saw cutting, burrs form on both sides of the edges, while in shear cutting, each edge may show either drooping or burring. When installing panels with exposed cut edges, it's important to pay attention to the condition of these edges.

Keep blades sharp for clean cuts, and adjust shearing dies properly for shear cutting. Edge quality is crucial, particularly for indoor use; trimming may be necessary using a trimmer, plane, or sandpaper. For Solid and Metallic Colors, consider chamfering for a visual effect, using a trimmer with a ball-bearing chamfer bit or a plane with a guide ruler for consistent edges. For Stone and Timber Finishes, avoid deep trimming as it can mar the appearance. If necessary, dull sharp edges with fine sandpaper to prevent injury. Normally, the mild edge created by shear cutting is safe enough without additional dulling.

Example of Suitable Saw Blade

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

Operating Conditions

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

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Processing Methods - Cont

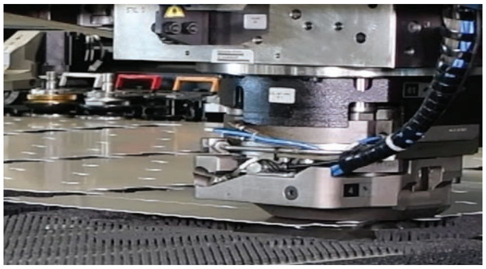
Curve Cutting

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



Punching

BEMO-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.



Perforating (for interior applications only)

BEMO-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 BEMO-Bond panel. The suitable clearance between punch and die is 0.1mm or smaller (material thickness × approx.2%). Small droop will appear at punched edge.


Water Jet Cutting

Plunge cut (piercing at the starting point) in water-jet cutting may cause a certain extent of delamination 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 BEMO-Bond panel.

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

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Bending

Bending With a Press Brake

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

The minimum bendable radius with press brake is as follows:

Bending Direction	Minimum Bendable Radius
Traverse	50mm
Parallel	80mm

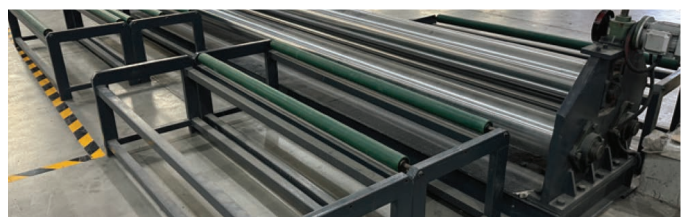
Notes on press brake bending
a. "Traverse" and "Parallel" show the bending direction toward the rolling (coating) direction, printed on the protective film.
b. The minimum bendable radius means the limit with which visible wrinkles appear on the aluminum surface of BEMO-Bond panel.
c. Use the top die (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.
d. Use a urethane pad for the bottom die, or place a rubber mat between BEMO-Bond panel and the bottom die.
e. Use a scratch-free top die. Polish and wipe the top die. Do the bending work without peeling off the protective film.

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.

Bending With a 3-Roll Bender

We can use manual or electric-drive 3-roll bender for bending BEMO-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 (mm R)
500	120
1000	150
2000	180
2500	200

Notes on 3-roll bending
a. Prior to bending operation, wipe the roll surface carefully.
b. Remove the burr at BEMO-Bond panel edge that may cause dent with rolling.
c. Remove the cut particles suck on BEMO-Bond panel and rectify the wrinkles of protective film, which may cause dent.
d. Do not tighten BEMO-Bond panel with rolls. If the roll clearance if rigid in the machine, adjust the clearance to panel thickness plus approx. 0.5mm.
e. 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.
f. When bending to small radius, gradual bending is necessary by adjusting the elevation of bending roll.
g. 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, w e have to do additional edge bending after the regular bending.

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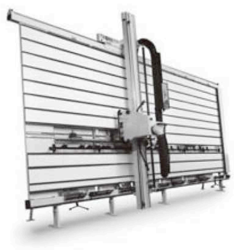
Routing and Folding

BEMO-Bond Panel Sheets can be shaped and bent using a flatbed CNC router, a Vertical Panel Saw, or a handheld router with a "V-Grooving" tool. These sheets can be folded into cassette trays for use in exterior facades or curtain wall systems. A "V" or rectangular groove should be cut on the back side of the panel along the intended fold line. It's crucial not to cut through the panel entirely; leave a thin layer of the core (0.8 mm) intact at the bottom to facilitate easy bending. This precaution helps prevent damage to the paint finish and aluminum from cracking or splitting during the bending process.

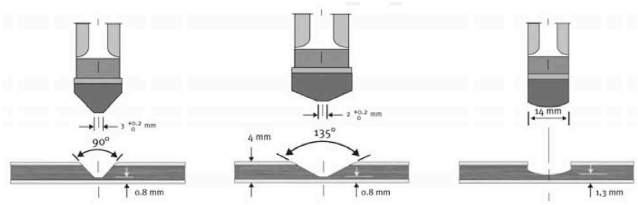
Flat bed CNC routing machine



Vertical panel sawing machine

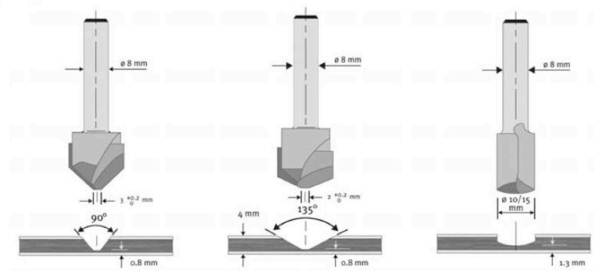
Handheld V-grooving tool

Disk milling cutter with carbide tips for vertical panel saw



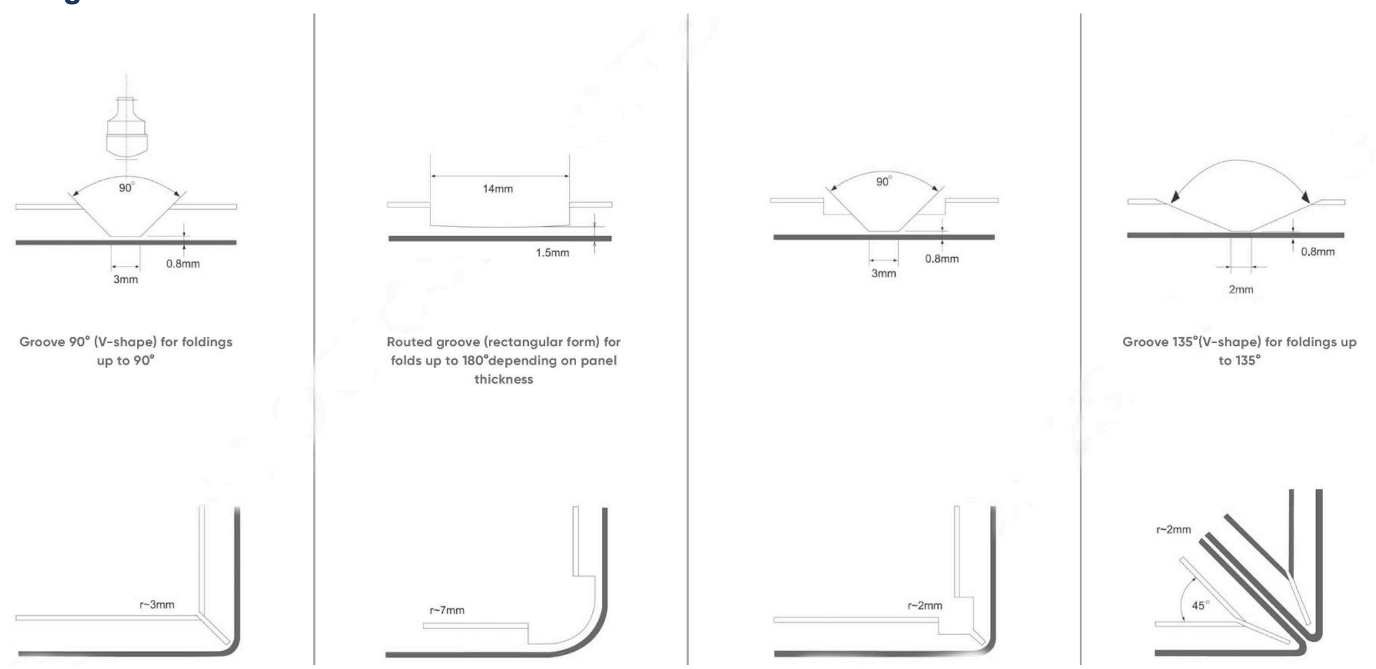
Disk milling cutter for V-grooves, 90° | Disk milling cutter for V-grooves, 135° | Disk milling cutter for rectangular grooves

Form milling cutter with cylindrical shaft for hand routing



Milling cutter for V-grooves,90° | Milling cutter for V-grooves,135° | Milling cutter for rectangular grooves

Folding



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

Routed groove (rectangular form) for folds up to 180°depending on panel thickness

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

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Clamping, Bolting and Screws

Screws for Outdoor Use

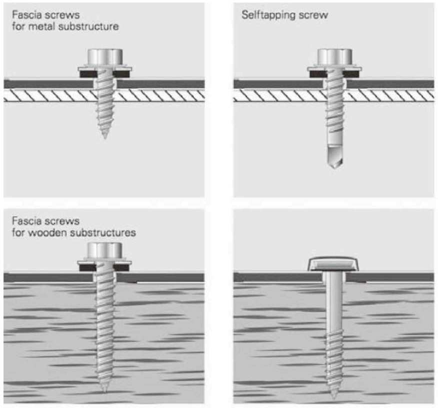
For outdoor applications, it's important to account for the panel's thermal expansion when using bolted connections. A recommended clearance of 2 to 3mm should be provided to accommodate this expansion. To prevent binding, ensure the hole diameter in the panel is large enough for the expansion, and it's advisable to use stainless steel facade screws equipped with sealing washers. These screws should be compatible with the designated substructure. When attaching the screws, use a torque wrench or power screwdriver to secure them so the washer seals the borehole without applying pressure to the panel. Multi-step drills or drill sleeves with appropriate diameters are useful for accurately drilling holes into the panel and substructure and for placing the rivet centrally. Remember to remove the protective film in the area where screws will be placed before proceeding with screwing.

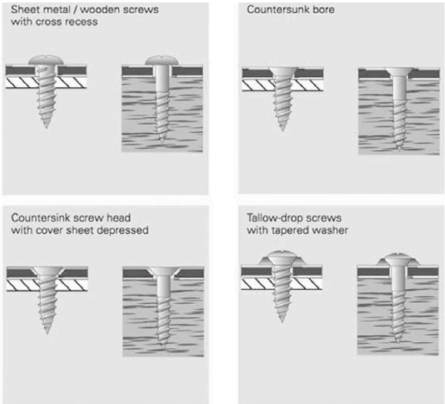
Screws for Indoor Use

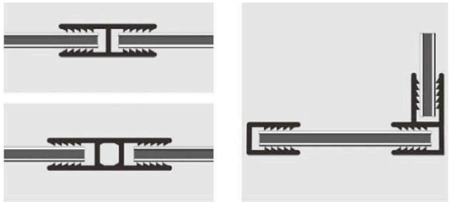
For indoor applications, sheet metal and wood screws with various head shapes are appropriate. These types of fasteners typically do not accommodate panel expansion, meaning no additional gap for expansion is necessary indoors due to minimal expansion. Countersunk screws can be installed using traditional countersinking techniques or by indenting the panel's surface. When indenting the aluminum surface, ensure the hole diameter in the panel is larger than the screw diameter.

Clamping

Clamp connections are primarily utilized in shop fitting and display construction, with aluminum or plastic clamps being suitable options. These clamps are composed of two parts, achieving a secure grip through bolting. Aluminum profiles are recommended for use as connectors or for creating impact-resistant frames. Variations in tolerances may affect the strength of the grip, but a consistent and sturdy fit can be achieved by compressing the sides of the profile before panel insertion. Profiles for butt joints, corners, and ends suitable for 3mm, 4mm, and 6mm thick panels can be found at local hardware stores or through suppliers specializing in aluminum profiles.







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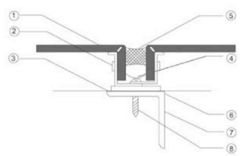
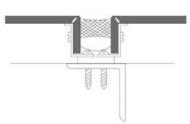
Installation and Fabrication Methods

Panel Type and Joint Design A

Angle aluminium and seal joint 1



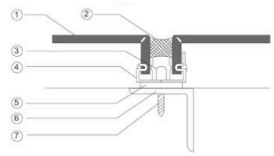
Angle aluminium and seal joint 2



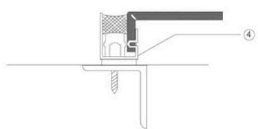
1 BEMO-Bond Panel
2 Aluminium rivet
3 Angle aluminium
4 Backer rod / Gasket
5 Sealant
6 Angle bar
7 'L' angle bar
8 Self-drilling screw

Panel Type and Joint Design B

Accessories and seal joint 1

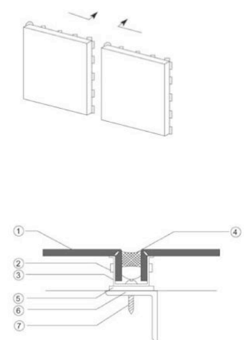


Accessories and seal joint 1



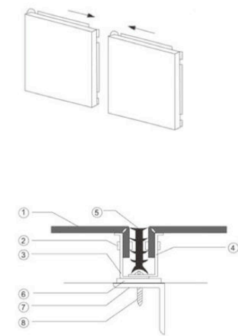
1 BEMO-Bond Panel
2 Sealant
3 Alum extrusion
4 Alum extrusion
5 Gasket
6 'L' angle bar
7 Self-drilling screw

Panel Type and Joint Design C



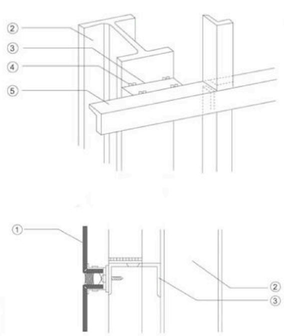
1 BEMO-Bond Panel
2 Aluminium rivet
3 Angle aluminium
4 Sealant
5 Spacer
6 'L' angle bar
7 Self-drilling screw

Panel Type and Joint Design D



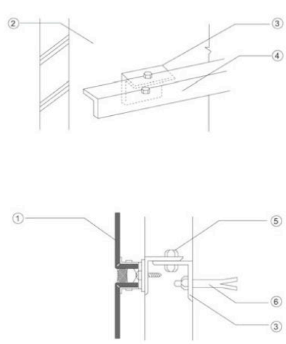
1 BEMO-Bond Panel
2 Rivet / Screw
3 Alum extrusion
4 Alum extrusion
5 Backer rod / Gasket
6 Separator pad
7 'L' angle bar
8 Self-drilling screw

Keel Structure A



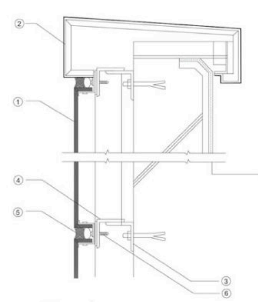
1 BEMO-Bond Panel
2 I-beam
3'C' bracket
4 Tack weld
5 'L' angle bar

Keel Structure B



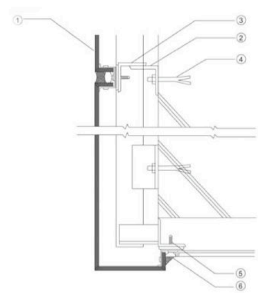
1 BEMO-Bond Panel
2 Bearing strut
3 'L' angle bracket
4 'L' angle bar
5 Bolt and nut
6 Expansion bolt

Parapet Capping



1 BEMO-Bond Panel
2 Roof top
3 'L' angle bar - bottom
4 'L' angle bar - top
5 Sealant
6 Self-drilling screw

Eaves



1 BEMO-Bond Panel
2 Angle support
3 Angle bar
4 Expanding bolt
5 Self-drilling screw
6 Sealant to act as drip-point

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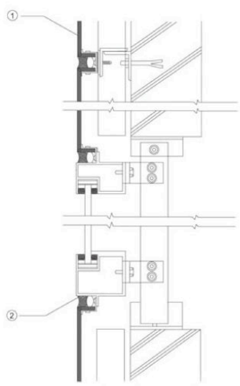
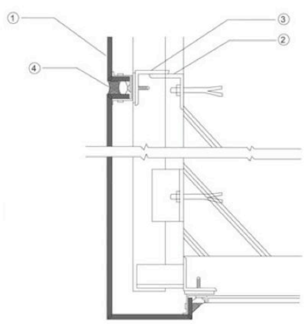
Installation and Fabrication Methods - Cont

Window Frame



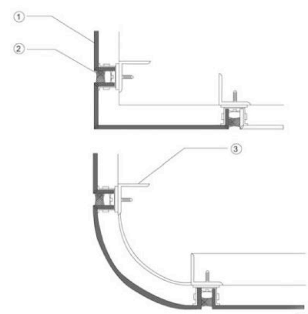
1 BEMO-Bond Panel
2 Sealant

Foundation



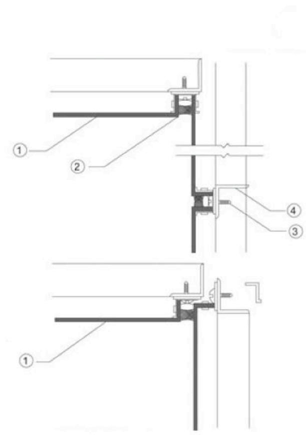
1 BEMO-Bond Panel
2 Angle bar
3 Angle support
4 Sealant

External Corner



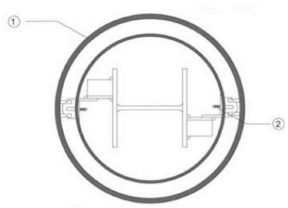
1 BEMO-Bond Panel
2 Sealing material
3 Angle bar

Corner Installation



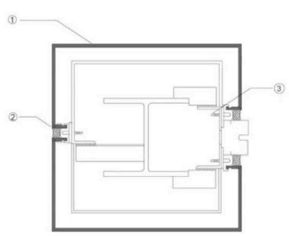
1 BEMO-Bond Panel
2 Sealing material
3 Screw
4 Angle bar

Column Covering



1 BEMO-Bond Panel
2 Screw

Strut Covering



1 BEMO-Bond Panel
2 Sealing material
3 Screw

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Joining Methods

Rivets
Rivets, bolts/nuts, and tapping screws are commonly employed to connect BEMO-Bond panels with aluminum extrusions. Aluminum blind rivets are recommended for their ability to be installed from one side. For bolts/nuts and tapping screws, materials such as aluminum or stainless steel are suitable choices.

Adhesive
Commercial adhesives are suitable for bonding and assembling BEMO-Bond panels. A broad range of adhesives can be used, although certain types that may cause corrosion to aluminum should be avoided. For instance, vinyl acetate-based adhesives, commonly used with wood and styrene foam, are not recommended for aluminum. The primary adhesives compatible with BEMO-Bond panels for joining them to other materials include the list below.

Adhesives Applicable to BEMO-Bond Panel

Adhesive Type		Epoxy	Chloroprene	Silicone RTV	Cyano-acrylate
Suitable material to be adhered	Metal	OK	OK	OK	OK
	Timber	OK	OK	OK	OK
	Gypsum Board	OK	OK	OK	OK
	Styrene Foam	OK	OK	OK	OK

Notes on Adhesives

a. Prior to adhesion work, remove all the foreign matters such as dust, particle, grease, water, etc. from the area to be adhered.

b. Select the most 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.

c. When BEMO-Bond panel is adhered to different material, it is possible that BEMO-Bond panel shows a deflection due to the thermal expansion different or dimension change of the material. Pre-test the adhesive before fabrication and installation.

d. Some adhesives may cause a distortion after hardening due to shrinkage of the adhesive, as shown in 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 lo w gloss and matte finished.

Welding of Core
One end of BEMO-Bond panel can be adhered to another end of BEMO-Bond 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.

Double-sided Tape
Double-sided tape like 3M's VHB tape is effective in joining BEMO-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.

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

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 follows. Regarding the joint design such as joint width and thickness, please follow the sealant manufacturer's specifications.

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