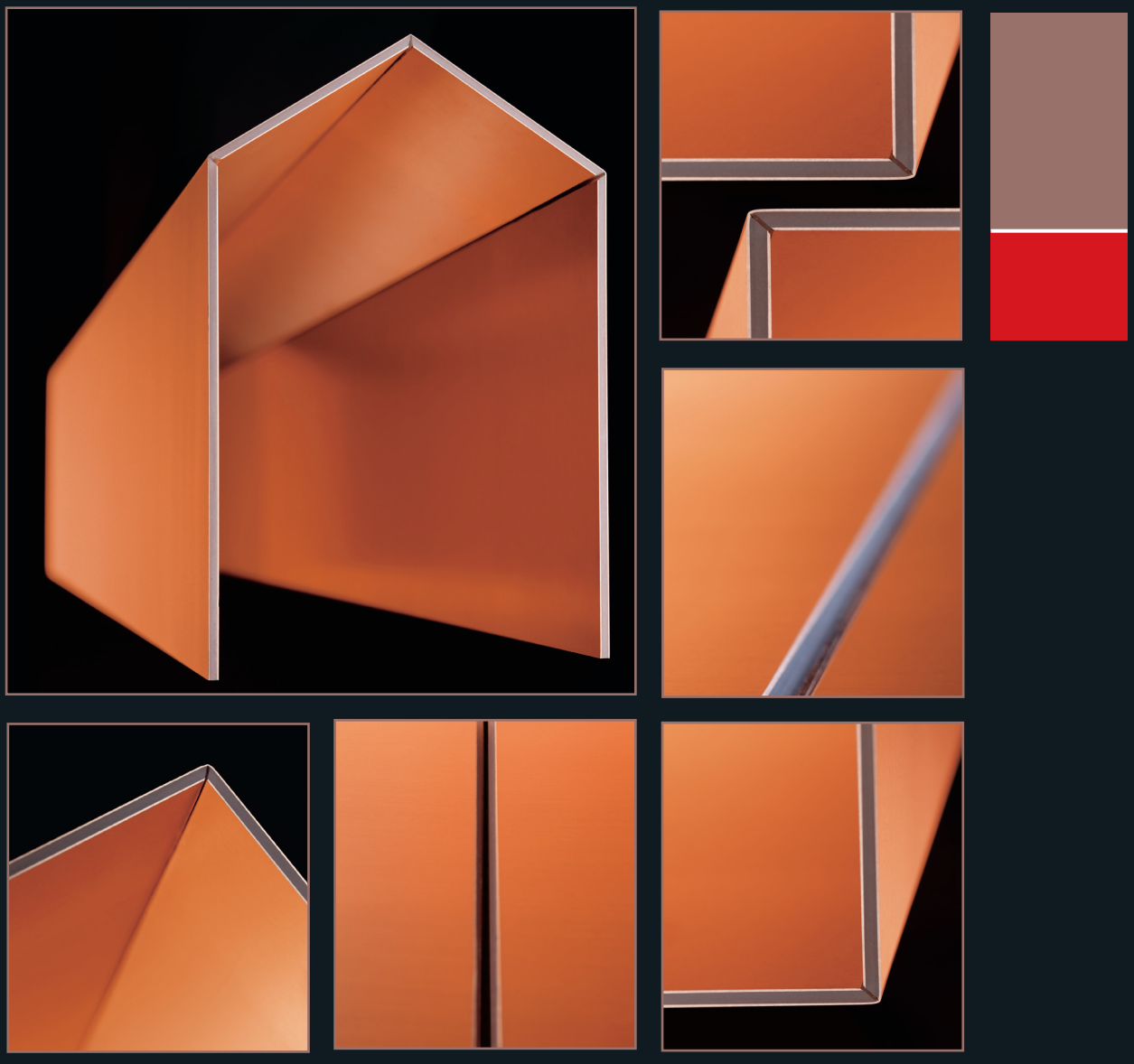
TECU® Bond

Product Information
Application and Processing

KME Germany GmbH & Co. KG
TECU® Bond



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July 2012

KME Germany GmbH & Co. KG
Osnabrueck

Processed by
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The technical information contained herein is correct and corresponds to the state-of-the-art at the time of printing. Although all due care and attention has been taken, we cannot accept liability for the content.

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PRODUCT CHARACTERISTICS

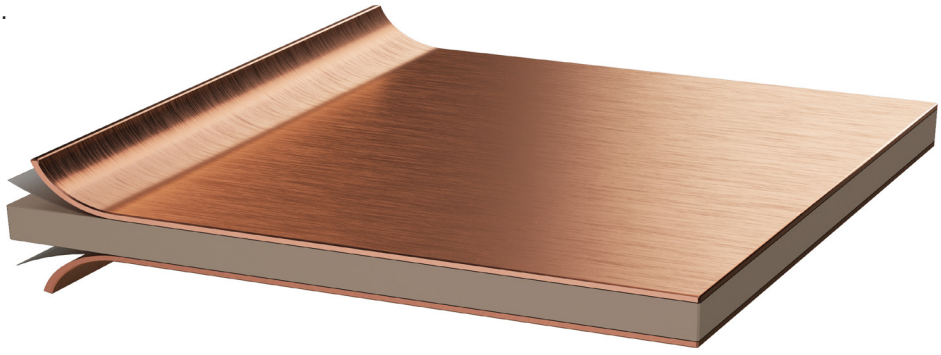
1. Introduction

A new approach in façade cladding: TECU® Bond is an economical, flexible and durable solution for numerous building applications. Its simple processing goes hand in hand with high durability and a high-quality surface.

Large and smaller area façades can now be implemented even more efficiently and economically in copper.

TECU® Bond opens completely new design possibilities. KME presents a composite material with the usual high-quality TECU® surfaces. Planners and designers now have a material on hand for high-quality building façades with perfectly even and flat surfaces.

- TECU® Face sheet
- Adhesive
- Core material
- Adhesive
- TECU® Face sheet



2. Material

The composition of the TECU® Bond panel is simple and efficient:
Two sheets of copper or copper alloys are joined to both sides of the core in a matured manufacturing process that optimally protects the material and guarantees high durability.
The result is an ideal façade material that is easy to process for a multitude of different purposes, and is absolutely easy to install.
The visible side is delivered with a protective film that effectively protects the material from contamination during the machining and construction phases.
TECU® Bond is the perfect combination of durability and efficient material consumption. The so far unknown extreme rigidity and flatness of the material, gives the natural copper surface an even nobler character.

3. Description

TECU® Bond is a composite panel consisting of two outer layers of Cu-DHP or copper alloys, which are glued on both sides to a core made of plastic and mineral components. The adhesion between the core and outer layer is accomplished by a combination of chemical and mechanical forces and gives the TECU® Bond panels excellent resistance from delamination.
Due to its exceptional flatness, TECU® Bond's application can be very versatile. The simple processing of TECU® Bond panels allows implementation of a variety of shapes with minimal technical effort.

- Face sheet thickness 0.3 mm or 0.5 mm
- Standard – Nominal Panel Thickness 4 mm
- Panel weight: 10.90 kg/m^2 for 0.3 mm or
  13.90 kg/m^2 for 0.5 mm

- Surfaces : TECU® Classic
  TECU® Oxid*
  TECU® Patina
  TECU® Brass
  ** 0.5 mm face sheet thickness only.*
  Further face sheet material available on request.

4. Technical Data

TECU® Bond is highly corrosion resistant and offers numerous technical and design advantages. TECU® Bond FR, whose bright core material includes mineral components, is available for improved fire resistance.
TECU® Bond is characterized by a relatively low linear expansion coefficient, and by its easy processing features. It offers all the excellent mechanical characteristics of copper, such as greater impact resistance and breaking strain. Fabricated elements made of TECU® Bond are lightweight and extremely rigid.

Characteristics for TECU® Classic _bond, FR

• Face sheet Cu DHP (outer face)	0.3 mm
• Face sheet Cu DHP (inner face)	0.3 mm
• Core material thickness	3.4 mm
• Core density	1.640 kg/m³
• Weight per square meter	10.90 kg/m²

5. Building Material Classification

Classification of TECU® Bond FR in accordance with DIN EN 13501-1:2002 as prescribed by European Union guidelines is

B-s1,d0

Fire behaviour		Smoke production	Burning droplets
B	-	s1	d0

This complies with DIN 4102-1 class B1 construction materials..

6. Expansion Behaviour

TECU® Bond is suitable for use in a temperature range from -50 to +80°C. The linear expansion coefficient is 1.7 mm / m ΔT 100K.

7. Production Tolerances

TECU® Bond panels are manufactured with the following tolerances:
Panel 4 mm

Thickness : 0 / + 0.2 mm
Width : 0 / + 2.5 mm
Length: 0 / + 10 mm
Deviation of the diagonals: ± 3 mm

8. Delivery Forms

TECU® Classic _bond
TECU® Oxid _bond*
TECU® Patina _bond**
TECU® Brass _bond
* only with face sheet thicknesses of 0.5 mm
** without protective film

Optionally supplied with:
double layers with thicknesses of
0.3 mm or 0.5 mm and a bright FR core
Delivered with a dark PE core on request.

Panels - Dimensions
4 mm x 1000 mm x 3000
Other dimensions on request
max. width 1250 mm

9. Sound Insulation

Ventilated, insulated TECU® Bond façades contribute significantly to the improvement of sound insulation. For example, sound insulation is doubled by a porous concrete wall. The sound absorption are 4 times better than with an equivalent copper sheet. Measured noise attenuation at 4 mm > 26 dB (A).

10. Areas of Application

a) TECU® Bond in architecture
TECU® Bond is particularly suitable for interior and façade design in new buildings and in renovation. It has many applications, such as:

- Ventilated façade constructions
- Sandwich elements (as curtain wall infills)
- Façade cladding, forming roof structures
- Implementation of flat or curved canopies
- Siding of balconies and tunnels
- Door panels, modular partitions for room layout.

The advantages of TECU® Bond are especially convincing in large-scale implementations that have special requirements for flatness and rigidity.

b) TECU® Bond in Corporate Design
Design (CID) and sign & display applications.

c) TECU® Bond in industry and transportation
TECU® Bond also offers engineers in industry and transportation a variety of innovative applications.

11. Extremely Easy Processing

TECU® Bond can be processed using conventional techniques: sawing, drilling, milling, bending, stamping, bending (mechanical or manual) and hot air welding. Assembly also takes place in traditional manners by screws, rivets and glue. The processing of TECU® Bond can be done in the workshop or at the construction site, which means considerable potential savings in freight and packaging costs.

12. Protective Film

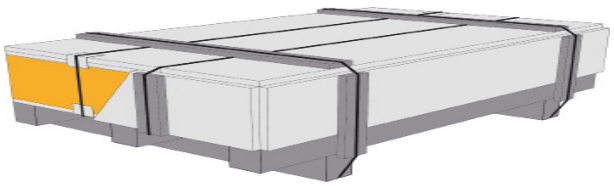
The film offers protection to the panel‘s visible surface during processing and installation.

As usual with film-protected copper surfaces, the protective film must be completely removed after installation or processing. This applies particularly to panels that are exposed to weathering. Partial film removal will result in visible differences caused by weathering. Leaving some of protective film on the panels can complicate residue-free removal later.

A transparent film with a thickness of 80 microns is applied on TECU® Bond. The protective film is recyclable and can be easily disposed of.

13. Storage and Transport

TECU® Bond panels are stored and transported in especially suitable packaging (see illustrations). All packages are enclosed with multilingual instructions for storage, use and processing.



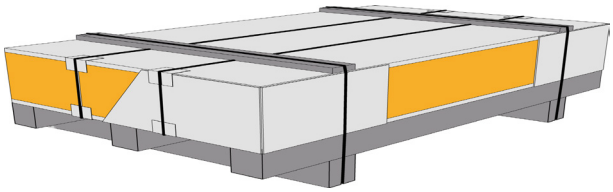
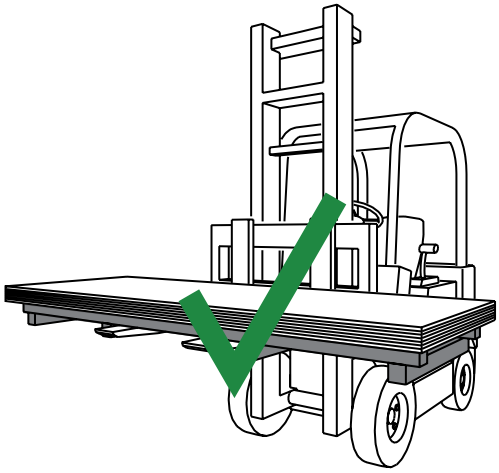
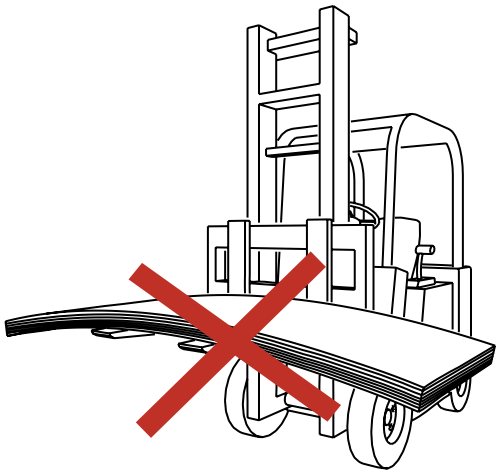


Fig. Packaging for storage and transport

Both open and original packaging must be stored dry and protected from the weather. The transport of individual panels must be made in compliance with applicable safety regulations and by approved lifting and transportation means.

In order to avoid damage, the stacking of open packages is not advisable.





BEFORE APPLICATION

Necessary preventative measures

All occupational safety requirements and any special safety rules for the operation of machinery and tools must be adhered to when processing TECU® Bond.

Handling the TECU® Bond Panels

It is recommended to wear suitable protective gloves.

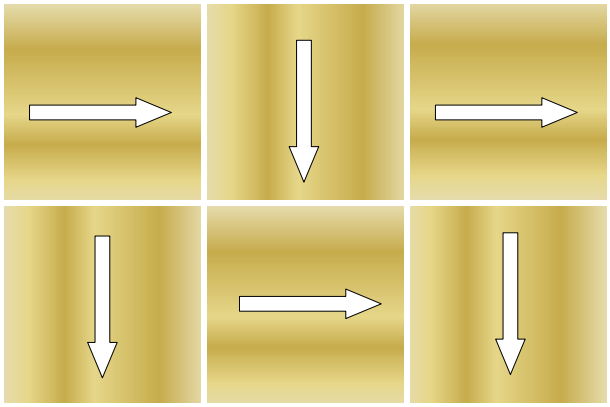
Despite the relatively high stability of TECU® Bond, safeguards must be taken via sufficient requirements against bending and mechanical damage.

Product-based Preventative Measures

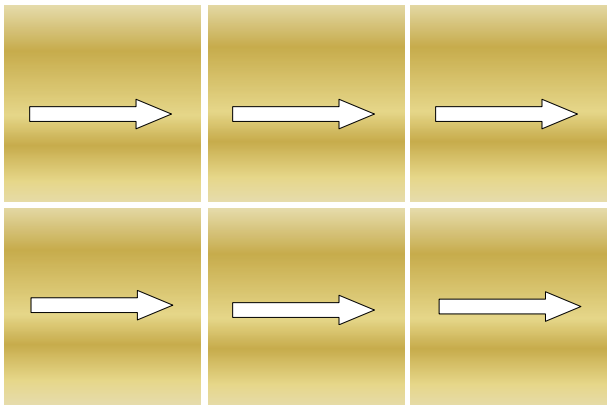
a) Direction of laying panels
The panels‘ installation direction to follow is a function of the respective surface finish (depends on the top layer). Different installation directions cause different reflections of light intensity, which may be visible in a facade in the long run.

To reduce differences in appearance between adjacent panels especially in the early phase of oxidation maintaining the installation direction also makes sense on panels whose outer layers lack a special surface finish like Classic and Oxid (see Figure). This should therefore also be taken into account in calculations and pre-cutting optimization.

Note: If not visible on the film, mark the installation direction with a pencil on the backside of small elements before processing.



Suitable arrangement



Unsuitable arrangement

b) Contact with other materials
The familiar procedures and practice in working with copper material applies here, too.

Only copper alloys, plastics, high-alloy stainless steel, anodized aluminium and lead can be combined with TECU® Bond without any special additional measures.

If in doubt, adjacent metallic material in the flow direction must be separated from TECU® Bond through corrosion-resistant coated or electrically insulating barrier layers (e.g. by plastics or base-washers, etc.).

MACHINES AND TOOLS

1. MASHINES

The machines suitable for the different processing methods of TECU® Bond to meet specific criteria and requirements are listed in the following table:

	Maschinen	Schneiden großer Durchsätze	Schneiden kleiner Durchsätze	Zusätzliche Schnitte	Fräsen	Bohren	Lochstanzen / Ausklinken	Nieten	Senken	Runden
A	Panel saw	X	X		X					
B	Hand-held circular saw		X							
C	Jig Saw			X						
D	CNC machining centre	X	X		X	X			X	
E	Hand-held milling machine				X					
F	Benchtop milling machine				X					
G	CNC Punch						X			
H	Drill					X			X	
I	Drill / Riveter					X		X		
J	3-roller rounding machine									X

All chip-producing machines must be equipped with a suction device!

A Panel Saw

Achieves sufficient precision cutting to be suitable for work in large scale production.

Some models can be equipped with a milling device.

B Hand-held Circular Saw
Particularly efficient in construction, easy to use.

The use of special blades, suitable for processing of non-ferrous metals, with hollow ground teeth and a negative rake angle ensures clean, accurate cuts.

Saw blades are made of high speed steel (HSS) or carbide cutting disks (HM).

C Jig Saw
Particularly suitable for smaller incisions, allowing the cutting of complex shapes and openings.

It is recommended to make samples before beginning a series to verify the final quality. This allows one or another parameter to be varied in order to achieve better results. Vibrations arising from the saw or a poor attachment of the work piece must be avoided in all cases.

D CNC Machining Centre
All machining steps on TECU® Bond panels can be performed in a gentle fashion on a single machine: a machining centre with numerical control (see Figure below).

Special software allows the precise control of various process tools, so that efficient production is possible without re-clamping the panels and tools. Depending on the machine‘s features, almost all forms required for the facade elements can be produced, even the precise milling of arc-and ellipse shapes.

Fixation of the panels on the table is carried out by means of a vacuum. All TECU® Bond delivery formats can be easily modified with high precision.

E Hand-held milling machine
Normally, ordinary panel sawing / milling (universal, vertical and horizontal) with appropriate disc cutters are used for the cutting of TECU® Bond panels.

The use of protective mechanisms on clamping devices has proven valuable, so that the clamping causes no marks on the panels.

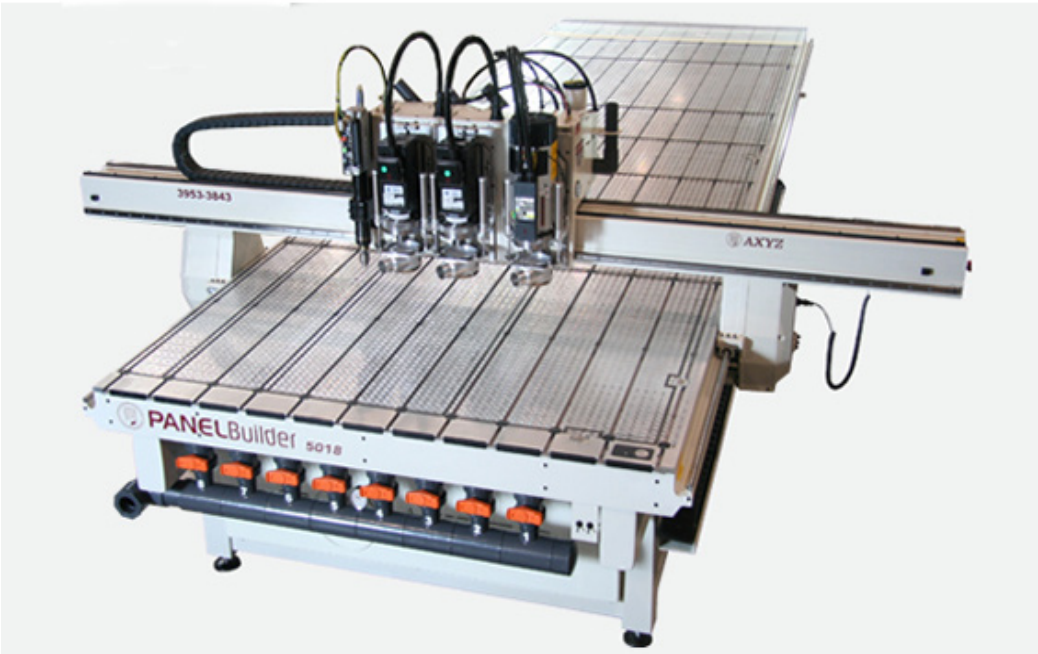


Fig. CNC machining centre, Panel Builder, from AXYZ International

F Benchtop milling machine
Because of its portability, it is well suited for use on the site for reprocessing or smaller works. Portable machines allow the cutting of grooves in the larger plates or milling on the edge (folded over edge, raised edge). The use of a guide rail or a stencil improves the accuracy and allows the repeatability of the process

G CNC Punch
For TECU® Bond machining is mainly used for producing special punched holes, especially when exact repetitions are required, such as single punched holes, ornaments with larger hole-spacing or apertures and notches in previously cut and milled panels. A remarkably good quality of cut is achieved during punching due to the excellent properties of the material and the lubricating function of the plastic core.

The interaction between the die and the stamp must be ± 0.15 mm. The quality depends on the geometry of the tool and the lowering speed of the punch. It is recommended to carry out preliminary tests to find an optimal setting.

H Drill
The drilling of TECU® Bond panels can be done with the same machines and spiral drills, such as those used for the drilling of steel and copper panels. The chips are carefully removed using an industrial vacuum. If the hole-quality is insufficient, the cutting and feed speed must be reduced. The final quality can be checked by tests.

I Drill / Riveter
Combined Drill/Riveters are important and flexible machines, usually battery operated for use on construction sites. They can be used for riveting cassettes and other elements as well as for attachment during installation. The selection of riveters, pneumatic or electric, and even for small batch production, the mechanical hand tool depends on the rivet or material / dimension. For visible rivets the use of rivet attachment jigs is recommended so that roll marks in the outer layer thicknesses of 0.3 / 0.5 mm can be avoided.

Fig. cassette inner surface with bracing

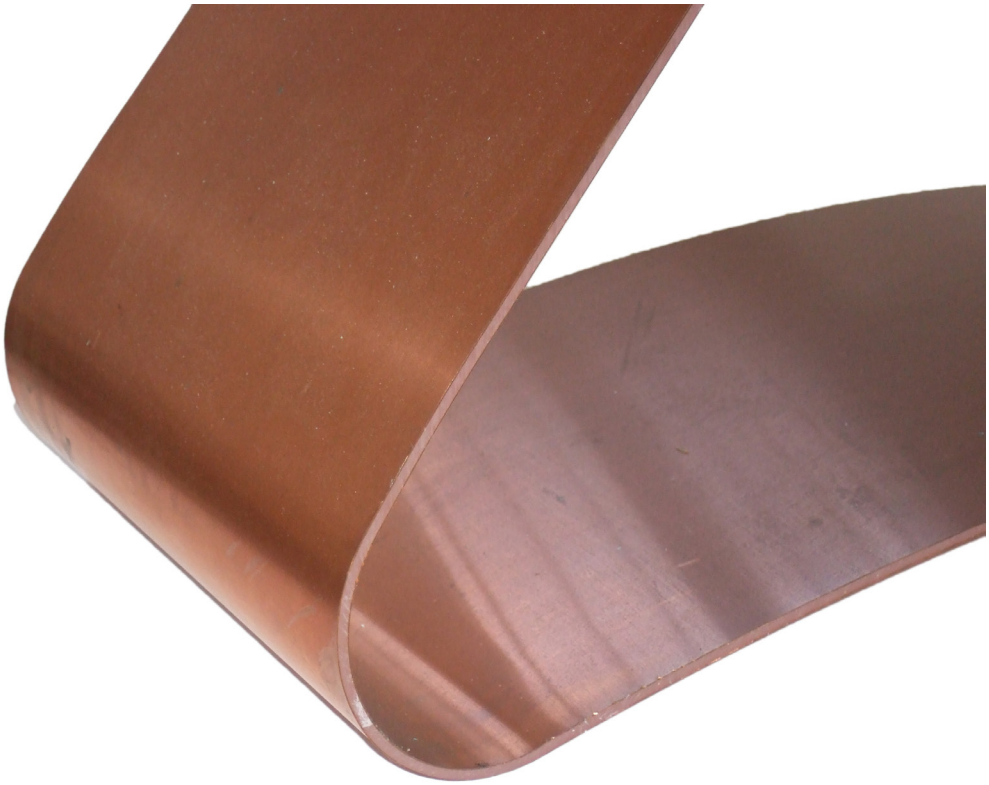


Fig. Rounded TECU® Bond

J Three-Roller Rounding Machine

TECU® Bond can be perfectly rounded due to its excellent coating properties. Thus, e.g. the production of high quality column coverings is possible.

The use of rotary machines has proven to be gentle on the material and therefore very suitable. The minimum bend radii achieved will be influenced by the lengths of the elements to be rounded and the machines used.

Other machining possibilities exist by circular bending in specially modified bending presses or folding machines.

It must be ensured that to avoid mechanical damage to the surface a more stable protective film is additionally inserted.

The minimum bend radius for 4 mm thick TECU® Bond is about 40 mm.

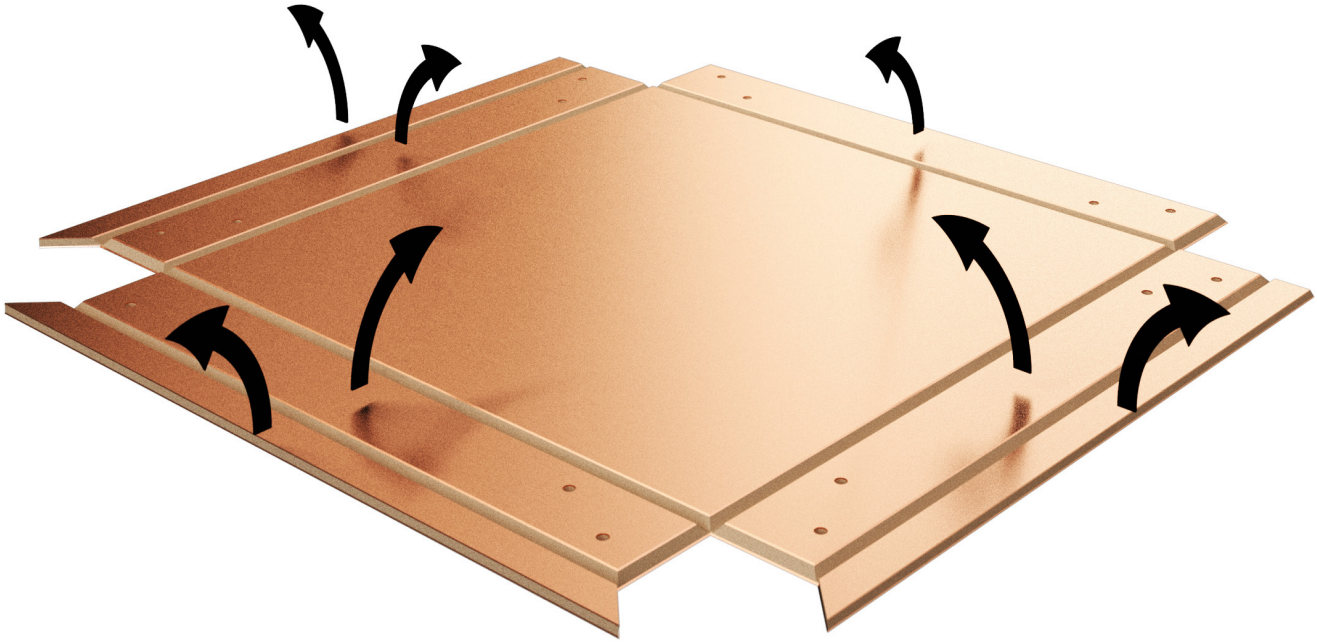
2. TOOLS

The processing of copper and copper alloys demands special attention in the selection of appropriate tools.

A variety of tools suitable for processing of TECU® Bond is available in the market. Equipment manufacturers and suppliers usually provide a wide range of suitable tools for their machines.

Saw blades, milling cutters, drills, etc. must as an essential characteristic be suitable for use in the processing of panels of nonferrous metals, copper and copper alloys. The operation of the tools must be possible without additional coolant and cutting agents. The specified feed rates must be observed to avoid damage to the tools and material.

There are great differences regarding the service life of these tools.



PROCESSING

SHAPING

1. PREPARATION
   Calculation of the dimensions to be milled

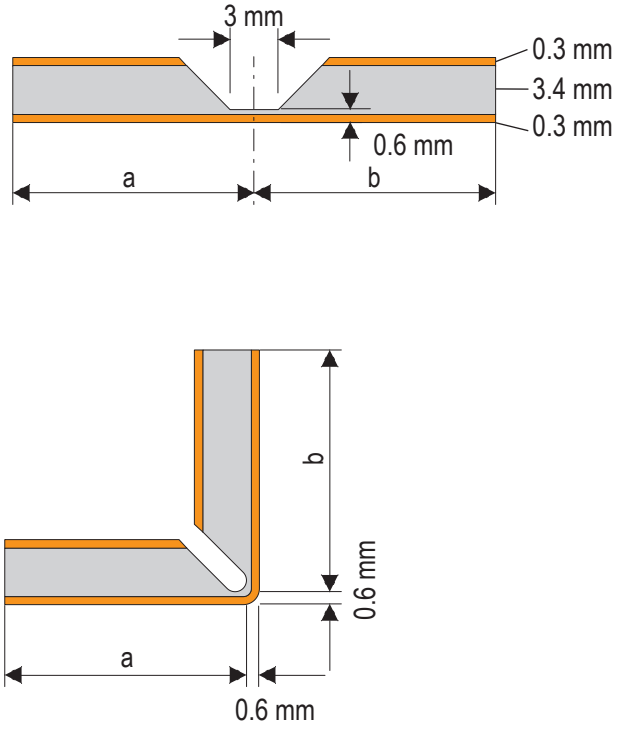


Fig. Exterior corner 90 °

a) Example: Simple folding 90°- exterior

4 mm TECU® Bond, 0.3 mm face sheet thickness
milling with a 3 mm bevelled channel:

Due to better stiffness during milling of the groove 0.3 mm remain in addition to the face sheet thickness.

During folding on a milled groove with a 3 mm bevelled channel, the axis of the folding is in the centre of the flat area of the milled groove, i.e. 0.6 mm away from the visible side. In the case of a 90° closed bent section, this results in a 0.6 mm oversize per corner. In practice, we round this value to 1 mm to facilitate the calculations.

When executing a closed bent section with a milled groove and 3 mm bevelled channel, the external / final dimensions will be about 1 mm larger.

b) Example: folding and back folding 90°

4 mm TECU® Bond with a 0.5 mm face sheet thickness milling with a 3mm bevelled channel:

The problem is different for a folding with back folding (always the work must be done on the panel's backside, regardless it is an open or a closed folded section). In the case of an open folded section the axis is always in the middle of the milling. However, the folding does not occur around this axis, but towards the outside, whereby the core material is stretched.

If you add an open folded section to a closed fold (folding and back folding technique), the following happens: when executing a back folding with a milled groove and 3 mm bevelled channel, the external final size is decreased by about 1 mm.

Attention: In each case, verify the calculated final dimensions with a sample!

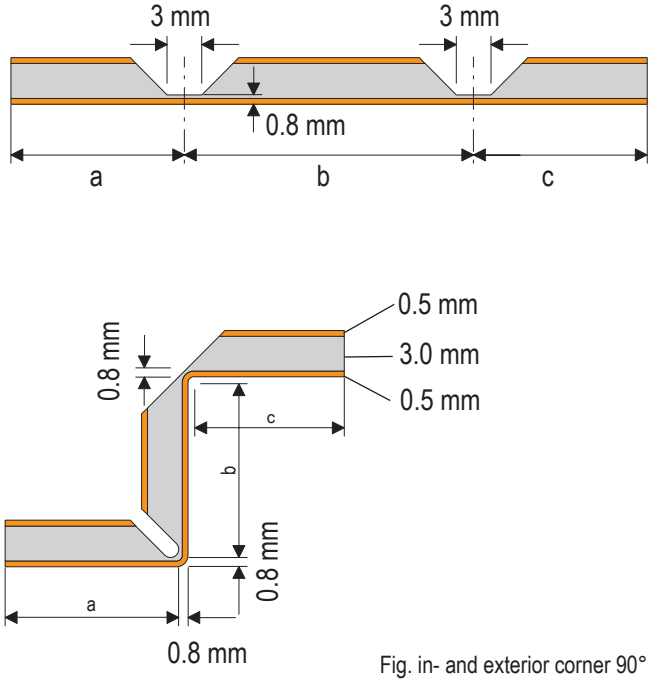


Fig. in- and exterior corner 90°

2. CUTTING TECU® Bond PANELS

Before starting work the machines settings must be checked and if necessary, calibrations or adjustments made. Please always remind that regular controlling and calibration of measuring tools is reasonable.

Sawing

Although TECU® Bond panels can be separated easier and faster with a jigsaw, this technique should only be used for short handheld cuts or special cuts. A portable circular saw is better suited.

TECU® Bond panels can be cut just as well as comparable solid material.

Three basic precautions to be observed:
- Keep the workplace clean of chips
- Use a vacuum system
- Always work on the back of the panel

Thereby damage is avoided on the exposed side.

It is advised to use guide rails, which overlap the panel ends a minimum of 200 mm. Multiple panels can be cut simultaneously.

Panel saw:
Allows the precise cutting of large-sized, rectangular panels. The sheet is nearly vertical. Modern panel sawing can successively cut the vertical and horizontal without re-clamping the panel. The use of appropriate and sharp saw blades, as described in section 2. TOOLS eliminates the subsequent deburring of cut edges. Depending on the application, you can cut several panels on top of each other at the same time. Again, it seems advisable to perform test cuts before starting work.

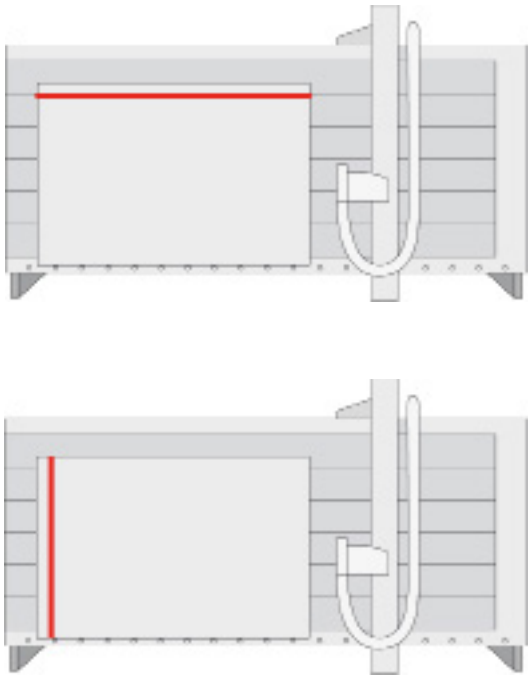


Fig. Panel saw - horizontal and vertical cuts

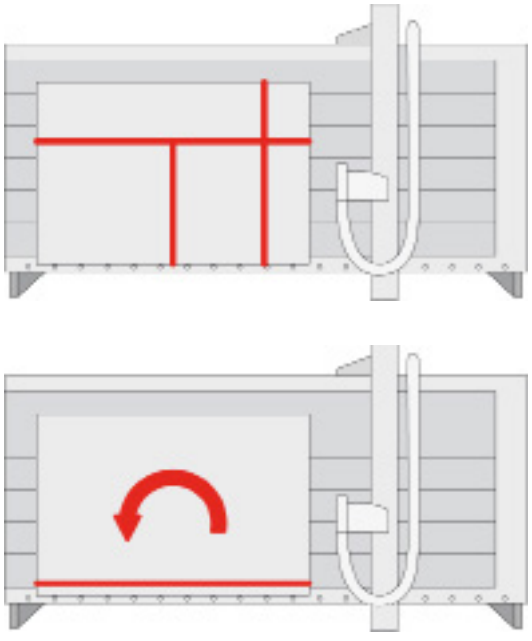


Fig. Panel saw - working on the panel‘s reverse side

3. MILLING

a) Determining the dimensions

As described in 1. PREPARATION, calculation of the dimensions to be milled, the required dimensions for the processing of each format must be determined.

b) Procedure

Milling machines run at much higher speeds than those encountered in sawing, thereby facilitating a more accurate and clean processing.

The milling method is usually determined according to the available machines and the work to be performed.

Depending on the type of tool, there is either form or disc milling. Form millers (see Fig.) are used in frequently encountered router and CNC machining centres, because of their versatility. Hand-held milling machines, whose operation is similar to the portable circular sawing, are equipped with disc cutters.

Benchtop und CNC machining centre:

Don't forget that the face sheet of the visible side may not be harmed, why at least 0.3 mm core material must remain at the bottom of the milled groove!

To ensure this, a high point of 0 is defined. For this, you guide the cutter gently and without pressure on the surface to be milled. This cutter position is marked as zero height. The cutter can now advance on the calculated groove depth.

Here too, it is strongly recommended to check the settings by using samples before starting work!

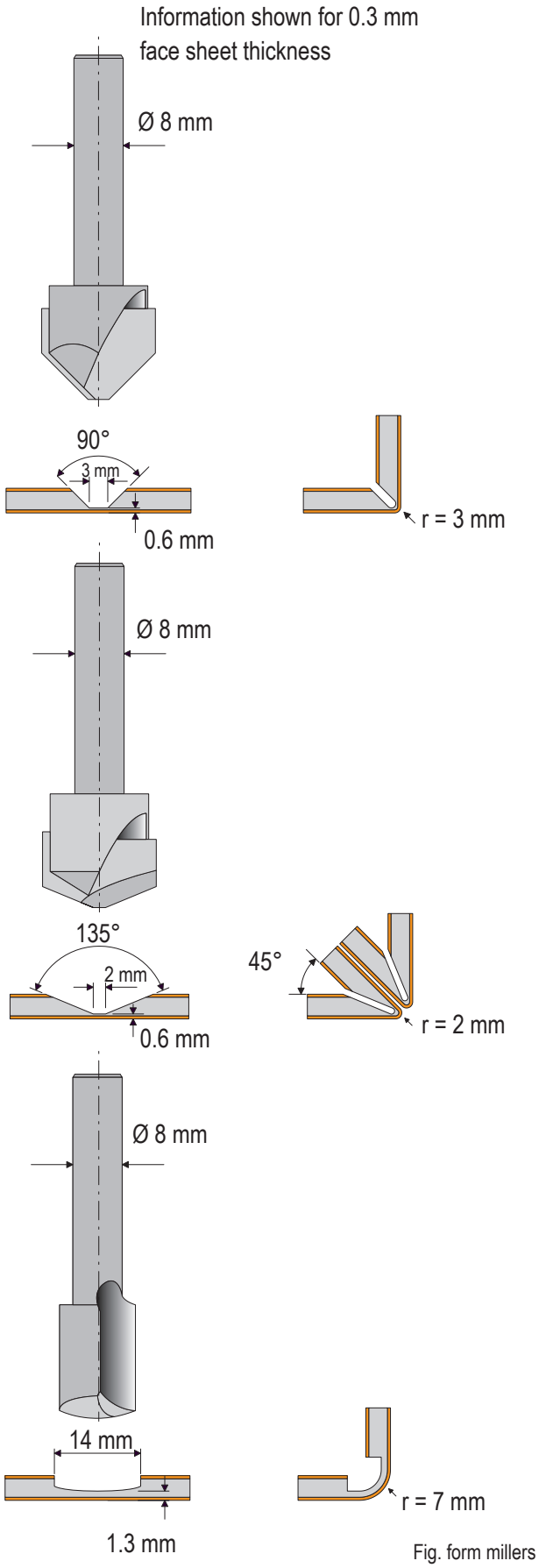


Fig. form millers

Hand-held milling machine:
Not to be confused with a saw!

Due to its low rotational speed, the mere mounting of a saw with a disc mill instead of a saw blade is not sufficient for an accurate processing of TECU® Bond.

Always when using a saw, the face sheet will crack or tear at the start of cutting or at intersections.

No specific setting is required when using a hand-held milling machine. The cutting depth can be selected easily.

However, an additional 30 mm plate must be placed on the work surface. This plate must be wider and longer than the TECU® Bond panel to be milled. For good processing quality, the surface and flatness of this additional plate should be flawless. In practice, the use of 20 mm thick Okoume slats screwed to 10 mm thick plywood has stood the test of time. Always the processing is done on the plywood side, which can tolerate some „handling errors“ and can be replaced at low cost.

For the milling of large TECU® Bond panels it is recommended to prepare a board with supporting brackets. They are screwed onto the panels and can be exchanged when worn. They can be made for example, from leftover TECU® Bond pieces.

Attention: When milling, do not use the stops provided for sawing. The milling axis is offset from the edge of the blade. Since the machine is equipped with several stops, they must be calibrated separately for sawing and milling work.

You can manage this by marking the mill‘s point of impact on the suction hood. This allows a more accurate setting and limits the „free play“ during milling.

During milling close to the panel edge, it must be ensured that the tool spindle touches the panel. A remnant piece of the same thickness can be used for this.

c) Milling and folding
When milling and folding, V-shaped or rectangular grooves are milled into TECU® Bond panels using form millers. This makes on-site hand panel folding possible without the use of a folding machine.

The edge can be facilitated by a self-made folding bar, which consists of a U or H-section with a folding lever.

Milling of grooves:
Depending on the selection of the milling technique and groove geometry, folding radii between 2 mm and 10 mm are possible.
V-groove:
Allows you to perform a folding radius of only 2 mm. The angle of the groove can be 90° or 135°.

Important: In order to sufficiently remove core material for 90 ° edges, it is recommended to make a 3 mm wide channel at the bottom of the groove.

Other types of grooves:
A straight groove with a curved bottom allows, depending on depth, folding radii of between 7 mm and 10 mm. A test run is needed to get the radius right. Core material can be removed using step cutters, followed by plastic solder for stabilization.

The outer layer of the visible side must remain intact regardless of the groove geometry! Therefore a minimum core thickness must be left in the groove channel. When milling a V-shape, the residual thickness is 3 mm. For a straight milled groove with a curved bottom, it is between 0.5 mm and 1 mm.

4. NOTCHING AND DRILLING/PUNCHING

In the technological process, notching and drilling / punching of TECU® Bond cuts is generally done before folding.

a) For large quantities both operations can be process controlled using the machining centre.

For notching corners or cassettes as well as punching, a CNC punch can also be programmed and used for efficient processing.

In contrast to the processing centre where the tool head moves to the panel, the panel is directed on a CNC punching machine to the tool. Lay the panel with the rear side on the table!

b) For hand-processing small quantities, the use of drilling and stop templates has proven to be beneficial. Sufficient accuracy and time savings can be achieved in production by using these tools.

5. ROUNDING AND BENDING

a) General Information

Rounding and bending of TECU® Bond is generally the same as for all copper and copper alloy sheets. However, some special features must be observed because of the composite panel properties and for gentle material handling:

The methods described below allow the execution of very different curved parts such as sleeves, ceiling edges, wing-like profiles, pillar covers and complex shapes.

The protective film on the visible side should not be removed when rounding and bending TECU® Bond. Depending on the load, it is recommended to enhance the protection with an additional sturdy layer of resilient material with a thickness of 1 to 2 mm.

b) Procedure

A Rounding

The process of rounding TECU® Bond panels is done on traditional three roller rounding machines with symmetrical and polished rollers.

Note: During processing, ensure that the rolls do not apply excessive pressure on the material. To obtain the desired radius, multiple passes may be necessary.

Determine the roller position and the number of passes by testing.

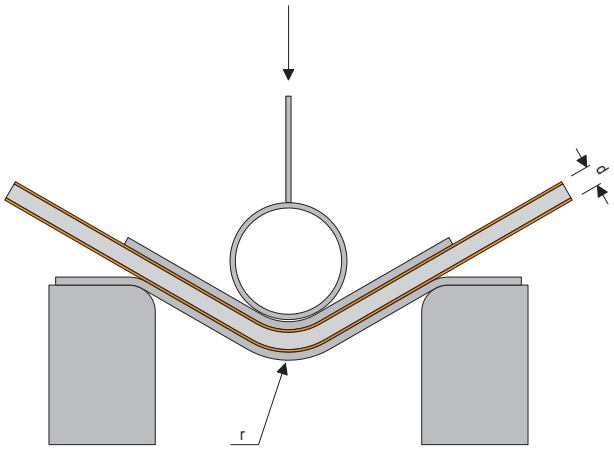
The stiffness of the TECU ® Bond panel causes a springback effect. You must take into account the bending forces and bending radii.

B Bending with press brakes

Bending is by lowering a punch by a predetermined distance. The bending radius and angles are determined by the punch diameter, the punch hub and the width of the die.

		Radius < 60 mm	Radius > 60 mm	Radius limited by roll diameter	Ring part	Elliptical part
(A)	Rounding			x	x	x
(B)	Bending with press brakes		x			x
(C)	Bending with folding machine		x			
(D)	Bending by milling	x[1]	x[1]		x	x

[1] with numerical control

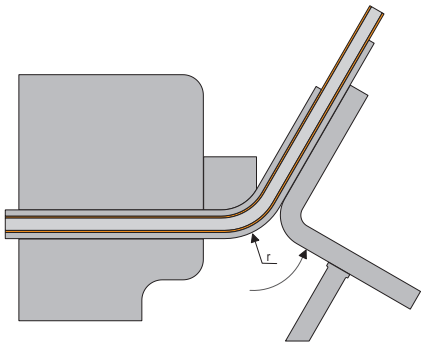


In this type of bending, the TECU® Bond panel is protected on both sides by a flexible film with a hardness of at least 60 Shore and a thickness of 1.5 mm or more. Through this protection, the panel can be moved into the cavity of the die without at the same time leaving imprints from the punch and die at the contact points.

The minimum bending radius for TECU® Bond is calculated at a radius of 15 times the panel thickness.

C Bending with a folding machine

For this kind of bending, the panel is clamped at a specially designed upper bar. The upper bar's removable slide rail thereby forms the bending radius. The protruding portion of the panel is bent to the upper bar in the usual way.



Larger radii can be achieved by a programmed panel feed and maintaining the bending angle. Convex and concave shaped profiles are created by turning the TECU® Bond panels.

D Bending by milling

Radii between 2 and 10 mm can be achieved with the technique of bending after previously milling (described above).

This technique consists of executing V-shaped or straight grooves using form cutters on the back side of the TECU® Bond panel. See the sections „milling“ and „folding“.

Intermediary radii of 10 to 60 mm can be achieved by a similar processing technology. Known as „surface rejuvenation“, the technique consists of removing a strip of the top layer from the panel's back side.

The width of this strip results in the processing of the radius to be achieved. The milling depth must be determined on prototypes.

Note: This technique requires experience in the processing of TECU® Bond panels.

Measures for reinforcement should be designed in order to compensate for the loss of stiffness in these areas.

Completely closed ring parts (360°) can only be made by rounding.

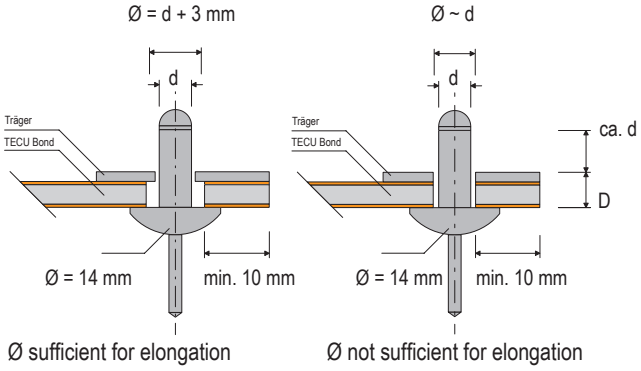
JOINTING / FIXING

Fasteners for use in the façade, which include the following, require a general building inspection approval!

It is especially important when working with TECU® Bond panels to use rivets and bolts made of metals that do not corrode when assembled with copper and copper alloys, and that meet all structural strength certificate requirements.

1. RIVETING

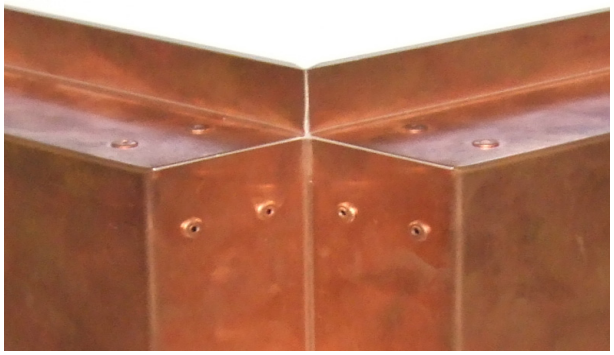
V4A or brass rivets commonly prescribed for connecting copper sheets are also suitable for the riveting of TECU® Bond elements. The rivets are placed at least 10 mm from the edge - this value can be greater for an assembly of TECU® Bond panels in a riveted façade system. The rivet head diameter must be at least 14 mm. The rivet length determines the thickness of the materials to be joined. This information can be found in the technical data sheet of rivet suppliers.



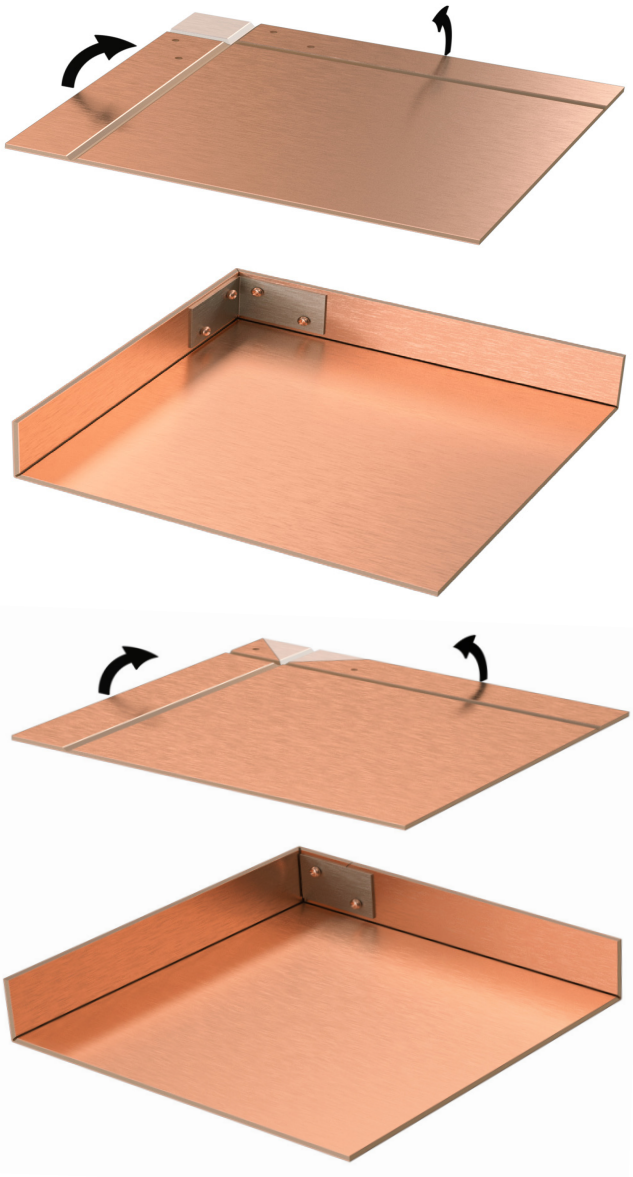
The forces at work on the TECU® Bond panel determine the type of rivet to be used and its diameter. Tearing out the rivet should be avoided. In rivet selection, it is recommended to apply a safety factor of 3 to the values specified by the supplier for tensile and shearing strengths. The rivet must be set in the middle free of constraint forces using a rivetting tool (see Figure above).

In outdoor structures, a free play of at least 3 mm between the rivet diameter and the hole diameter in the TECU® Bond panel must be present to adequately account for elongation behaviour. The use of a drilling template for designing the sliding point is recommended.

Centring drills are very well suited to achieve perfect coaxial holes.



Examples for the rivet arrangement as a function of the corner cut for peripheral bent edge formats

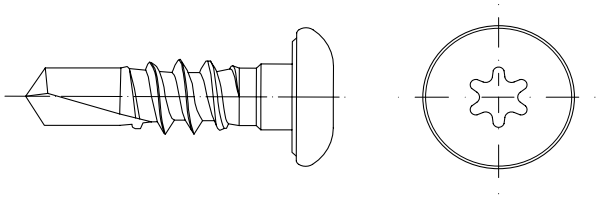


2. SCREWING

Screwed connections with self-locking nuts are the easiest way to connect and fix the panels.

As with rivets, the same materials considerations in screws, nuts and also washers must be considered (see 1. RIVETING).

Construction-approved drilling screws are also suitable for fixing TECU® Bond panels on metal structures.



Screws must not be subject to additional bending by shearing forces on the structure elements. Screws must always be placed perpendicular to the surface.

The screw manufacturer instructions must be observed!

The distance to the panel rim should be 15 mm, and the distance between screws 40 mm.

Note: Fixation with drilling screws allows no temperature-related panel expansion and is therefore only applicable for constraint-free connections.

3. CLAMP CONNECTION

A clamp connection can be prepared by means of clamping profiles of stainless steel or synthetic material.

There are profiles of various shapes for sign & display applications. Depending on the profile form, it may be possible to use a press to press the profile flange before connecting. This action improves the tear resistance during assembly. For outdoor installations and large sizes we recommend additional fixing by rivets (these can be hidden under the clamping profile) to secure the position.

4. GLUING

a) General Information

The use of adhesive systems is enjoying ever increasing popularity thanks to improvements in gluing technology. Gluing allows invisible connections between panels as well as with a wide range of support materials such as metals, plastic products, composites and painted surfaces.

Adhesive systems for use in the façade require general building inspection approval based on the material to be bonded!

The processing instructions of the adhesive systems‘ manufacturer must be adhered to in all cases!

Adhesives and adhesive systems based on polyurethanes such as produced by the firm Sika are suitable for the bonding of copper and copper alloy elements.

b) Methods

The use of adhesive techniques is determined by the application. Significantly more methods can be used indoors because of the more stable environmental conditions and lack of weathering. Single-component bonding systems can be used indoors problem-free.

Surface preparation is important for using all adhesives:

All adhesives and binders require surface pre-treatment to achieve good results.

In doing so, all paint, rust, oil and dust residues must be removed from all surfaces. The extent of use permissible is determined by the adhesive manufacturer! Preparations are based on the adhesive bond‘s desired performance. Generally, structural adhesives require an intensive surface preparation to achieve the promised benefits.

There are three main techniques for surface preparation

Degreasing: Cleaning with solvents used exclusively for removing greases, oils, etc. must use a hydrocarbon such as heptanes as a solvent. For detergent residues and / or humidity, the use of a solution based on alcohol such as isopropyl alcohol (IPA) or ethanol is required. Dry with a clean, lint-free cloth.

Sanding: Mechanical surface treatment by sanding (with sandpaper or sanding belt or Scotch-Brite™) leads to excellent results in preventing deformation with all sufficiently thick materials. After sanding, cleaning is required.

Chemical Treatment: This is the best method for metallic surfaces and glass. For each application there is a particularly suitable chemical solution (acidic or alkaline). The manufacturer's rules must be observed and tests must be conducted on sample pieces!

The use of double-sided tape for interior applications is possible. The general recommendations for adhesives apply. A high pressure (about 1 kg/cm^2) increases the adhesion. The use of a pressure roller or a plastic spatula is recommended for this.

An invisible and removable attachment can be achieved with retaining strips of the Velcro© type (hook-and-loop tape) or Dual-Lock™ Scotchmate.

5. HOT-AIR WELDING

a) General Information

This method, also known as PE-welding, is used for joining plastic materials. Although the method is rarely used for TECU® Bond with PE core, the following description is added for the sake of completeness.
Welding should not be used for load-bearing connections. With the help of welding wire the polyethylene cores are welded to each other after heating by the hot air of an electric hot air welder.

For a good weld quality, note the following:

- Good preparation of the welded edges
- Appropriate quality welding rod
- correct welding speed
- properly metered pressure
- clean hot air
- correct temperature

b) Methods

Welding using the Pendulum Method
Hold the welding wire at a right angle and at the same time exert a uniform pressure on the wire by performing a back and forth (not circular) motion. The welding wire and the edges to be welded must be heated in the same way.

Modern hot air welding equipment works with special nozzles and profiles - welding wires which facilitate the uniform feeding of welding wire. They are especially suitable for the welding of long welds.

Welding of a tilt

First bevel the edges to be welded with the form miller as shown in Figure A.

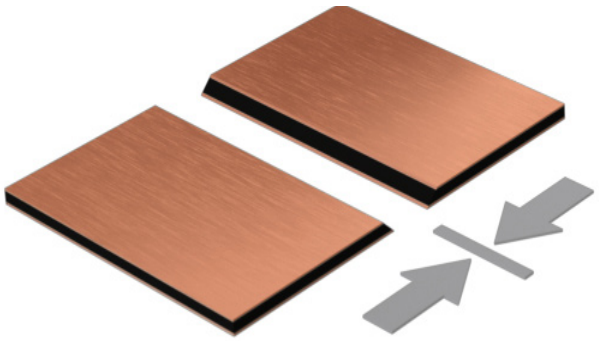


Fig. A - Butt weld

Corner joint - T-Connection: Only one of the plates is bevelled. Remove a narrow band of the metal coating to expose the areas to be welded (not shown).

Butt welding: The edges must be bevelled, as shown in Figure B. Note: Welding must not be used for supporting the connection of panels.

Fig. B - Corner joint with V-weld

Practical information: The polyethylene core is oxidized relatively quickly in the air. Therefore, it should be welded no more than 24 hours after bevelling.

After cooling, the weld seam can be trimmed with a knife or scraper. It is advisable to carry out this work in a clean place, free from dust, grease and moisture.

Processing:

The specific properties of the welding wire, available as a welding wire profile, are as follows:

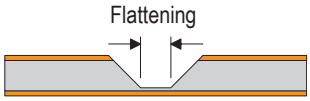
- Low density polyethylene (PE)
- Black colour
- Density of about 0.91 g/cm3
- 3 or 5.7 mm wire cross-section with a round profile

Remove the oxide layer from the welding wire just before welding.

GLOSSARY

Flattening

Designation for a thin flat or rectangular portion.
Flattening



Bending

Bending can be accomplished by various methods, such as by press brake, bending machine, etc.

Drilling

A method in which a cylindrical hole in material is produced with a drill.

Compressed Air Cleaner

A device that is connected via a hose to a compressed air line. This allows the use of compressed air for cleaning surfaces, debris or dust clogged depressions.

Groove Milling

The grooves correspond with subsequently bent edges and are always placed on the back of the panel.

Deburring

Processing to remove the burrs that arise in the shape cutting.

FR

Fire resistant. Name for the core material of the TECU® Bond panels with mineral content.

Milling

A method of shape cutting. Material is removed using a rotating tool, whose end has cutting edges.

Hot Air Welding

Used only for core material of PE, and is therefore rarely used. In this welding process, two work pieces are bound by melting their edges, so that there is a homogeneous, smooth and very resistant seal. Hot air is used for welding PE.

Edge

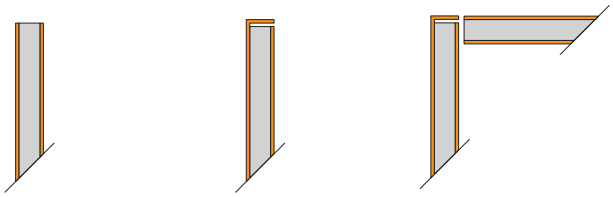


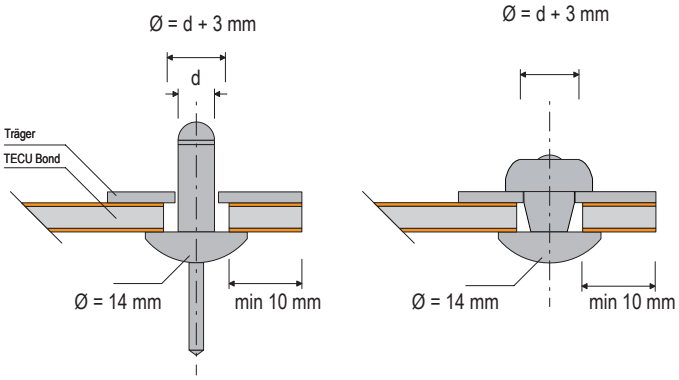
Fig. Panel edge, bordered, fitted (from left)

Edge of a sheet

Bordered Edge: Folding of a sheet thickness to the width of the sheet.

Fitted edge: Connection of two panels which are processed so that the edges at the joint are not visible. This makes it possible to conceal the two thicknesses of the surface layers and the thickness of the core material.

Riveting



Ø sufficient for expansion

Ø drawn rivet sufficient for expansion

Connection of two or more metal parts joined together, drilled, and pierced by a rivet.
The rivet is tightened using a rivet attachment jig by a riveter.

Punching

Method in which the material is torn through. Two tools are aligned with each other: the upper is called the punch, the other the die. In conjunction with TECU® Bond, the process is used almost exclusively for punching or notching of the panel.

Please note: “Important information for storage, use and processing“

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The technical information contained herein is correct and corresponds to the state-of-the-art at the time of printing.
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