ALUCOBOND®

PROCESSING AND TECHNICAL DATA
TRANSPORT & INDUSTRY

Simply original, originally simple

COMPOSITES

CONTENTS

TECHNICAL DATA SHEET

ALUCOBOND®

Thickness	**Standard**	**Unit**	**3 mm**	**4 mm**	**6 mm**
Thickness, cover sheet		mm		0.50	
Weight		kg / m²	4.5	5.5	7.3
Fabrication width		mm		1000 / 1250 / 1500	
Technological values					
Section modulus **(W)**	DIN 53293	cm³ / m	1.25	1.75	2.75
Rigidity **(E·I)**	DIN 53293	kNcm²/m	1250	2400	5900
Alloy	EN 573-3			EN AW-5005A (AlMg1)	
Temper of cover sheets	EN 515			H22 / H42	
Modulus of elasticity	EN 1999 1-1	N / mm²		70000	
Tensile strength of cover sheets	EN 485-2	N / mm²		$R_m \geq 130$	
Proof stress (0.2 %)	EN 485-2	N / mm²		$R_{p0.2} \geq 90$	
Elongation	EN 485-2	%		$A_{50} \geq 5$	
Linear thermal expansion-koeffizient	EN 1999 1-1			2.4 mm/ m bei 100 °C temperature difference	
Core					
Polyethylene, type LDPE		g / cm³		0.92	
Surface					
Lacquering				Coil Coating. Fluoro-carbon (e.g. PVDF)	
Gloss (initial value)	EN 13523-2	%		30-80	
Pencil hardness	EN 13523-4			HB-F	
Acoustical properties					
Sound absorption.factor **(α_s)**	ISO 354			0.05	
Sound transmission loss **(R_W)**	ISO 717-1	dB	25	26	27
Loss factor **(d)**	EN ISO 6721		0.0072	0.0087	0.0138
Thermal properties					
Thermal resistance **(R)**	DIN 52612	m²K / W	0.007	0.0103	0.0172
Thermal conductivity **(λ)**	DIN 52612	W / mK	0.43	0.39	0.35
Heat transition coefficient **(U)**	DIN 52612	W / m²K	5.65	5.54	5.34
Temperature resistance		°C		-50 ... +80	

TECHNICAL DATA SHEET

ALUCOBOND® PLUS

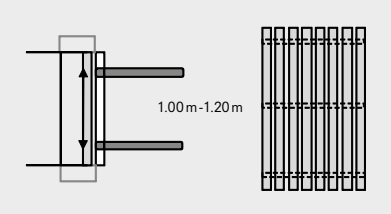
Thickness	**Standard**	**Unit**	**3 mm**	**4 mm**	**4 mm**
Thickness, cover sheet		mm		0.50	
Weight		kg / m²	5.9	7.6	10.8
Fabrication width		mm		1250 / 1500	
Technological values					
Section modulus **(W)**	DIN 53293	cm³ / m	1.25	1.75	2.75
Rigidity **(E·I)**	DIN 53293	kNcm²/m	1250	2400	5900
Alloy	EN 573-3			EN AW-5005A (AlMg1)	
Temper of cover sheets	EN 515			H22 / H42	
Modulus of elasticity	EN 1999 1-1	N / mm²		70000	
Tensile strength of cover sheets	EN 485-2	N / mm²		$R_m \geq 130$	
Proof stress (0.2 %)	EN 485-2	N / mm²		$R_{p0.2} \geq 90$	
Elongation	EN 485-2	%		$A_{50} \geq 5$	
Linear thermal expansion	EN 1999 1-1			2.4 mm / m bei 100 °C temperature difference	
Core					
Mineral-filled polymer					
Surface					
Lacquering				Coil Coating. Fluoro-carbon (e.g. PVDF)	
Gloss (initial value)	EN 13523-2	%		30-80	
Pencil hardness	EN 13523-4			HB-F	
Acoustical properties					
Sound absorption factor **(α_s)**	ISO 354			0.05	
Sound reduction index **(R_w)**	ISO 717-1	dB		≥ 25	
Loss factor **(d)**	EN ISO 6721			--	
Thermal properties					
Thermal resistance **(R)**	DIN 52612	m²K / W	0.007	0.009	0.0152
Thermal conductivity **(λ)**	DIN 52612	W / mK	0.49	0.44	0.40
Heat transition coefficient **(U)**	DIN 52612	W / m²K	5.68	5.58	5.40
Temperature resistance		°C		-50 ... +80	

TECHNICAL DATA SHEET

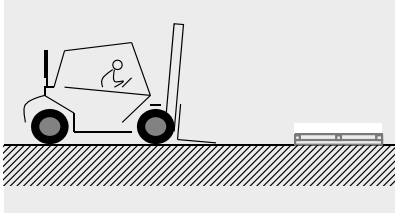
ALUCOBOND® A2

Thickness	**Standard**	**Unit**	**3 mm**	**4 mm**
Thickness		mm	0.50	
Weight		kg / m²	5.9	7.6
Fabrication width		mm	1 250 / 1 500	
Technological values				
Section modulus **(W)**	DIN 53293	cm³ / m	1.25	1.75
Rigidity **(E·I)**	DIN 53293	kNcm²/m	1 250	2 400
Alloy	EN 573-3		EN AW-5005A (AlMg1)	
Temper of cover sheets	EN 515		H22 / H42	
Modulus of elasticity	EN 1999 1-1	N / mm²	70 000	
Tensile strength of cover sheets	EN 485-2	N / mm²	$R_m \geq 130$	
Proof stress (0.2 %)	EN 485-2	N / mm²	$R_{p0.2} \geq 90$	
Elongation	EN 485-2	%	$A_{50} \geq 5$	
Linear thermal expansion	EN 1999 1-1		2.4 mm / m bei 100 °C temperature difference	
Core				
Mineral compound, polymer bonded				
Surface				
Lacquering			Coil Coating. Fluoro-carbon (e.g. PVDF)	
Gloss (initial value)	EN 13523-2	%	30-80	
Pencil hardness	EN 13523-4		HB-F	
Acoustical properties				
Sound absorption factor **(α_s)**	ISO 354		0.05	
Sound transmission loss **(R_W)**	ISO 717-1	dB	27	27
Loss factor **(d)**	EN ISO 6721		0.004	0.005
Thermal properties				
Thermal resistance **(R)**	DIN 52612	m²K / W	0.002	0.002
Thermal conductivity **(λ)**	DIN 52612	W / mK	1.99	1.77
Heat transition coefficient **(U)**	DIN 52612	W / m²K	5.83	5.80
Temperature resistance		°C	-50 ... +80	

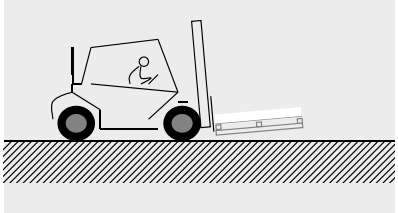
TRANSPORTATION, STORAGE



Set maximum fork width



Pick up the pallet, slightly raise the fork



Pick up the complete pallet, do not draw nor push

GENERAL

To protect ALUCOBOND® composite panels against mechanical damages and the harmful effects of weather conditions and moisture, the following information must be observed:

- The pallets must be handled carefully during transport and unloading. (Caution: Do not handle open pallets).
- Upon delivery the pallets must be examined for any damage due to transportation and moisture
- ALUCOBOND® panels that have become wet must be dried to avoid any spots or corrosion forming. Any damage must be reported immediately and confirmed by the forwarding agent.
- Store the pallets so that they are protected against any wetness penetrating due to rain and spray water and avoid any condensation forming (e.g. when transporting cold panels to warmer rooms).
- Store the pallets stacked one over the other (do not store ALUCOBOND® panels standing vertically) with a maximum of 6 pallets of the same format stacked on top of each other (heavy pallets at the bottom).
- Individual panels must be lifted off the pallet by two people holding all four corners and not drawn over each other. Carry the panels vertically. Wear gloves to avoid staining.
- When stacking panels, nothing should be put in between to avoid markings.

To ensure perfect functioning of the ALUCOBOND® protective film, the following information should be observed:

- Storage exceeding 6 months should be avoided. Severe temperature fluctuations and exposure to direct sunlight reduce the long-term durability. In this case the protective film may become very difficult to remove.
- Do not mark the protective film with inks (markers), tapes or labels. Solvent or plasticizer may penetrate the film and affect the lacquered surface.
- Should the protective film partially come off during processing or after assembly, dirtied edges can occur in the course of time, which may be difficult to remove.
- Remove the protective film as soon as possible after assembly. Protective film that remains on the panels for an extended period of exterior exposure may be very difficult to remove.
- Make sure not to remove the protective film at temperatures below 10°C.

PANEL DIMENSIONING

WHEN DIMENSIONING THE PANELS, THE FOLLOWING SHOULD BE NOTED

Dimensional tolerances (Standard)

Due to manufacturing, a displacement of the cover sheets sidewise at the panel edges up to 2 mm is possible.
Thickness: ± 0,2 mm (mill-finish | stove lacquered | anodized)
Width: - 0 / + 4 mm
Lengths: 2000 - 4000 mm; - 0 / + 6 mm
Lengths: 4001 - 6800 mm; - 0 / + 10 mm

When cutting and routing, the thermal expansion in length of ALUCOBOND® must be taken into account to ensure the dimensional accuracy of the components during assembly. We recommend that prior to processing the panels should be stored at room temperature for at least one day.

Trimming

The panels have to be trimmed:
- on all sides, to ensure accurate rectangularity and precisely cut edges when using raw edges, such as e.g. with the riveted façade version.
- on three sides, to ensure accurate rectangularity for further processing.

The trimming cuts must be taken into account when dimensioning the panel.

Anodised contact lines

Anodised ALUCOBOND® composite panels have contact lines on the short sides - of up to 25 mm width on the front and up to 35 mm width on the back.

With panel lengths of more than 3.5 m, contact lines of up to 20 mm width must also be taken into account at the longitudinal edges.

Panel edges

Due to the manufacturing process a lateral displacement of the cover sheets of max. 2 mm is possible at the panel edges.

Static calculation of elements

- For static values, please see the Technical Data Sheets
- For static tables, please ask for details

INFORMATION ON SPECIAL SURFACES

Anodised surfaces

During the anodising process an artificial oxide layer is produced on the aluminium surface. This takes place in a liquid medium with a defined bath composition under direct and alternating current.

Anodized aluminum parts are used for a great range of exterior and interior applications due to their corrosion resistance and decorative effect for. Even over prolonged periods (> 30 years), the layer of oxidation is only minimally reduced and the protective effect of anodically generated oxide layers is not impaired. These properties, however, are only retained for a longer period, if a sufficiently thick oxide layer has been built up and is well compacted on an aluminium material that is suitable for anodising. Additionally, the elements must be cleaned in such a way that the corrosive impact is also taken into account.

According to DIN 17611, anodised ALUCOBOND® and ALUCOBOND® PLUS composite panels are anodised, semi-finished products made of aluminium with an anodised layer thickness of at least 20 µm for exterior applications. Quality assurance during the production of the panels according to DIN EN ISO 9001, ensures a high-quality, final product.

Bending and folding anodized panels can result in micro cracks and fading may occur in that area. If this is not desired, enamelled ALUCOBOND® Anodized Look composite panels, whose surfaces comply with the anodizing industry standard EURAS, can be folded or bent without problems.

naturAL surfaces

3A Composites has introduced an innovative coating – ALUCOBOND® naturAL – that permanently preserves the natural, aluminium surface. During the rolling process this allows “brushed” structures to be produced, for example, with a clearly higher surface brilliance than we know of stainless steel.
The surface is not only weather-resistant but also insensitive to perspiration (finger prints). Cleaning only need occur in more regular intervals in highly corrosive environments (e.g. near the coast or in industrial environments). In most cases, clean water will then be sufficient for cleaning and will prevent accumulation of salt or any other pollutants.

Owing to the production process, ALUCOBOND® naturAL Reflect produces a slightly iridescent effect in artificial light. Therefore, for interior applications – please inquire – a Reflect surface with a modified structure may be advisable. Due to the high degree of reflection of the underlying surface – as compared to conventionally pigmented lacquering – the coating is exposed to almost double the UV radiation. For this reason, the resistance of ALUCOBOND® naturAL surfaces is reduced in the case of inclined planes and applications between latitudes of 20°N and 20°S.

INFORMATION ON SPECIAL SURFACES

Mill-finished surfaces
When using ALUCOBOND® panels with mill-finished surfaces that are not protected from atmospheric influences through coating or anodising, a variation in the appearance of the aluminium surface must be taken into account.

The untreated, mill-finished aluminium surface – on which no decorative demand should be made, acquires a natural oxide layer; in the course of time the thickness increases to approx. 0.1 µm under the influence of the outer atmosphere.

When coated with reaction products, the surface shows a reduced reflectivity compared to its state when new, i.e. the surface loses its metallic brilliance taking on a dull, light-grey appearance. This impression may be intensified when dirt gathers in and on the surface. This graying constitutes a natural patina.

Whereas the reactions of uncoated aluminium to atmospheric influences change the appearance of the surface, the stability of the ALUCOBOND® panel is not impaired, as the reactions only have an effect on the panel surface, and the oxide layer protects the material underneath from any further corrosion.

It is virtually impossible to clean untreated, aluminium construction parts in exterior architecture, but this is not necessary as a rule, due to the readily accepted surface change and also its high resistance to weathering.

The protective film should not be removed until all the necessary work has been completed. After removal, make sure to wear gloves, as this will avoid leaving any finger prints that are almost impossible to remove afterwards.

PROCESSING METHODS

SAWING WITH VERTICAL PANEL SAWS

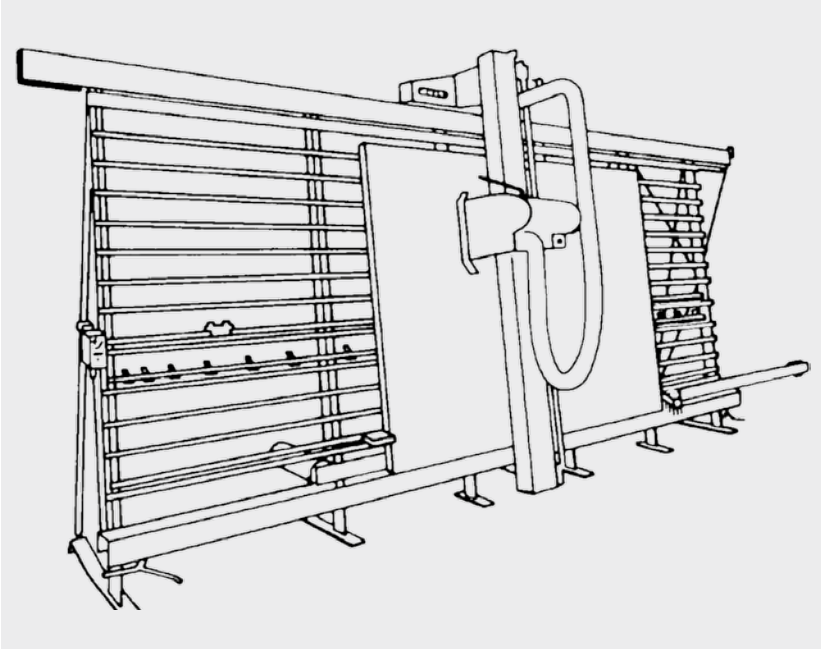
- **Holz-Her vertical panel saws with routing device**
  When purchasing a new system we recommend the following panel saw:
- **Holz-Her panel saw**, PK 1255 ALUCOBOND®, with pole-changing motor (2 speeds)

Please pay attention: saw blade – Ø 250 mm

Retrofitting existing machines

Since 1991 Holz-Her panel saws have been equipped with dustproof bearings. On older machines, the saw shaft and the casing cover need to be exchanged and the routing device newly ordered. Owing to the speed regulation from 4,800 to 2,400 rpm, retrofitting to a 2-speed, pole-changing saw motor will be required.

When ordering new machines or pole-changing saw motors, and for retrofitting with dustproof bearings, please contact Reich Spezialmaschinen GmbH directly, stating the year of construction, type and serial number of the machine.



Vertical panel saw

Striebig vertical panel saws with routing device

When purchasing a new system we recommend the following panel saw:

- **Striebig panel saw,** Standard II for ALUCOBOND® with 2-speed, pole-changing motor (please include when ordering)

Please pay attention: saw blade – Ø 300 mm

Retrofitting existing machines

Since 1993 Striebig saws have been equipped with dustproof bearings. On older machines, a dustproof tracing roller bearing flange must be provided for. Owing to the speed regulation from 4,800 to 2,400 rpm, retrofitting to a 2-speed, pole-changing saw motor will be required.

PROCESSING METHODS

When ordering new machines or pole-changing saw motors and for retrofitting to dustproof bearings, please contact Striebig AG directly, stating the year of construction, type and serial number of the machine.

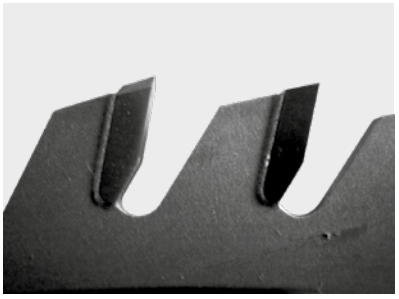
DUST EXTRACTOR SYSTEMS FOR CIRCULAR PANEL SAWS

We recommend a dust extractor with filter shaker for sawing and milling ALUCOBOND®A2 and ALUCOBOND® PLUS, for example:
AL-KO POWER UNIT 200P/250P for ALUCOBOND®A2 and ALUCOBOND® PLUS (mobile system)
- **AL-KO ECO-JET 3A/3A XL** (stationary system)

Important when ordering: With ECO-Jet standard systems the connecting branch is arranged on the right-hand side. Other branch sides please specify when ordering.
- **SCHUKO Vacomat 200XP** (mobile system) with special equipment for ALUCOBOND® A2 (please specify when ordering)

SAW BLADES FOR CIRCULAR PANEL SAWS

Saw blades for ALUCOBOND®
- carbide tipped circular saw blades, trapezoid/flat tooth
- flat teeth 45° chamfered for burr-free edges
- saw blade – Ø = 300 mm for Striebig saw, type Standard II
  t = 72 (for stack cutting), **purchase order No. 181724 (LEUCO)**
  purchase order No. 10170331 (AKE)
  t = 96 (for neat single cuts), **purchase order No. 181725 (LEUCO)**
  purchase order No. 10170330 (AKE)
- saw blade – Ø = 250 mm for Holz-Her saw, type PK 1255 ALUCOBOND®
  t = 60 (for stack cutting), **purchase order No. 181726 (LEUCO)**
  purchase order No. 10170328 (AKE)
  t = 80 (for neat single cuts), **purchase order No. 181727 (LEUCO)**
  purchase order No. 10170329 (AKE)
- bore – Ø = 30 mm
- tooth thickness 3.2 mm
- clearance angle 15°
- rake angle 10° positive
- speed 5,000 rpm


Tooth geometry trapezoid/flat tooth

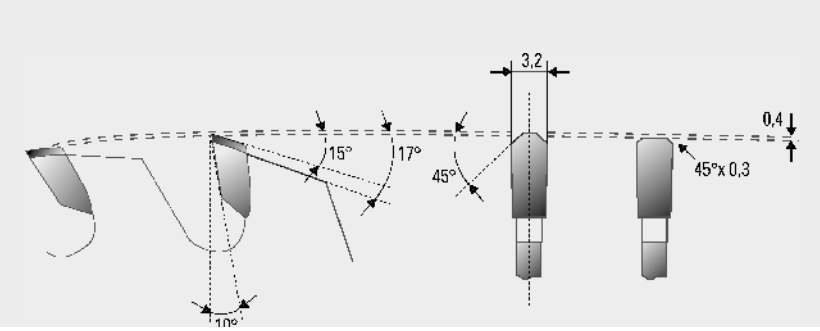

Stack cutting

Saw blades for ALUCOBOND® PLUS and ALUCOBOND® A2
- carbide tipped circular saw blades, trapezoid/flat tooth
- flat teeth 45° chamfered
- saw blade – Ø = 300 mm for Striebig saw, type Standard II
  purchase order No. 10168187 (AKE)
- diamond saw blade – Ø = 300 mm
  purchase order No. 10170336 (AKE)
- saw blade – Ø = 250 mm for Holz-Her saw, type PK 1255 ALUCOBOND®
  purchase order No. 10168158 (AKE)
- diamond saw blade – Ø = 250 mm
  purchase order No. 10170332 (AKE)

- bore – Ø = 30 mm
- tooth thickness 3.2 mm
- t = 72 (Ø = 300 mm)
- clearance angle 15°
- t = 60 (Ø = 250 mm)
- rake angle 10° positive

PROCESSING METHODS

- speed 5,000 rpm (using 2,400 rpm = ½ speed , possible on Striebig and Holz-Her panel saws with variable speed motors, can prolong the blade service life significantly)
- feed, single cut 25 m/min
  stack cut 20 m/min (3-4 panels)



Sketch showing the edge geometry for professional re-sharpening

SAWING WITH HAND-HELD CIRCULAR SAWS

Machine

- For hand-held circular saws, the appropriate cutting speed for ALUCOBOND® processing must be observed:
- **FESTOOL hand-held circular saw**, type TS 55 EB Q-Plus-FS, speed 2,000-5,200 rpm

Jig saw blades

With ALUCOBOND® PLUS and ALUCOBOND® A2 please pay attention to the speed reduction!

Tools are not included in the scope of supply. Please order separately:

- **FESTOOL carbide tipped saw blade**, trapezoid/flat tooth, rake angle positive, saw blade – Ø 160 mm, t = 48, **purchase order No. 496308**

SAWING WITH JIG SAWS

Machine

Use hand-held jigsaws with pendulum stroke

Tools – ALUCOBOND®

Saw blades for wood and plastics, tooth pitch = 2.5 mm for precision cuts, e.g. Bosch saw blade T101B

Tools – ALUCOBOND® PLUS and ALUCOBOND® A2

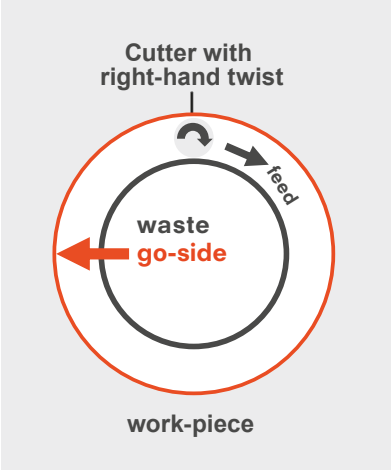
Saw blades for aluminium, tooth pitch = 2 mm, e.g. FESTOOL saw blade HS 60/2 bi

ROUTING

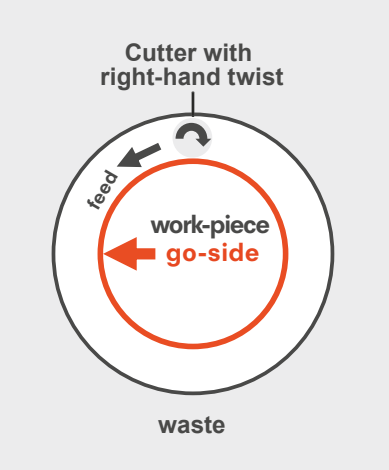
ALUCOBOND® can be easily routed on conventional routing machines and CNC machining centres. To avoid pressure marks on the surface, please use plastic or wood vice jaws when chucking the work-pieces. Preferably use vacuum tables with MDF boards as sacrificial boards.

PROCESSING METHODS

Carbide tipped cutters suitable for aluminium and plastics are also suitable for ALUCOBOND®. Perfect cuts are produced, e.g. under the following conditions: feed 5 m/min., speed 24,000 rpm.



Panel = work-piece, feed in clockwise direction



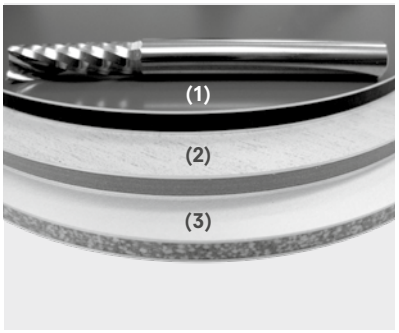
Cut shape = work-piece, feed in anticlockwise direction

Single flute cutter with right-hand twist

Suitable cutters for contour cutting of ALUCOBOND®:
- Single flute cutter, series F113 (GIS)
- solid carbide metal
- right-hand twist
- polished flute

WATER JET CUTTING

Cut abrasively when using a water jet cutting machine. Pre-drilling of the panels is necessary when starting the cut in the middle of a panel as it is not possible to drill through with the water jet. For clean cut edges, the routing method should preferably be used.



(1) ALUCOBOND®, **(2)** ALUCOBOND® PLUS, **(3)** ALUCOBOND® A2

PUNCHING / SHEARING

Punching

ALUCOBOND® 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.

Multi-station machines (Liechtblick)

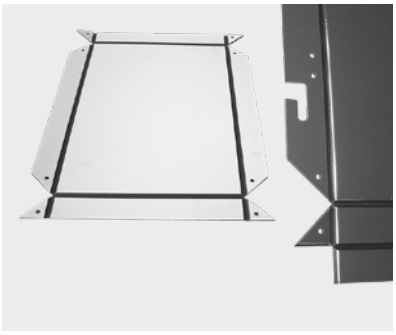
Series punching of, for example, tray panels can be realised efficiently using multi-station machines.

Multi-station machine

Perforating (for interior applications only)

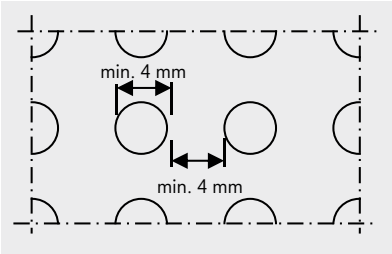
ALUCOBOND® panels can be perforated using CNC punching machines. This is often used for interior and ceiling design. Holes of a minimum diameter of 4 mm can be punched. The minimum width of web between hole edges is also 4 mm. The best results will be obtained using a punch

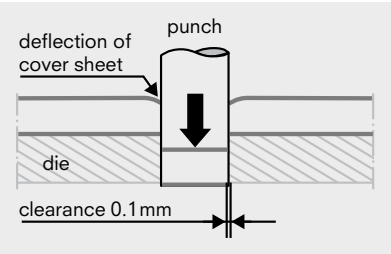
PROCESSING METHODS

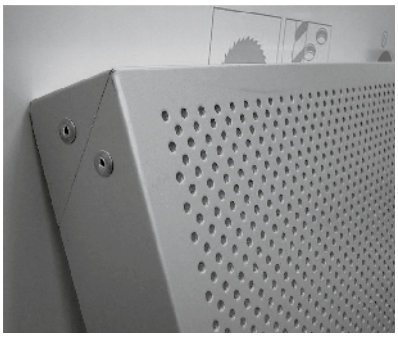


Punching tray panels

die for single punching. Multi-station machines are more economical. After punching, the flatness will possibly require further processing.







Punching holes

Shearing

ALUCOBOND® can be sheared with a conventional guillotine. A shearing angle of ≤ 1,5° 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.

Important: Cutting or shearing ALUCOBOND® panels for applications where cut edges are visible (e.g. riveted facades) is not suitable for decorative requirements.

BENDING

ALUCOBOND® can be formed by conventional metal fabrication methods. Certain specific points should be noted relating to the multilayer structure combining materials of different properties:

- the minimum bending radius is for

ALUCOBOND®, ALUCOBOND® PLUS	r = 10 x d
ALUCOBOND® A2	r = 25 x d
ALUCOBOND® naturAL	r = ≥ 60 mm
ALUCOBOND® naturAL Reflect	r = ≥ 200 mm

(d = panel thickness)

The spring-back effect experienced when folding sheet metal is larger with ALUCOBOND®. For production series a prototype should be made.

To prevent the surfaces from being damaged, the protective film must not be removed during processing. Additionally, the visible surface can be protected by using plastic pads of 1-2 mm thickness.

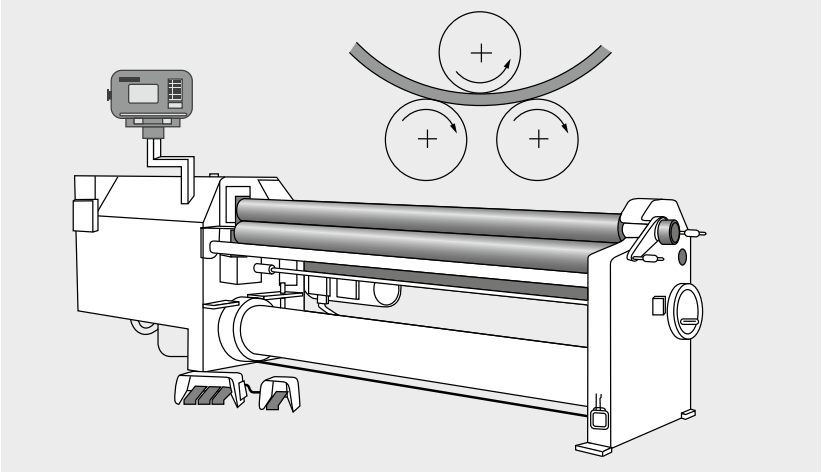
Attention: When bending ALUCOBOND® with an anodised surface, the bent area is brighter.

PROCESSING METHODS

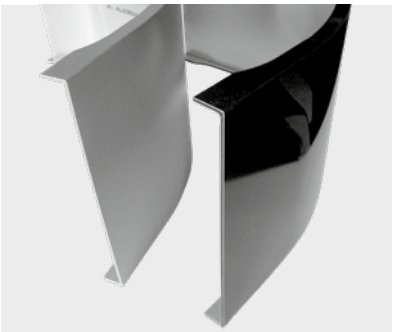
Bending with a roll bending machine
ALUCOBOND® can be bent using sheet metal roll bending machines – mainly with three and four-roll machines. Please make sure that the feeder does not exert too much pressure.

Bending rollers which are also used for bending other metals must be thoroughly cleaned from swarf before processing ALUCOBOND®. We recommend ground rollers to avoid damaging the cover sheets.

Rounded elements and edges (e.g. tray panels) can be bent using special roll bending machines. The depth of the edge depends on the radius. Please ask for details.



Bending with a roll bending machine



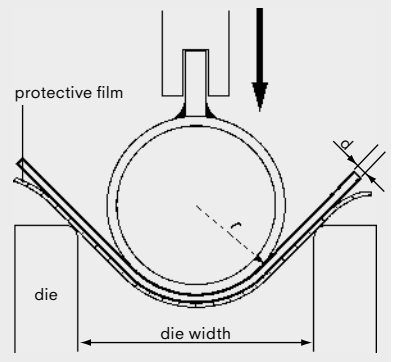
Elements rounded / folded

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

The ALUCOBOND® panel rests on the edges of the die (rails, U-sections) and is bent by the punch (tube or shaft). The bending angle is determined by the width of the die and the stroke of the punch. The die edges should be rounded and smooth.

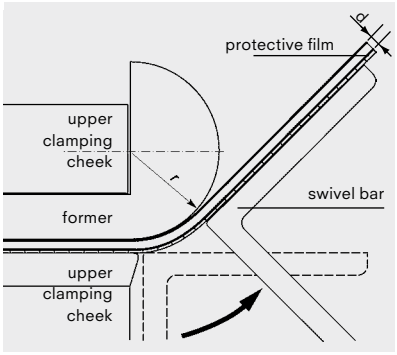
Ideal die width:
2 x d + 2 x protective film thickness + punch diameter + 15 mm

The minimum side length of the bent part should be 5 times the ALUCOBOND® thickness.



Bending with a brake press

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 folding machine

ROUTING AND FOLDING TECHNIQUE

Routed / folded elements

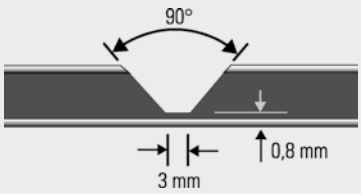
GENERAL

ALUCOBOND® composite panels can be shaped by means of a simple processing technique. This procedure, the routing and folding technique, enables a production of folded elements in different shapes and sizes.

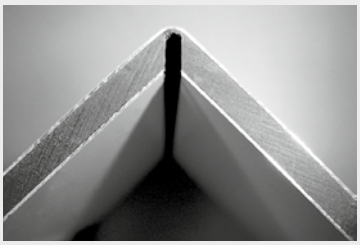
V-shaped or rectangular grooves are routed on the rear of the ALUCOBOND® panels using disk or end milling cutters, whereby the aluminium cover sheet at the front and part of the polyethylene core are retained. The small thickness of the remaining material then allows folding by hand. A brake press is not required. The shape of the groove determines the edge radius. The grooves can be produced with a panel saw with routing device for ALUCOBOND®, on a CNC machining centre, with a panel routing machine or a hand routing machine. The routing and folding technique can be used for composite panels of all standard surfaces.

Advantages

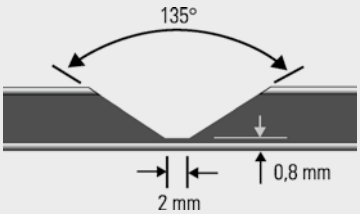
- The convincing advantages of the routing and folding technique are:
- Minimum investment
- Simple operating technique
- Folding need not be done in the workshop, it can be done on site; this means low transport costs
- Low-cost manufacture of shaped parts like façade elements, frames, fascia claddings and roof edgings, corner pieces and many more are possible
- Versatile formability
- Good economy
- Shapes are not restricted by machine dimensions.
- Tension-free folding, therefore no buckling in the corner area and thus even elements.



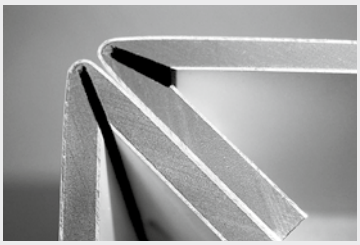
Groove (V-shaped) for edges up to 90°



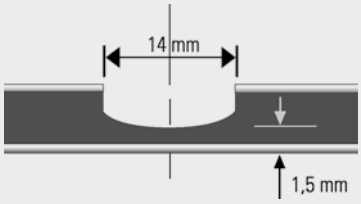
r ~ 2-3 mm



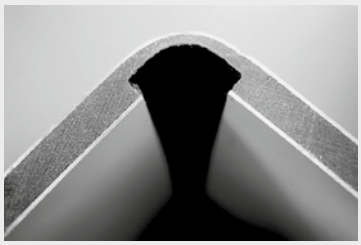
Groove (V-shaped) for edges up to 135°



r ~ 2-3 mm



Rectangular groove for edges up to 180° depending on panel thickness
Not suitable for ALUCOBOND® A2



r = 7 mm

Important: With ALUCOBOND® with anodised surface and ALUCOBOND® with naturAL Reflect surface, the formation of micro-cracks leads to brightening in the edges.

ROUTING AND FOLDING TECHNIQUE

MACHINES FOR ROUTING AND FOLDING TECHNIQUE

Vertical panel saws with routing device for routing ALUCOBOND® (special accessory)

- **Holz-Her vertical panel saw**, PK 1255 ALUCOBOND®
- **Striebig**, vertical panel saw, Standard II for composite panels

Other panel saws with a special routing device can also be supplied or retrofitted by the manufacturer. If necessary, the frame has to be raised.

For inquiries relating to

- new machines with accessory parts for routing ALUCOBOND®
- possible retrofitting of existing machines (stating machine type/No. and year of construction)
- accessories such as cutter disks, tracing rollers, etc.

Please contact the manufacturer of the panel saws.

Important: For inquiries and orders, please add "for processing ALUCOBOND® composite panels".

Important:

General information regarding the routing and folding technique

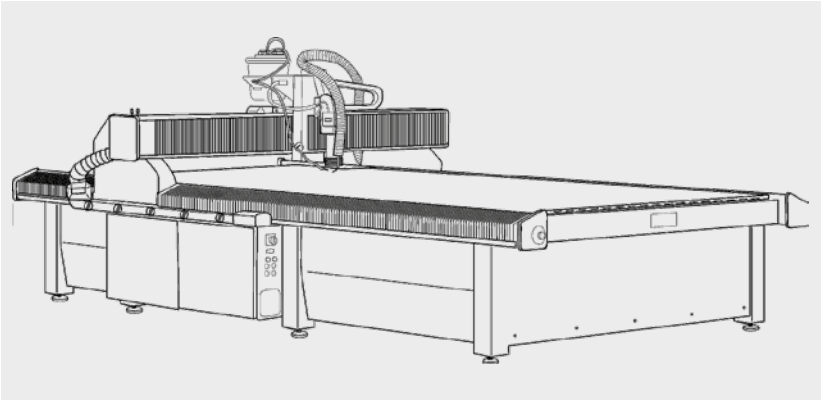
- Processing temperature: During folding, the ambient and material temperature should not be below 0°C (see also DIN EN 1396).

For ALUCOBOND®A2

- Tracing rollers: Make sure to use tracing rollers with dustproof bearings.
- Speed 2,400 rpm (= ½ speed with panel saws of Striebig and Holz-Her)
- Feed max. 20 m/min. Pay attention to a constant feed.
- Routing of rectangular groove not possible.

CNC machining centres

Series production of ALUCOBOND® components can be carried out very economically on CNC machining centres.
Depending on the equipment of the machines, various processing steps can be performed: sawing, milling (routing and folding), contour cutting, drilling.



ROUTING AND FOLDING TECHNIQUE

Panel routing machine PF 1200 E-Plus

MACHINES FOR ROUTING AND FOLDING TECHNIQUE

Festool panel routing machine PF 1200 E-Plus ALUCOBOND®

Supplied with:

- Tracing roller for 4 mm
- Cutter disk for V-grooves 90°
- Adjustment template
- Transport box

Hand routing machines

Commercially available hand routing machines with a minimum rating of 800 W are suitable.

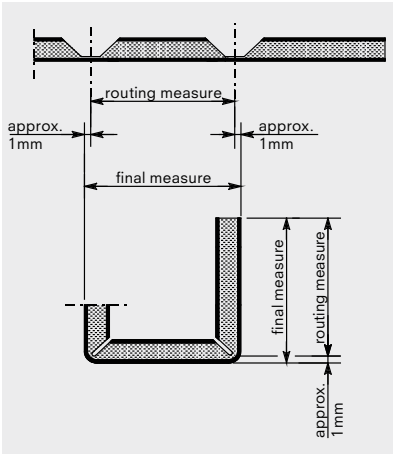
Mobile dust extractors

E.g. Festool mobile dust extractors, types CTM approved for dust class M for dust with MAK values > 0.1 mg / m³ for sheet milling machines, hand routers and hand-held circular saws.

TOOLS FOR ROUTING AND FOLDING TECHNIQUE

Carbide tipped disk milling cutters for vertical panel saws

With a nominal panel thickness, the diameters of tracing rollers and cutter discs are adjusted so as to leave a residual core thickness of 0.3 mm (V-groove) or 1 mm (rectangular groove). The dimensions given in the drawings show the cover panel thickness of 0.5 mm plus the corresponding residual core thickness.

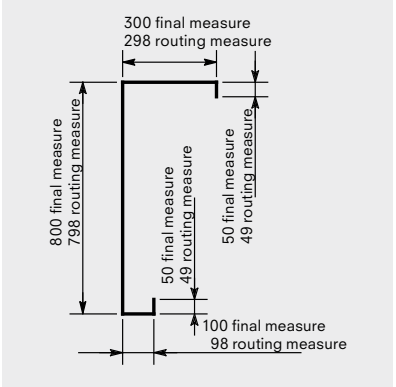


Determination of the routing measure

For inquiries relating to disc milling cutters with indexable inserts recommended for processing ALUCOBOND® PLUS and ALUCOBOND® A2 for **Holz-Her panel saws** (type PK 1255 ALUCOBOND®, number of teeth = 8, cutter disk outer dia. = 244 mm), please contact Reich, Holz-Her or LEUCO.

For ordering disk milling cutters with indexable inserts V-groove 90° and V-groove 135° as well as the corresponding tracing rollers for all types of **Striebig panel saws**, please contact Striebig AG.

When ordering please state type of panel saw and year of construction.



Determination of the measures of periphery and routing measures

The measures of periphery and the routing measures are determined on the basis of the drawing measures (final measures). In this case, approx. 1 mm per edge is deducted from the final measure. The total of the routing measures results in the cutting measure. In any case, the final measures should be checked using a test strip prior to series production. Then the limit stops of the panel saw can be adjusted to obtain elements of identical sizes.

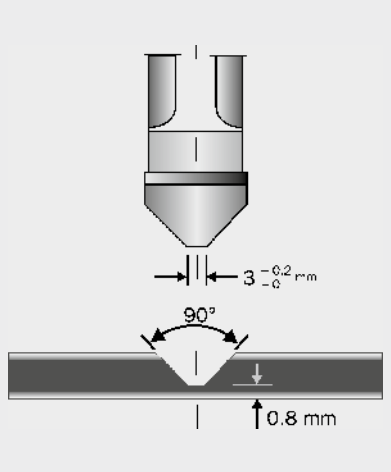
Determination of the cutting measure

Example ALUCOBOND® roof edge:

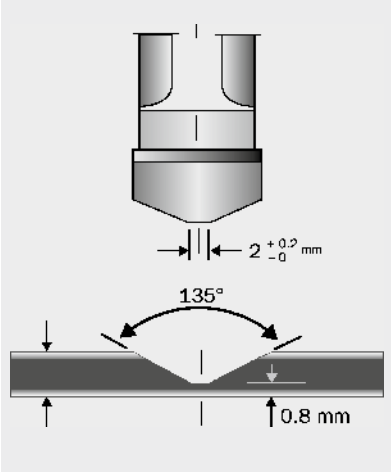
Total of routing measures = cutting measure = 1292 mm

ROUTING AND FOLDING TECHNIQUE

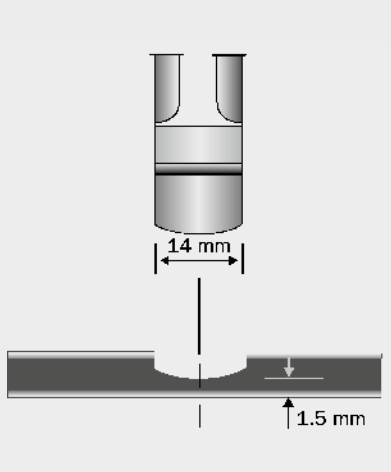
Carbide tipped disk milling cutters for vertical panel saws



Disk milling cutter for V-grooves 90°

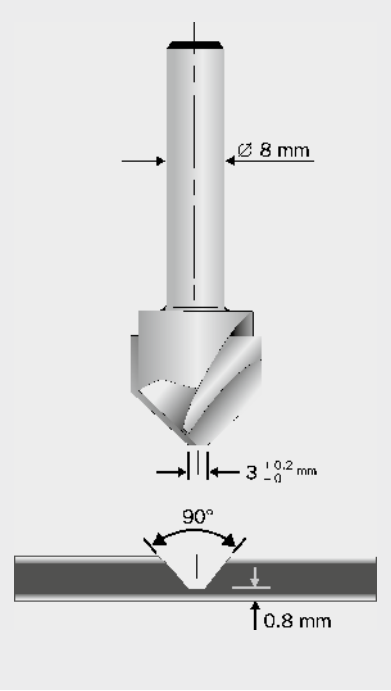


Disk milling cutter for V-grooves 135°

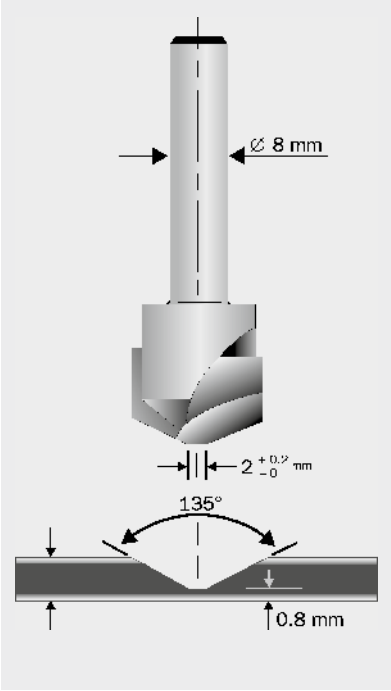


Disk milling cutter for rectangular grooves

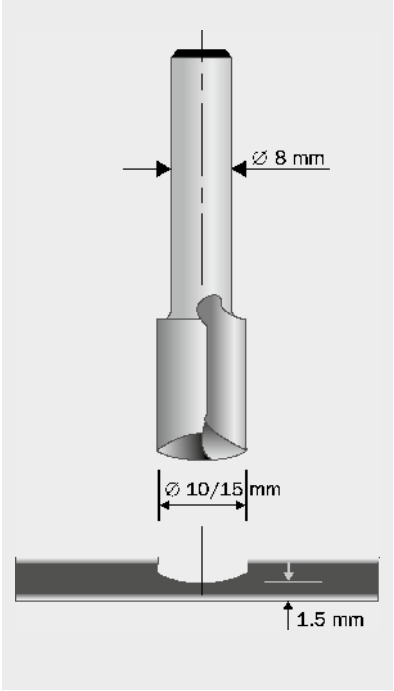
Milling cutters with cylindrical shank for hand routing machines



End milling cutter for V-grooves 90°
Carbide tipped cutter No. 491 444 (Festool)
Carbide tipped cutter No. FV09.01.090 (GIS)
Carbide tipped cutter No. 79 803 (KWO)

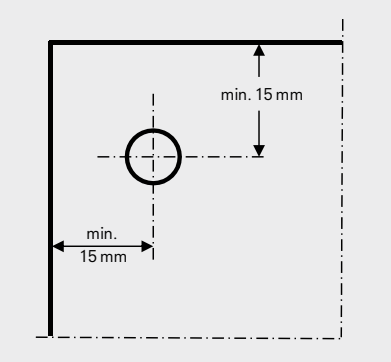


End milling cutter for V-grooves 135°
Carbide tipped cutter No. 491 443 (Festool)
Carbide tipped cutter No. FV09.01.135 (GIS)
Carbide tipped cutter No. 79 804 (KWO)

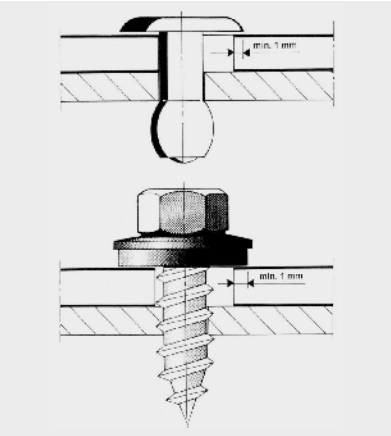


End milling cutter for rectangular grooves
HSS cutter Ø 10 mm No. 79800(KWO)
HSS cutter Ø 15 mm No. 79801(KWO)

JOINTING / FIXING TECHNIQUE



Distances from the edge



Overlapping the hole edge

GENERAL

To avoid any tension occurring in the rivet and screw connections, the rivets and screws must be set tension-free. The bore holes in the panels must be large enough to allow for the expected thermal expansion. The linear, thermal expansion of ALUCOBOND® is 2.4 mm at a panel length of 1 m and a temperature difference of 100°C.

THERMAL EXPANSION AND CONTRACTION

Material	Linear thermal expansion coefficient α_T (m/°C)	Expansion at 1 m panel length/width and 50°C temp. difference
PVC	~ 70 x 10^{-6}	3.5 mm
ALUCOBOND®	24 x 10^{-6}	1.2 mm
Aluminium	24 x 10^{-6}	1.2 mm
Steel	12 x 10^{-6}	0.6 mm
Concrete	12 x 10^{-6}	0.6 mm
Wood	5 x 10^{-6}	0.25 mm

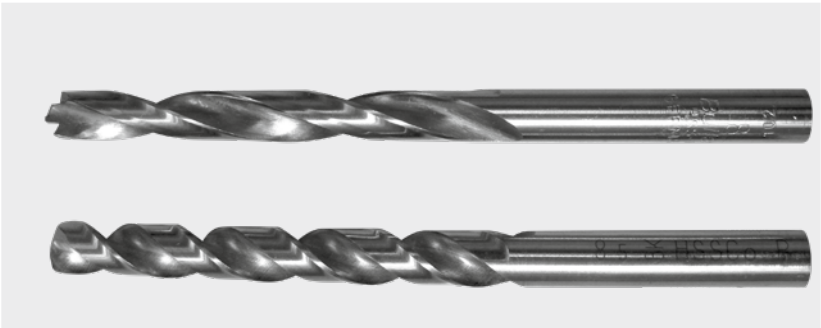
Maximum heating of the panel approx. 70°C (measured at a black panel at an air temperature of 40°C).

1 m x 3 m panel as an example
Expected heating of the panel max. 70 °C
Assumed assembly temperature 20 °C
Temperature difference Δ t = 50 °C

Calculation
2.4 mm x 3 (m) x 0.5 (Δ t = 50 °C) = 3.6 mm panel expansion, i.e. half of the panel expansion must be expected on the opposite panel edges.

DRILLING / COUNTERSINKING

Countersinks are used for countersinking the hole and for widening larger holes.



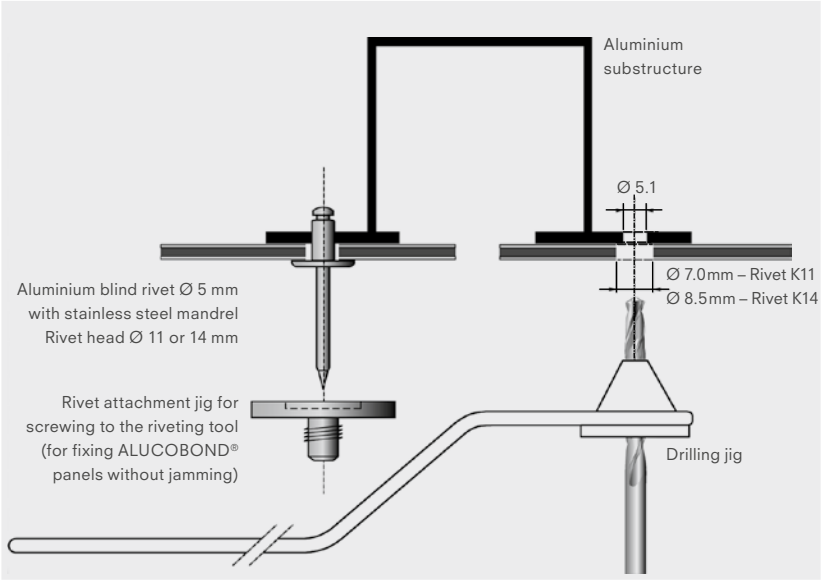
ALUCOBOND® can be drilled with twist drills Standardally used for aluminium and plastics. The following drills are particularly suitable:
- Drills with centring-point, e.g. Extreme 2TM HSS -G metal drill DIN 338 of De Walt
- Stainless steel drills HSS Cobalt DIN 338DIN 338 von Fa. De Walt

RIVETING

ALUCOBOND® panels can be fastened together or joined to other materials with rivets common to aluminium constructions.

For outdoor use and for use in areas of high humidity, aluminium blind rivets with stainless steel mandrels should be used to prevent ugly corrosive edges. When using aluminium blind rivets with steel mandrels, the mandrel should drop out after riveting (detachable version).

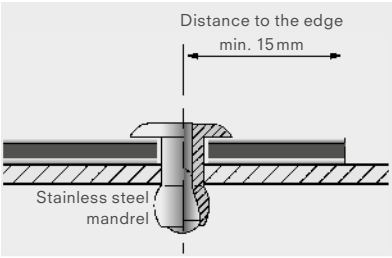
Countersunk rivets are suitable for indoor use only..



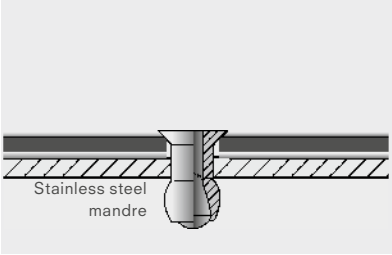
For outdoor use please note:

- For outdoor use, aluminium blind rivets are used that have been approved for construction, and have a 5 mm shaft diameter and a rivet head diameter of 11 or 14 mm.
- Please take the thermal expansion of the panel into account (2.4 mm/m/100°C). To avoid jamming, the hole in the panel must be large enough to allow for the expected expansion.
- With the shaft of the rivet fitting closely to the edge of the hole, the rivet head must cover over 1 mm of the area surrounding the hole.
- Drilling jigs are used for centrically drilling holes into the panel and the substructure and for centrically setting the rivet.
- Rivet attachment jigs are used for setting blind rivets without jamming allowing for a tolerance of 0.3 mm. Make sure to use rivet attachment jigs and rivets from the same manufacturer, as the height of the rivet head according to Din 7337 may vary.
- The clamping thickness results from the thickness of the material to be riveted plus an additional value of 2 mm to ensure that the closing head is perfectly formed. In accordance with this clamping thickness the corresponding shaft length is determined in the tables provided by the rivet manufacturers (L min. = 14 mm).

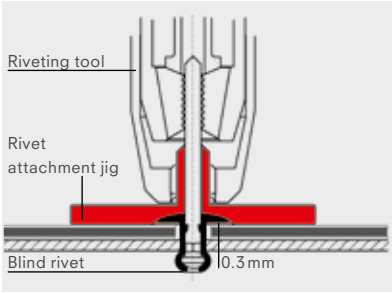
Top: Conical drilling jig, **centre:** drilling jig for hole = Ø 8.5 mm, **bottom:** rivet attachment jigs for rivet head dia. 11 and 14 mm mountable on riveting tool AccuBird (MBE)



Blind rivet with standard head



Countersunk rivet (for indoor use only)



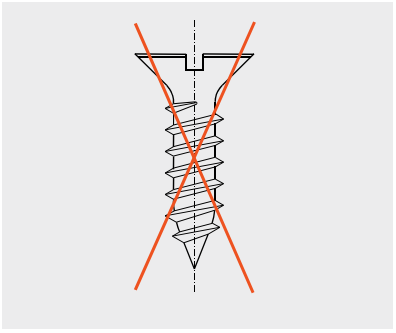
Important: During riveting many factors may have an influence on the exact tolerance of the rivets of 0.3 mm (e.g. rivet head tolerance). Therefore, we recommend that you make a test on a façade panel. Please always remove the protective film in the riveting area prior to riveting.

THREADED FASTENERS

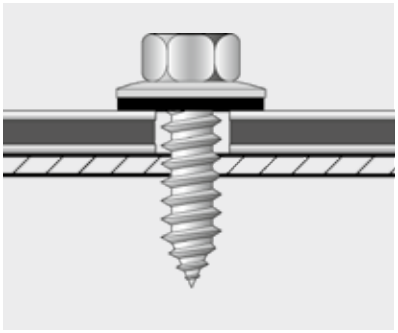
Screws on metal substructures

Commercially available fascia screws that have been approved for construction, made of stainless steel, with sealing washer (e.g. EJOT, SFS Stadler, etc.) are used for metal substructures. The screws must be suitable for the corresponding substructure (please note the information given by the manufacturer).

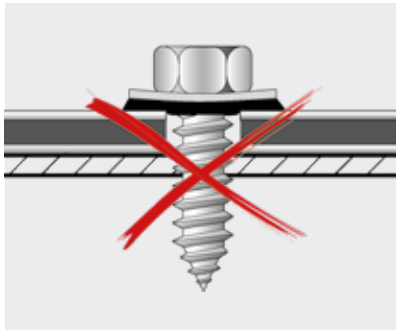
The screws should be tightened with a torque wrench or screwdriver such that the EPDM sealing washer is placed on the panel for sealing the bore hole without exerting any pressure to the panel. If the sealing washer is visibly deformed or if the rubber seal laterally protrudes beneath the washer, an expansion of the panel is no longer possible which may result in a slight deflection of the cover sheet around the sealing washer.



Do not use countersunk screws for outdoor application!



Correct setting of fascia screws: Sealing washer without deformation – the panel can move under the washer.



Incorrect setting of fascia screws: The sealing washer is deformed – the panel cannot expand.

EJOT Drilling screws with centring sleeve

EJOT Drilling screws with centring sleeve

EJOT drilling screws JT4-FR-2H/6, 4.8 x 22 mm with centring sleeve are suitable for ALUCOBOND® panel thickness 4 mm and aluminium substructures with a web thickness of 2 mm.

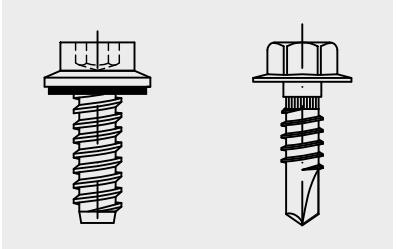
Screws for fixing SZ 20 and blue clip tray panels on aluminium substructures

Fascia screw **(1)** with Torx head for top-hat section 35953 and supporting sections with flange thickness 3 mm, diameter 5.5 – 6.3 mm, stainless steel, with head or stainless steel sealing washer, diameter 14 mm (Z-14.1-537).

For supporting sections with a flange thickness of 2 mm we recommend the drilling screw EJOT JT4-3H (2), diameter 5.5 mm.

Screws for connecting aluminium wall brackets and aluminium stiffeners

Drilling screw EJOT JT4-3H/5-5.5x19, diameter 5.5 mm, head diameter 13 mm, stainless steel **(2)** or comparable screw (SFS / Mage).



(1) Fascia screw **(2)** Drilling screw

JOINTING / FIXING TECHNIQUE

GLUING

Metal adhesives / universal adhesives, tapes, Velcro tapes

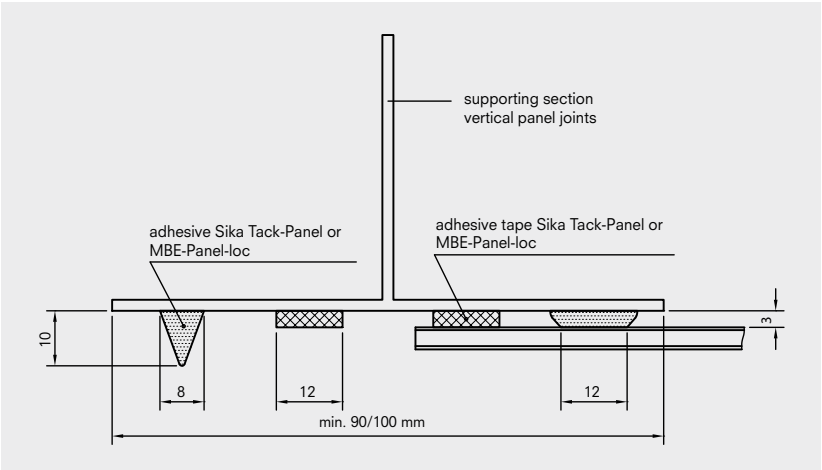
For indoor use, trade fair/exhibition stand structures, mechanical engineering, etc. commercially available metal/universal adhesives or double-sided adhesive tapes are used according to the particular application.
So-called Velcro tapes are available for detachable joints, e.g. SCOTCH MATE or Dual Lock (3M).

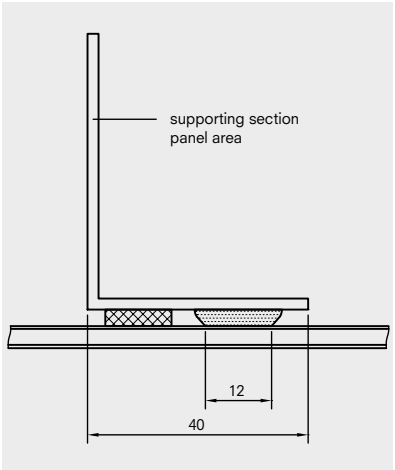
Please note:

- Adhesives or structural sealants do not adhere to the ALUCOBOND® core.
- All-over lamination of ALUCOBOND® panels (one side) to other materials may result in the deformation of the laminates (differing expansion/ bimetal effect).
- As with mechanical fastening, special care is required when processing or installing high-gloss and/or dark surfaces.
- Regarding the application and use of adhesives/tapes, please observe the manufacturers' instructions and regulations.
- Training has to be carried out in accordance with the building supervision approvals of the adhesives manufacturers.

Fixation of ALUCOBOND® by means of gluing

The fixation of ALUCOBOND® façade panels using structural sealants is approved by the building authorities:





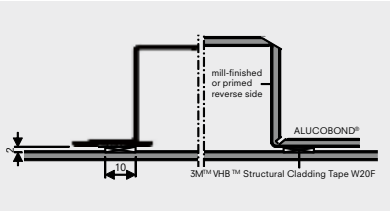
Bonding ALUCOBOND® to stiffeners

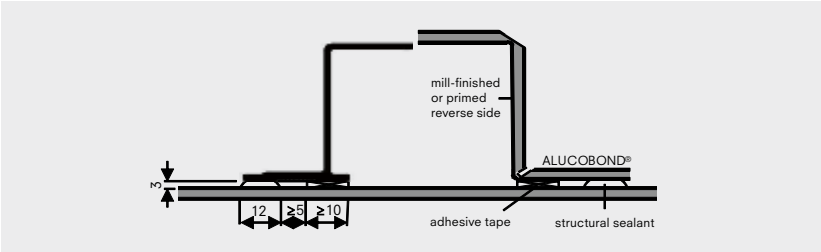
- The fixation of stiffeners using adhesives enables the fabrication of tray panels in larger sizes.
- For mounting façade cladding, the gluing must not be applied as the sole means of fixation.
- Forces acting on the stiffener must be conducted to the substructure in an appropriate way.
- If the adhesive should fail, it must be ensured that nobody is endangered by any falling façade elements.
- When positioning the stiffeners horizontally, the adhesive must be protected against standing water.

JOINTING / FIXING TECHNIQUE

- For bonding mill-finished aluminium stiffeners to bright-rolled and primed reverse sides of ALUCOBOND® panels, 3A Composites GmbH recommends using permanently elastic, structural sealants or double-sided, adhesive tapes.
- The use of OMEGA sections is recommended.
- For the products Sika Tack Panel of Sika Chemie, MBE Panel-loc of MBE GmbH and 3M VHB Structural Cladding Tape W20F, bonding to ALUCOBOND® has been approved, thereby taking the corresponding processing instructions into consideration.

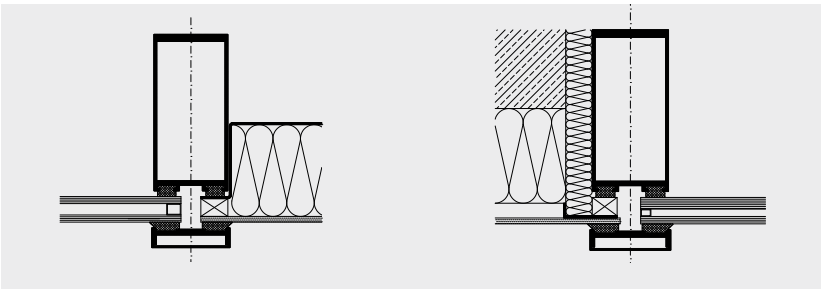
Type of section	Aluminium stiffeners
Adhesive	- **SikaTack Panel System,** one-component - PUR – structural sealant, general national building approval: Z-36.4-18 - **MBE Panel-loc,** MS polymer structural sealant, general national building approval: Z-10.8-350 - **3M VHB Structural Cladding Tape W20F,** European approval ETA -10/0149
Cleaning agent	- **Sika Aktivator 205** - **MBE Adhesive Cleaner** - **3M IPA Cleaner 08986** or - **3M Heptane Cleaner**
Primer	- **SikaTack-Panel Primer** - Not required with MBE - **3M Primer 94**
Adhesive tape, Thickness 3 mm, width 12 mm (for fixing the sections to the panels and for ensuring the precise adhesive thickness)	- **SikaTack-Panel fitting tape** - **MBE Panel-loc adhesive tape** - Not required with 3M





CLAMP CONNECTIONS

ALUCOBOND® elements can be clamped e.g. with double "top hat" sections or glass strips, such as with mullion/transom facades. Please pay attention to the design specifications according to the construction approval.



SURFACE TREATMENT

LACQUERING MILL-FINISHED ALUCOBOND® SURFACES OR PRIMED REVERSE SIDES OF ALUCOBOND® A2

The composition of lacquer coating for ALUCOBOND® is basically the same as those for mill-finished aluminium surfaces. However, it is advisable to be familiar with coating systems and materials as well as working methods for aluminium.

Lacquer coating on stove-lacquered fluorocarbon surfaces is not possible.

Please note:

- The maximum permissible temperature of the material (ALUCOBOND® panels) must not exceed 70 °C when applying fast-drying methods. During the drying process at high temperatures the panels must be positioned with great care to prevent deforming.
- ALUCOBOND® cut edges should not be in contact with organic solvents for a longer period to avoid weakening the bond.
- ALUCOBOND® panels lacquered at a later stage should not be bent or folded. The lacquer in the bends or folds may be damaged due to the low elasticity of the top coat.
- Upon request, we can name you lacquer suppliers who are able to apply lacquer that can be bent and folded.
- Only inferior lacquer adhesion can be achieved on core material exposed at cut edges.
- Please make a test prior to lacquering and follow the instructions of the lacquer suppliers.

Further information

For general information on painting, lacquering and coating of aluminium we recommend the leaflets on “02, 03, 012, 015 surfaces” issued by Gesamtverband der Aluminiumindustrie e. V. (GDA), www.aluinfo.de

INTERNET ADDRESSES

MACHINES

Vertical panel saws
www.holzher.de
www.striebig.com

CNC machining centres
www.holzher.de
www.portatec.de
www.homag.de
www.mecanumeric.fr
www.promak.it
www.flexicam.de
www.casadei-industria.it

Sawing machines
www.pressta-eisele.de
www.bergundschmid.de

Festool panel saws, machines
www.festool.de

Bosch Machines
www.bosch-pt.de

Punching machines, hydr./pneum., Hand lever notching machines, Hand lever punching machines
www.edel-stanztec.de
www.liechtblick.ch

Roll bending machines
www.knuth.de

Special roll bending machines
www.kuttruff-maschinenbau.de

Brake presses
www.knuth.de
www.amada.de
www.trumpf.com

Dust extractor systems
www.schuko.de
www.al-ko.de
www.get-guhl.de

Mobile dust extractors for small machines
www.festool.de

Rivet attachment jigs
www.gesipa.com
www.honsel.de
www.vvg-befestigungstechnik.de
www.titgemeyer.de

TOOLS

Saw blades
www.leuco.com
www.ake.de
www.festool.de

Jig saw blades
www.festool.de
www.bosch-pt.de

Cutter disks
www.agefa.de
www.leuco.com

End milling cutters for hand routing machines / CNC machining centres
www.gis-tec.de
www.festool.de

Single flute cutters for CNC machining centres
www.gis-tec.de
www.leitz.org
www.crown-norge.no

Rivet attachment jigs, drilling jigs
www.mbe-gmbh.com
www.haspo.ch

Drills with centring point
www.dewalt.de

ACCESSORIES

Aluminium blind rivets lacquered in standard colours
www.mbe-gmbh.com
www.sfsintec.biz
www.ejot.de
www.haspo.ch

Aluminium blind rivets
www.gesipa.com
www.honsel.de
www.vvg-befestigungstechnik.de
www.titgemeyer.de

Fascia screws
www.ejot.de
www.sfsintec.biz
www.mbe-gmbh.com
www.magefast.de

Structural sealants
www.dichten-und-kleben.de
www.sika.com
www.mbe-gmbh.com
www.bostik.de
www.teroson-bautechnik.de

Metal adhesives
www.loctite-europe.com

Structural Cladding Tape
www.dichten-und-kleben.de
www.3m.com

Double-sided adhesive tape Velcro tape
www.3m.com
www.tesa.de

INTERNET ADDRESSES

Sealing tapes
www.iso-chemie.de
www.technoplast-gmbh.de

Starlock washers
www.titgemeyer.de

Tray panel corner sheets
www.aluform-gmbh.de
www.liechtblick.ch

Thermostops for wall holders
www.thermostop.de
www.isowa.de
www.thermostop-plus.com

Bolts
www.fischerduebel.de
www.hilti.de
www.wuerth.com
www.ejot.de
www.mkt-duebel.de

Connection systems for exhibition display stands
www.klemproducts.de
www.irus-system.de
www.voluma.net

Workshop equipment, Panel transport cart
www.kaiserkraft.de

SECTIONS

ALUCOBOND® special sections
www.alucobond.de
(ALUCOBOND® profiles and fittings)

Façade substructures
www.athens-hoevelhof.de
www.bwm.de
www.eurofox.com
www.keune-kantprofile.de
www.montaflex.de
www.nauth.de
www.pohlnet.com
www.u-kon.com
www.wagner-system.com

Aluminium sections
www.allega.ch
www.amari.at
www.amari.de
www.gemmel-metalle.de
www.mejo.de
www.spaeter.de
www.thyssenkruppschulte.de
www.wmh.de

Structural sections
www.protektor.com

Window sills
www.rbb-aluminium.de

Section systems
www.octaStandard.de
www.mero.de
www.syma.de

Perforated plates
www.mevaco.de
www.moradelli.de
www.rmig.com

Bending of sections (e.g. SZ 20 sections)
www.bms-biegetechnik.de
www.aluform-gmbh.de

INFORMATION

INFORMATION (please request)

- ALUCOBOND® product information
- ALUCOBOND® colour charts
- ALUCOBOND® "Architecture in Detail" CD
- ALUCOBOND® Documentation folder containing examples of façade applications and texts with "Architecture in Detail" CD
- ALUCOBOND® static folder
- ALUCOBOND® Original samples of standard surfaces

Our brochures are also available at
www.alucobond.com DOWNLOADS

Create the difference.

ALUCOBOND®

3A Composites GmbH
Alusingenplatz 1
78224 Singen, Germany
Phone +49 7731 - 941 2347
info.eu@alucobond.com
www.alucobond.com

ALMET BENELUX
Tussendonk 22, 4878 AM Etten-Leur
Phone +31 (0)76 5480200 | Fax +31 (0)76 5418899
www.almet-benelux.eu
Lenniksebaan 451, B-1070 Brussel
Phone +32 (0)2 3322 900 | Fax +32 (0)2 3320 028

01/11/2017 Edition 2 ALUCOBOND® Processing and Technical Data T&I GB