

ultralight

Ultralight Handbook
Technical product manual

Ultralight Sandwich Panels

What is Ultralight?

ultralight

As a global reference in the production of plywood panels, Garnica has developed an innovative range of ultralight products.

Combining the excellent mechanical properties of Garnica plywood –lightness, stability and machinability– with an insulating and ultralight material such as extruded polystyrene produces a panel with improved performance.

Ultralight sandwich panels comprise an insulating XPS core, plywood panel made from European poplar sourced from sustainable plantations and a wide range of finishes of exceptional surface quality.

The Ultralight product range is the lightest plywood that Garnica currently produces and is an excellent solution for numerous applications.

Exceptional Properties

Its extremely lightweight nature in combination with a robust structure gives Ultralight a series of characteristics that perform better when compared with conventional panels:

- The 18 mm panels are 45% lighter while the 60 mm panels can be up to 75% lighter than standard poplar plywood
- This lightweight nature is maintained even in giant format pieces
- Easy to handle, both during transport and production
- Easy to machine using all sorts of tools: traditional, CNC and wood shapers
- 30% faster cutting
- Perfect for covering with any type of material: veneers and papers, laminated, aluminium, HDF/MDF, etc.
- High-quality XPS core: exceptional thermal insulation, high mechanical resistances, low weight, high water tolerance, uniform seal and cellular structure

Detailed info:

- Sizes
- Thicknesses & compositions
- Bonding
- Technical specs
- Certifications
- Good Practices

Scan or click here 



Plywood →
 XPS →
 Plywood →



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Applications

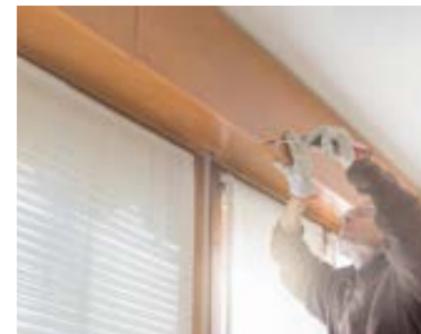
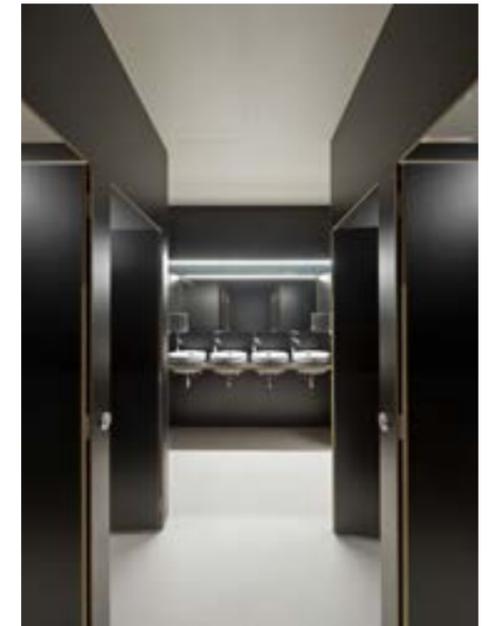
The Ultralight product range is ideal for a variety of applications, particularly those where weight reduction is key or where thermal or acoustic insulation is crucial, even in outdoor settings.

Mobility and Transportation: van conversions, interior furnishings for caravans, and the marine industry.

Interior Furnishings and DIY Projects: wardrobes, shelves, tables, chairs, and any kitchen furniture.

Advertising: signs, displays, stands, shopfitting, and billboards.

Outdoor Applications: garden sheds or prefabricated structures, doors, and outdoor acoustic fencing.



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Fire Protection and Sound Insulation

Protection against Fire

The extruded polystyrene (XPS) used for the Ultralight core as insulation is an HBCD-free flame retardant component and contains none of the foam blowing agents CFC and HCFC.

According to Specification STM-S-001, Index D (2014), Ultralight possesses a very low smoke gas index and has been classified as F1, a material of low toxicity.

The I.F. smoke gases index measures the maximum specific optical density (Dm), the smoke obscuration value (VOF4) and the toxicity index (I.T.C.).

The test establishes requirements related to the smoke and potential toxicity of practically all flammable materials on a railway vehicle.

F1

Acoustic Insulation

The XPS core and excellent physical-mechanical properties of plywood panels from Garnica mean that Ultralight possesses outstanding levels of thermal and acoustic insulation.

Ultralight has been accredited by the most demanding acoustic tests, such as the UNE-EN ISO 10140-2:2011 standards. It has been laboratory tested to measure acoustic insulation and accredit its use in construction. Please contact your local sales rep to see the tests.

Screw pull-out resistance

Poplar plywood panel resistance value: **91 N/mm**



wood screw

	1 panel			2 panels		
Plywood thickness (mm)	4	4.5	6	8	9	12
Resistance (N)	364	409.5	546	728	819	1092

To use screws with greater resistance (non-standard), we recommend selecting the 6 mm plywood thickness.

By providing greater mechanical inertia to the assembly owing to perfect industrial adhesion capacity, this combination of layers in the form of a sandwich panel also creates a stiffness in the Ultralight panels that is genuinely surprising when considering their lightweight nature and easy machinability.

Determination of screw pull-out resistance from fibreboards is performed under UNE EN 320:1993 standards.

For any further information, please reach out to your Sales Representative.

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Results of technical analysis and pre-dimensioning tables

Ultralight is mainly used for interior applications where panel stiffness and stability is important, as well as reduced weight.

From a static perspective, the panels commonly have a bending moment similar to that found in shelf panels, for example.

To support our customers in the planning process, we have produced the following information and tables:

Calculation Method and Premises

The pre-dimensioning tables were produced under the assumption that the panel is supported in two locations and subject to bending under an constant uniformly distributed load (Figure 2) for "q" values of 0.5, 1.0, 1.5 and 2.0 kN/mm² and inter-support spans of between 400 and 1200 mm.



Figure 2. Calculation model

It was also taken into consideration that the panels could work longitudinally or transversally, with the longitudinal direction being that which coincides with the direction of the largest number of plywood panel layers. The modulus of elasticity properties considered for calculating the panels in the longitudinal direction are those coinciding with the values in column E0 of Table 1, while those considered in the transversal direction are those in column E90.

The weight of the panel itself as well as the overload was taken into consideration to calculate the instantaneous deflection of the panels, and the shear influence on the deflection was also considered with the following transversal modulus of elasticity: $G=E/30$.

Possible external influences were not taken into consideration, such as humidity content variance or panel yield owing to long-term loads, among others.

The dimensioning was limited by the maximum permitted span deflection between 300 (L/300).

Checks were performed to verify panel deflection resistance for the previously defined spans and loads and based on the resistance values provided by Garnica (Table 1). Shear verifications were not included.

Pre-dimensioning tables USING THE TABLES

1. Select the table according to the work direction of the panel: longitudinal or transversal.
2. Select the table based on the load applied: 50, 100, 150 or 200 Kg/m².
3. Select the panel inter-support span in the first column of the table: 400, 500, 600, 800, 1000 or 1200 mm.
4. In the tables the colour blue denotes combinations of panel thickness and span that result in an instantaneous deflection less than the span between 300 ($<L/300$). The colour pink denotes combinations that result in a deflection below that limit.

PANELS WORKING LONGITUDINALLY

Distributed load 50 kg/m²

Span (mm)	Panel thickness (mm)							Limit (l/300)
	15	18	25	30	40	50	60	
400	0.2	0.2	0.1	0.0	0.0	0.0	0.0	1.3
500	0.6	0.4	0.2	0.1	0.1	0.0	0.0	1.7
600	1.3	0.8	0.4	0.2	0.1	0.1	0.1	2.0
800	4.0	2.4	1.2	0.7	0.4	0.3	0.2	2.7
1000		5.9	2.8	1.8	0.9	0.7	0.5	3.3
1200			5.8	3.7	1.8	1.4	1.1	4.0

Distributed load 100 kg/m²

Span (mm)	Panel thickness (mm)							Limit (l/300)
	15	18	25	30	40	50	60	
400	0.5	0.3	0.1	0.1	0.0	0.0	0.0	1.3
500	1.2	0.7	0.3	0.2	0.1	0.1	0.1	1.7
600	2.4	1.5	0.7	0.4	0.2	0.2	0.1	2.0
800		4.6	2.2	1.4	0.7	0.5	0.4	2.7
1000				3.4	1.7	1.3	1.0	3.3
1200				7.0	3.5	2.7	2.1	4.0

Distributed load 150 kg/m²

Span (mm)	Panel thickness (mm)							Limit (l/300)
	15	18	25	30	40	50	60	
400	0.7	0.4	0.2	0.1	0.1	0.0	0.0	1.3
500	1.7	1.0	0.5	0.3	0.2	0.1	0.1	1.7
600		2.2	1.0	0.6	0.3	0.2	0.2	2.0
800			3.3	2.1	1.0	0.8	0.6	2.7
1000				5.0	2.5	1.9	1.5	3.3
1200					5.2	4.0	3.1	4.0

Distributed load 200 kg/m²

Span (mm)	Panel thickness (mm)							Limit (l/300)
	15	18	25	30	40	50	60	
400	0.9	0.6	0.3	0.2	0.1	0.1	0.1	1.3
500	2.3	1.4	0.7	0.4	0.2	0.2	0.1	1.7
600		2.9	1.4	0.9	0.4	0.3	0.3	2.0
800			4.3	2.7	1.4	1.0	0.8	2.7
1000				6.6	3.3	2.5	2.0	3.3
1200							4.1	4.0

PANELS WORKING TRANSVERSALLY

Distributed load 50 kg/m²

Span (mm)	Panel thickness (mm)							Limit (l/300)
	15	18	25	30	40	50	60	
400	0.5	0.3	0.1	0.1	0.0	0.0	0.0	1.3
500	1.2	0.8	0.3	0.2	0.1	0.1	0.1	1.7
600	2.4	1.6	0.7	0.4	0.2	0.1	0.1	2.0
800		5.0	2.1	1.3	0.7	0.5	0.4	2.7
1000			5.1	3.3	1.8	1.1	1.0	3.3
1200				6.8	3.8	2.4	2.2	4.0

Distributed load 100 kg/m²

Span (mm)	Panel thickness (mm)							Limit (l/300)
	15	18	25	30	40	50	60	
400	0.9	0.6	0.2	0.2	0.1	0.1	0.1	1.3
500	2.3	1.5	0.6	0.4	0.2	0.1	0.1	1.7
600		3.1	1.3	0.8	0.4	0.3	0.3	2.0
800			4.0	2.6	1.4	0.9	0.8	2.7
1000					3.5	2.2	2.0	3.3
1200							4.1	4.0

Distributed load 150 kg/m²

Span (mm)	Panel thickness (mm)							Limit (l/300)
	15	18	25	30	40	50	60	
400	1.4	0.9	0.4	0.2	0.1	0.1	0.1	1.3
500		2.2	0.9	0.6	0.3	0.2	0.2	1.7
600		4.5	1.9	1.2	0.7	0.4	0.4	2.0
800				3.8	2.1	1.3	1.2	2.7
1000					5.1	3.2	2.9	3.3
1200							6.1	4.0

Distributed load 200 kg/m²

Span (mm)	Panel thickness (mm)							Limit (l/300)
	15	18	25	30	40	50	60	
400	1.8	1.2	0.5	0.3	0.2	0.1	0.1	1.3
500		2.9	1.2	0.8	0.4	0.3	0.2	1.7
600			2.5	1.6	0.9	0.5	0.5	2.0
800					2.8	1.7	1.6	2.7
1000							3.9	3.3
1200							8.0	4.0

5

Comparison of Structural Thickness, Density and Technical Characteristics with other Materials

One of the most remarkable benefits of Ultralight is its perfect dimensional stability and extremely lightweight nature combined with an excellent result in terms of elasticity and rupture moduli.

These excellent physical-mechanical properties are shown below in various analyses of density, weights and numerous performance tests in comparison with other types of panels.

Ultralight Elastic Modulus based on panel thickness

Composition: plywood 4.5 mm / XPS / plywood 4.5 mm (plywood of 4 mm for the total thickness of 12 mm)

Thickness	Density* (kg/m ³)	MOE** (N/mm ²)		Weight (kg/m ²)
		Long.	Perp.	
12	312	1300	2800	3.74
15	276	1400	2700	4.14
18	227	1500	2500	4.09
25	184	1200	2200	4.60
30	160	1100	2100	4.8
40	133	1000	2000	5.32
50	110	900	1500	5.5
60	97	650	1250	5.82

Comparison of various panel types based on Density and Elastic Modulus

Format 18 mm thick	Density* (kg/m ³)	MOE** (N/mm ²)	
		Long.	Perp.
Ultralight	227	1500	2500
Poplar plywood	420	3500	4800
Birch plywood	700	7000	10000
MDF	700	2100	2100
Particleboard	700	1600	1600

Thermal performance of Ultralight panels based on total thickness

Total thickness (mm)	"R" thermal resistance (m ² ·K/W)	"U" thermal transmittance (W/m ² K)
12	0.346	2.89
15	0.411	2.44
18	0.496	2.01
25	0.696	1.44
30	0.839	1.19
40	1.125	0.89
50	1.411	0.71
60	1.696	0.59

* Density variance: +/- 5%

** MOE variance: +/- 30%

The data shown here are purely for information purposes and have no contractual value. The technical characteristics may vary with no prior notification based on new developments and technological advancements. The buyer is responsible for deciding whether the Garnica product is suitable for the desired application, and will be required to ensure that the location and way in which it is used are suitable according to the manufacturer's instructions and suggestions, as well as its compliance with current regulations.

6

Introduction to Panel Connections

The strength and lightweight nature, as well as the easy machinability using standard furniture and panelling production tools, of Ultralight panels means they can be used in various applications for all sorts of pieces and in combination with various fittings, tools, edges and fillings.

This section provides a compilation of recommendations, a practical solution for mounting and Ultralight machining. Details of several standard solutions are provided, as well as a number of innovative solutions for various market segments and applications in which their daily use have been tested and approved. These solutions will be constantly updated with the latest mounting and machining technologies.

The information to be found in this handbook supports the standard industry information for quickly and precisely choosing fixed and mobile connections and machining solutions while optimising the use of Ultralight panels in combination with other materials.

Standard carpentry machines and tools are used for this list of recommendations. However, certain specific tools or items may be needed in some cases due to the specialist nature of the fixture in question.

See **Annex: Creating Panel Connections**



hinge



flat connection



90° connection



insert



filled edge

Annex: Creating Panel Connections

Connections

hinge	flat connection	90° connection	insert	filled edge
<ul style="list-style-type: none"> Overlay hinge Exterior folding hinge Concealed hinge Häfele hinges and connectors 	<ul style="list-style-type: none"> Fastmount Knob/Handle (metric screw) Knob/Handle (wood screw) Connection on the same plane 	<ul style="list-style-type: none"> Ovvo connector Shelf bracket Wood screw connection with washer Countersunk wood screw connection Inclined wood screw connection 90° connection with dowel pin Long eccentric Short eccentric Lamello Cabineo 	<ul style="list-style-type: none"> Insert for metric screw (visible) Insert for metric screw (concealed) Blind rivet Würth Coldmelt Technology Sliding door system 	<ul style="list-style-type: none"> Filled Edges

Tools

				
saw	rivet gun	cutter	drill	special

Accessories

				
dowel pin	wood screw	rivet	metric	filled
				
edge	PVA adhesive	PU adhesive	PC adhesive	EVA adhesive



hinge



hinge

Overlay hinge

Overlay hinge used on doors, cupboards, kitchen furniture.

* The wood screw used must apply grip force between 2 and 8 mm of the shank.

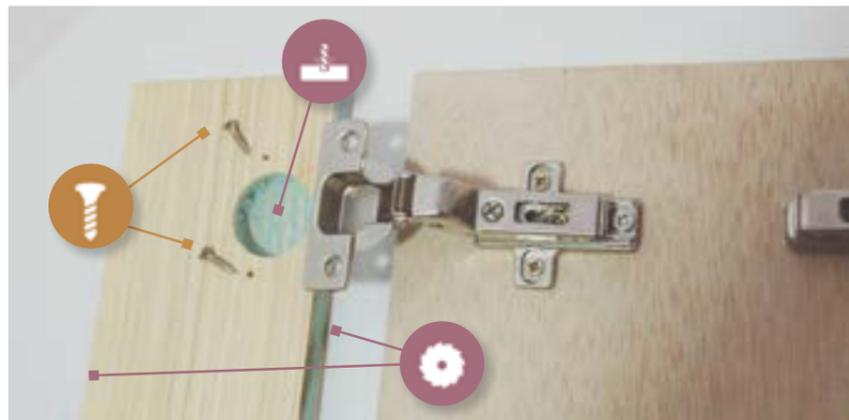
** The resistance of the 4.5 mm poplar faces is usually sufficient for standard connections. 6 mm poplar faces are also available for applications that require greater strength, such as large furniture, doors, etc.

ADVANTAGES:

- ✓ Less stress on the hinge and screws thanks to the lighter weight of the Ultralight panel
- ✓ High screw pull-out resistance
- ✓ Only standard components are required

SUPPLIER:

Regular supplier



Tools



saw



cutter

Accessories



wood screw

Exterior folding hinge

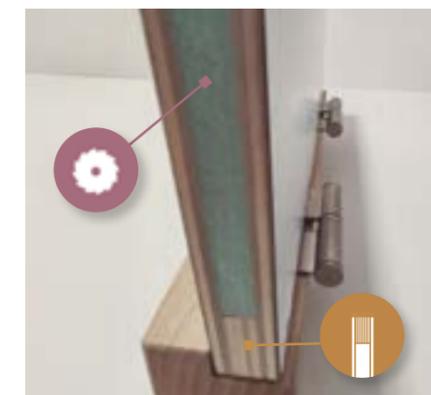
Exterior folding hinge for use on both interior and exterior doors.

ADVANTAGES:

- ✓ Less stress on the hinge and screws thanks to the lighter weight of the Ultralight panel
- ✓ High screw pull-out resistance
- ✓ Only standard components are required

SUPPLIER:

Regular supplier



Tools



saw



cutter

Accessories



wood screw



filled



hinge



hinge

Concealed hinge

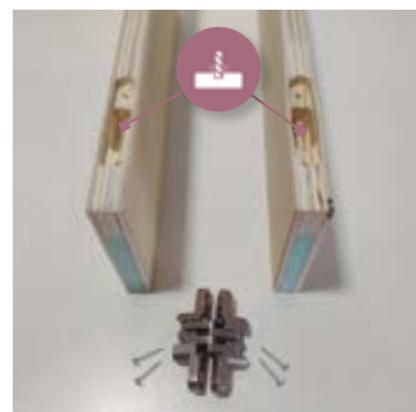
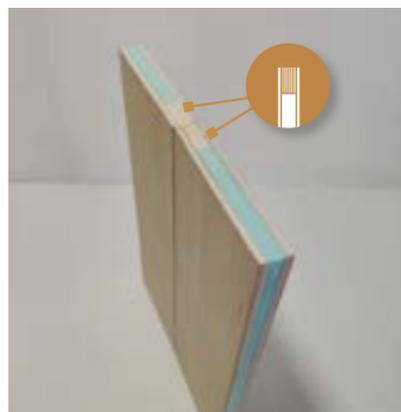
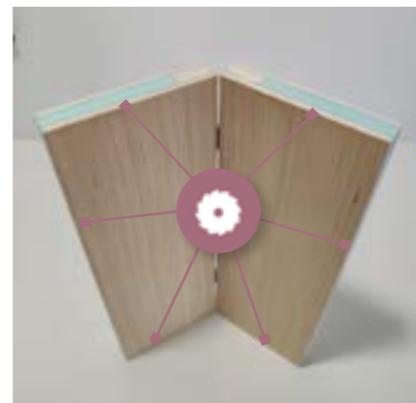
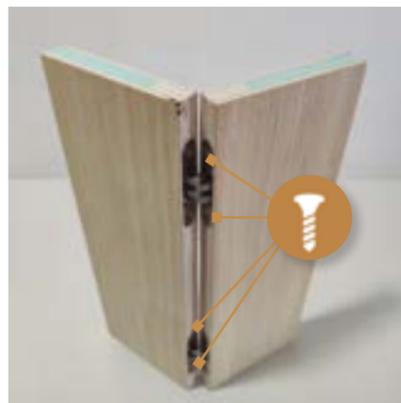
Concealed hinge used for both exterior and interior doors and cupboards.

ADVANTAGES:

- ✓ Less stress on the hinge and screws thanks to the lighter weight of the Ultralight panel
- ✓ High screw pull-out resistance
- ✓ Only standard use components are required
- ✓ Concealed hinge

SUPPLIER:

Regular supplier



Tools



saw



cutter

Accessories



wood screw



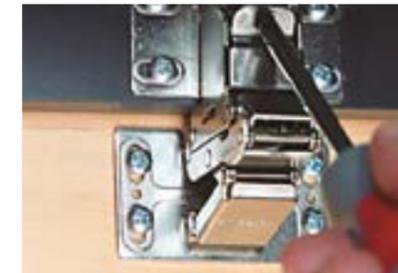
filled

Häfele hinges and connectors

Hinges and connectors for interior caravan furniture.

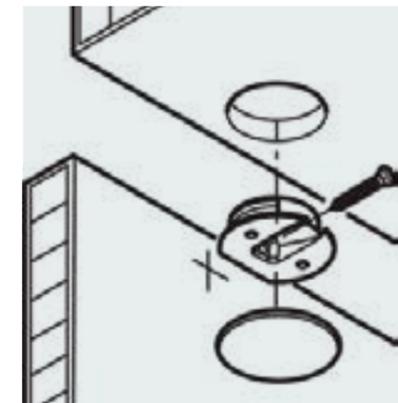
HINGE ADVANTAGES:

- ✓ Lighter than a standard hinge
- ✓ Less stress on the hinge and screws thanks to the lighter weight of the panel
- ✓ High screw pull-out resistance
- ✓ Only standard components are required



CONNECTOR ADVANTAGES:

- ✓ Reversible connection and exceptionally lightweight
- ✓ High screw pull-out resistance
- ✓ Easy to use with common tools



SUPPLIER:

www.haefele.de

Tools



drill

Accessories



wood screw



flat connection



flat connection

Fastmount

The Fastmount connection is perfect for countless uses in panelling, false ceilings, acoustic panels, furniture, upholstery, etc.

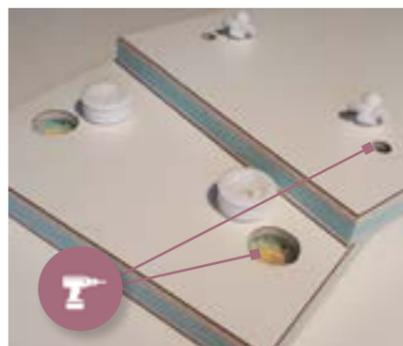
* The website of the supplier indicates the technology necessary for this system.

ADVANTAGES:

- ✓ Invisible connections
- ✓ Lightweight
- ✓ Reversible
- ✓ Easy to install
- ✓ Wide variety of solutions
- ✓ Suitable for outdoor use
- ✓ Absorbs expansions and contractions

SUPPLIER:

www.fastmount.com



Tools



drill



special

Knob/Handle (metric screw)

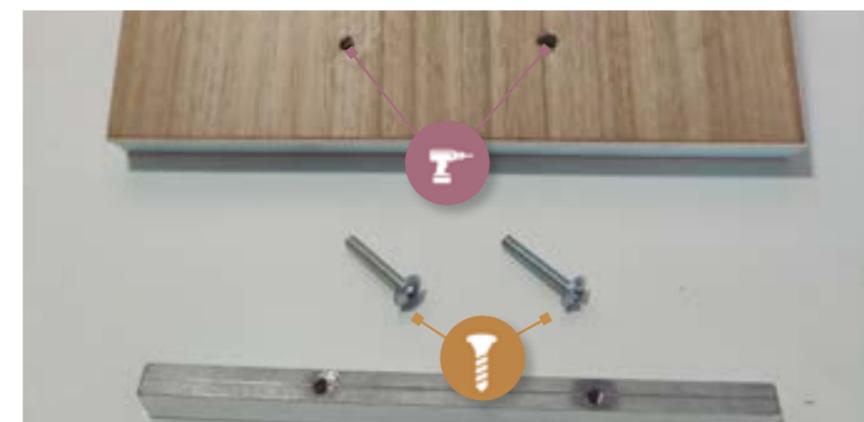
Knob/handle (wood screw) for handle use.

ADVANTAGES:

- ✓ Easily machinable

SUPPLIER:

Regular supplier



Tools



saw



drill

Accessories



wood screw



flat connection



flat connection

Knob/Handle (wood screw)

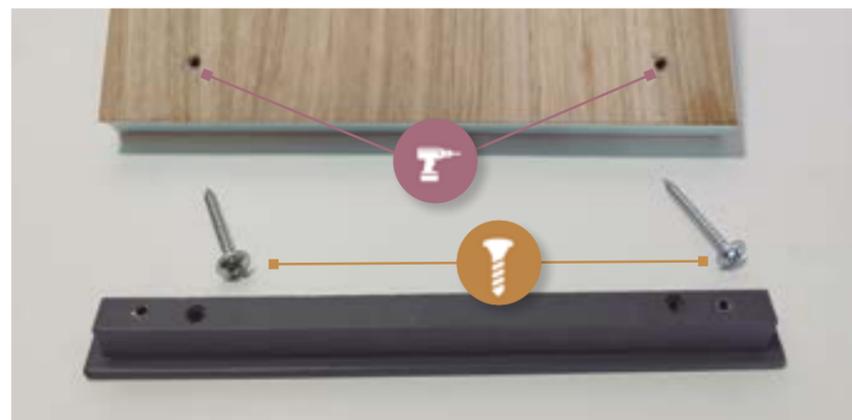
Knob/handle (wood screw) for handle use.

ADVANTAGES:

- ✓ Easily machinable

SUPPLIER:

Regular supplier



Tools



saw



drill

Accessories



wood screw

Connection on the same plane

Lengthening Ultralight panels.

* The cutting gear must be central on the edge and 1mm thicker than the XPS.

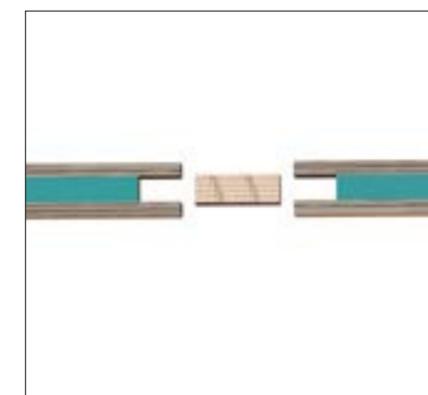
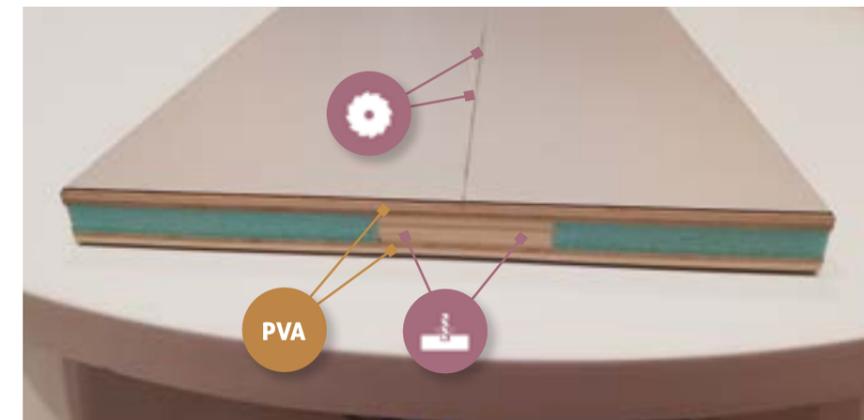
** The connecting piece must be twice as thick as the insulation.

ADVANTAGES:

- ✓ Lengthens the Ultralight panel surface

SUPPLIER:

Regular supplier



Tools



saw



cutter

Accessories



PVA adhesive



90° connection



90° connection

Ovvo connector

Ovvo connector used in furniture.

* Requires edging of at least 0.2 mm on the edge.

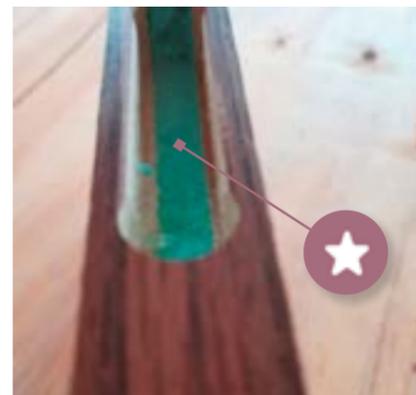
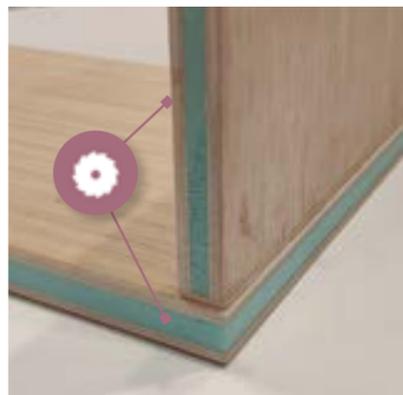
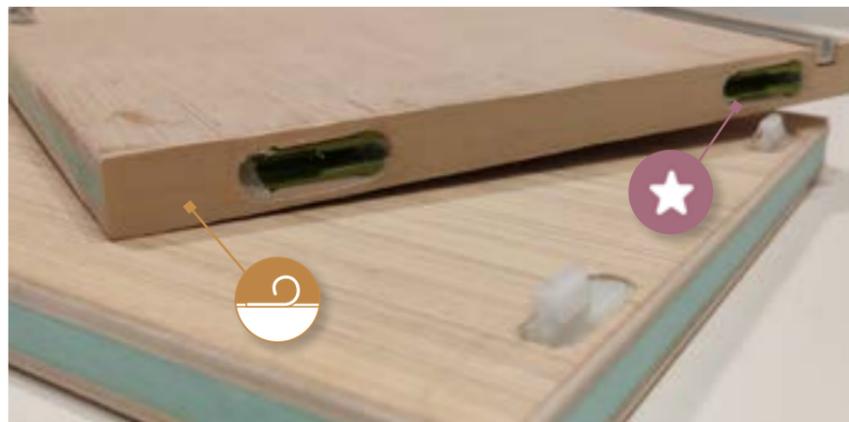
** The website of the supplier contains the technical information necessary.

ADVANTAGES:

- ✓ Connection versatility
- ✓ Connector option for joining parallel planes, at an angle or perpendicular
- ✓ Fixed or reversible connection option

SUPPLIER:

www.ovvotech.com



Tools



saw



special

Accessories



edge

Shelf bracket

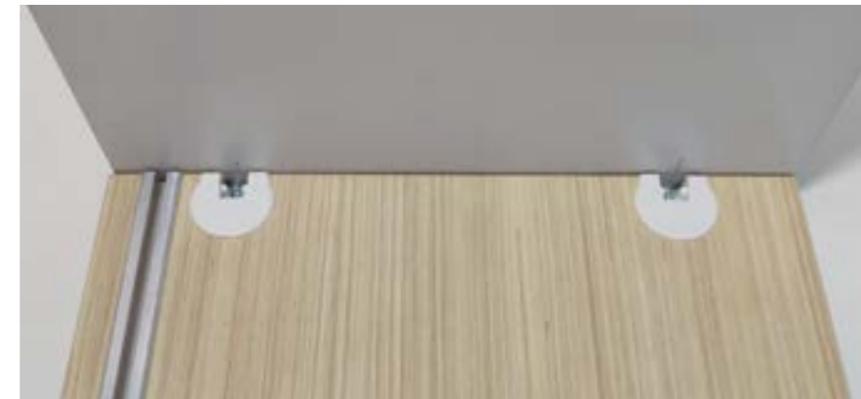
Shelf bracket connection used for supporting shelves, removable assemblies.

ADVANTAGES:

- ✓ Component allows reversible shelf support
- ✓ High screw pull-out resistance
- ✓ Option to create removable assemblies
- ✓ Concealed hinge

SUPPLIER:

www.emuca.es | www.hettich.com | www.wuerth.com



Tools



saw



cutter



drill



90° connection



90° connection

Wood screw connection with washer

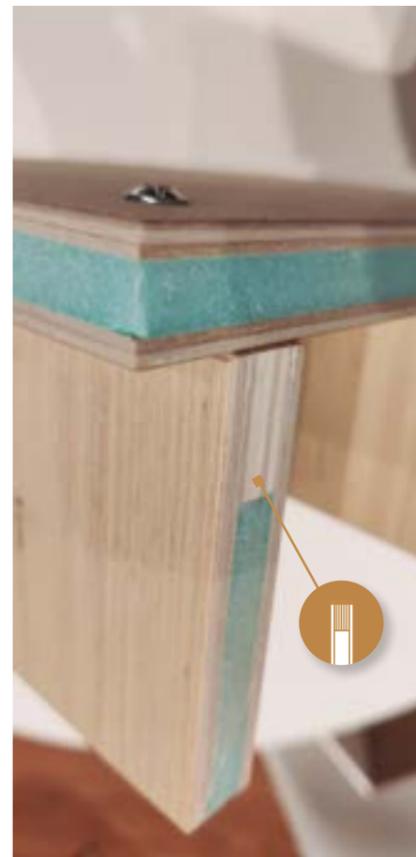
Wood screw connection with washer used for 90° connections in furniture

ADVANTAGES:

- ✓ Strong mount with pressure base
- ✓ High screw pull-out resistance
- ✓ Standard components only

SUPPLIER:

Regular supplier



Tools



saw

Accessories



wood screw



filled

Countersunk wood screw connection

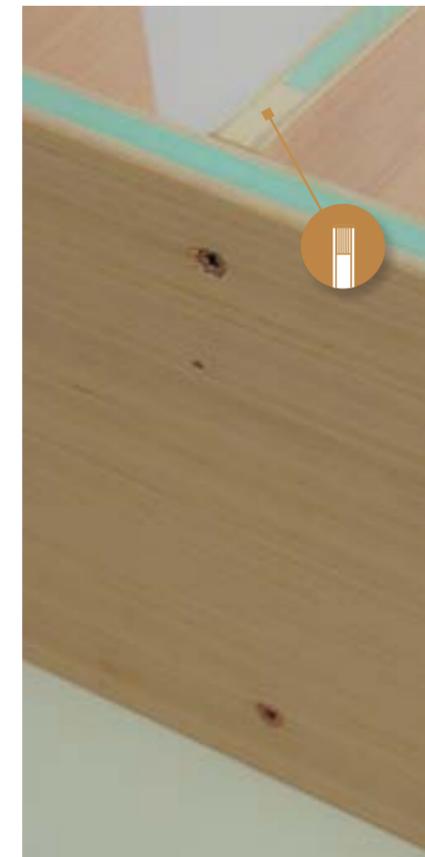
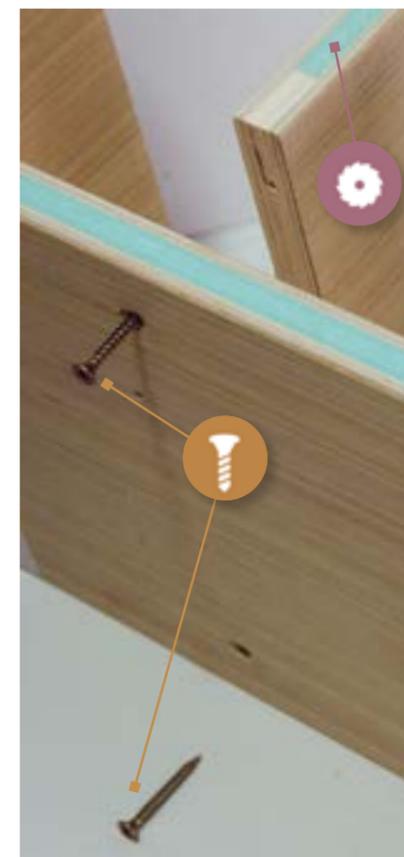
Countersunk wood screw connection used for 90° connections in furniture.

ADVANTAGES:

- ✓ Strong mount with flush head
- ✓ High screw pull-out resistance
- ✓ Standard components only

SUPPLIER:

Regular supplier



Tools



saw

Accessories



wood screw



filled



90° connection



90° connection

Inclined wood screw connection

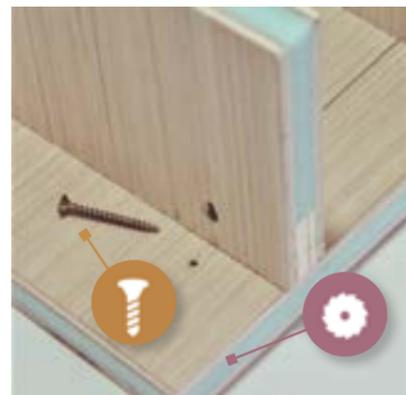
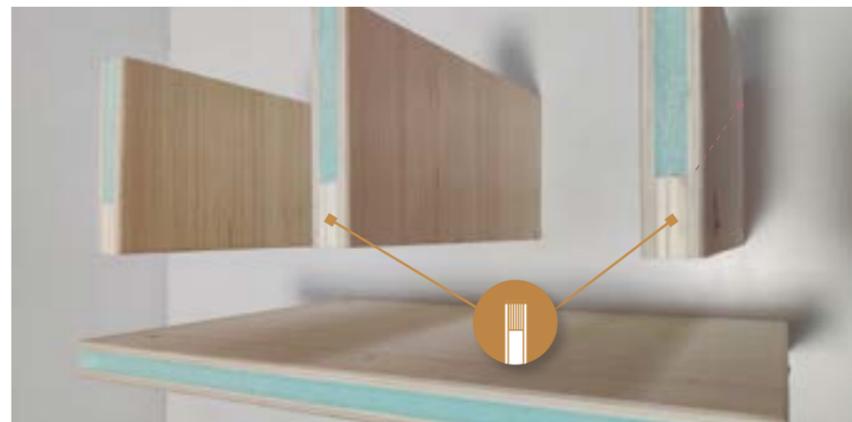
Inclined wood screw connection used for 90° connections in furniture.

ADVANTAGES:

- ✓ Strong mount with flush head.
- ✓ High screw pull-out resistance

SUPPLIER:

Regular supplier



Tools



saw

Accessories



wood screw



filled

90° connection with dowel pin

90° connection with dowel pin used in furniture.

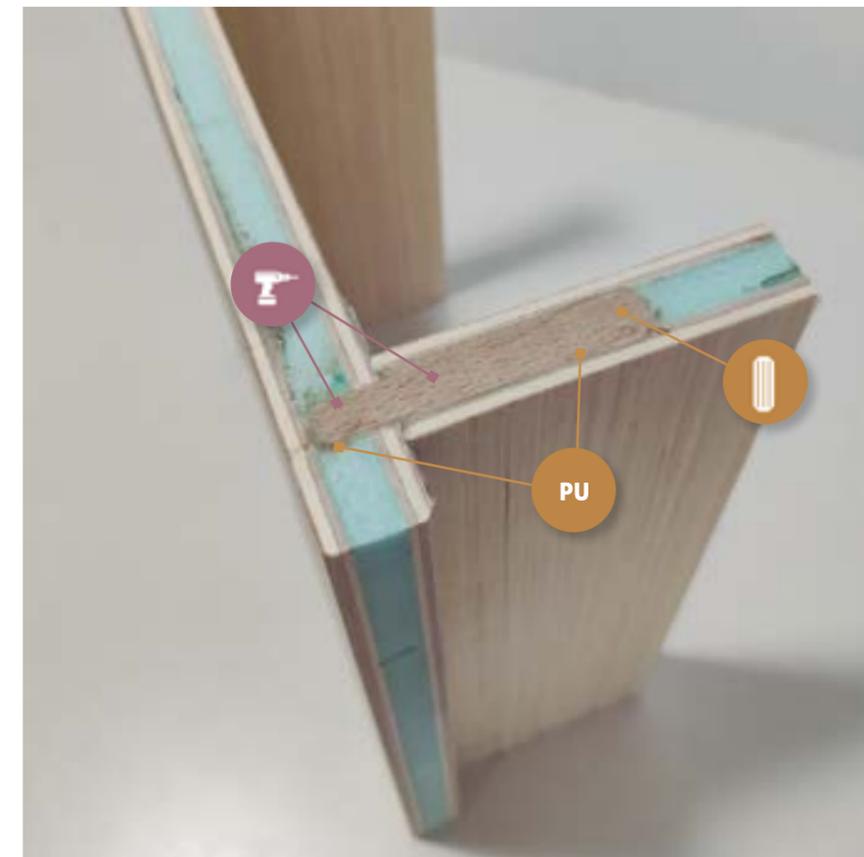
** The dowel pin must have a diameter of 1 mm or be larger than the XPS and the drilling must be central on the edge.*

ADVANTAGES:

- ✓ Concealed anchoring
- ✓ Standard components only

SUPPLIER:

Regular supplier



Tools



saw



drill

Accessories



dowel pin



PU adhesive



90° connection



90° connection

Long eccentric

Long 90° eccentric connection for drawers, removable assemblies.

* No edging required for use.

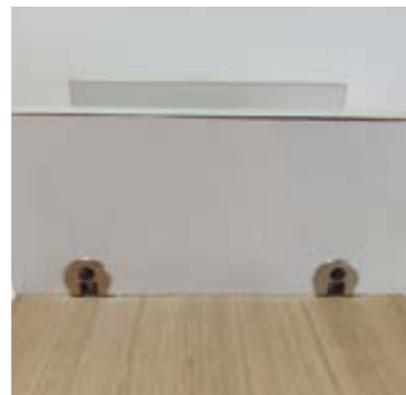
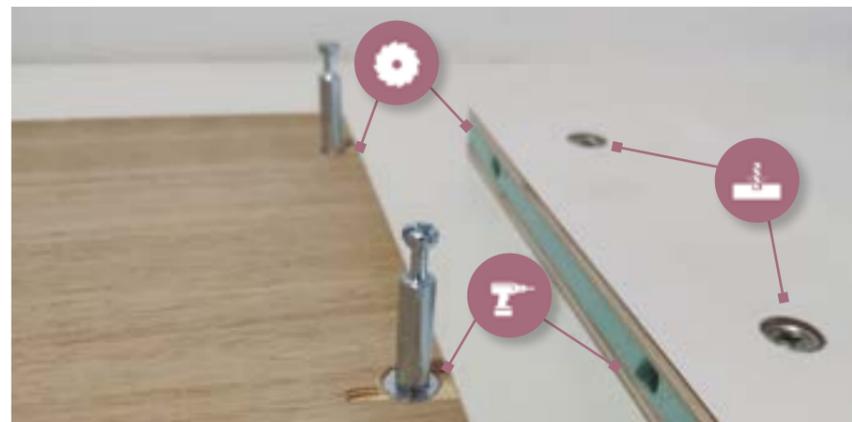
** For a better connection, filled edge recommended on eccentric side.

ADVANTAGES:

- ✓ Reversible connection
- ✓ High screw pull-out resistance

SUPPLIER:

www.emuca.es | www.hettich.com | www.wuerth.com



Tools



Short eccentric

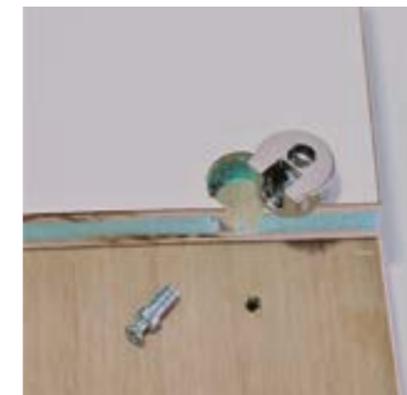
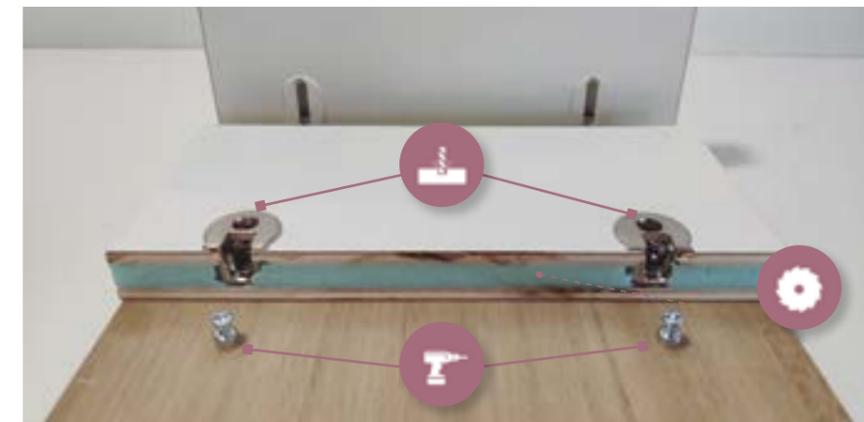
Short 90° eccentric connection for drawers, removable assemblies.

ADVANTAGES:

- ✓ Reversible connection
- ✓ High screw pull-out resistance

SUPPLIER:

www.emuca.es | www.hettich.com | www.wuerth.com



Tools





90° connection



insert

Lamello Cabineo

Lamello Cabineo 90° connection for drawers, removable assemblies.

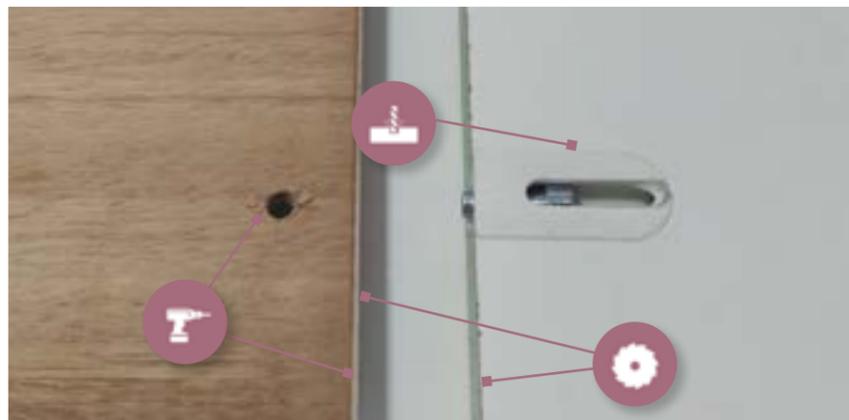
* The website of the supplier contains the technical information necessary.

ADVANTAGES:

- ✓ Reversible connection
- ✓ High screw pull-out resistance

SUPPLIER:

www.lamello.com



Tools



saw



cutter



drill

Insert for metric screw (visible)

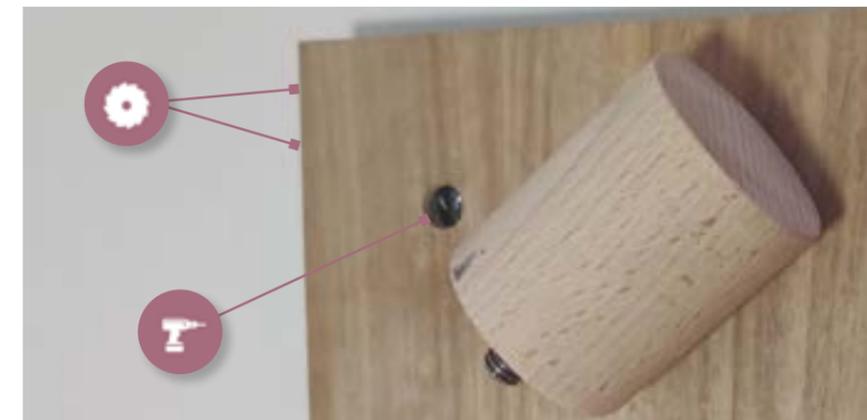
Insert for metric screw (visible) for furniture feet, connections on the same plane with metric screws.

ADVANTAGES:

- ✓ Insert for connection with metric screws and bolts to affix all sorts of components, furniture feet, other panels on the same plane, extra thicknesses

SUPPLIER:

Regular supplier



Tools



saw



drill



insert



insert

Insert for metric screw (concealed)

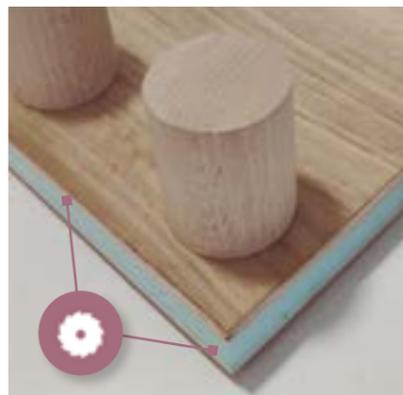
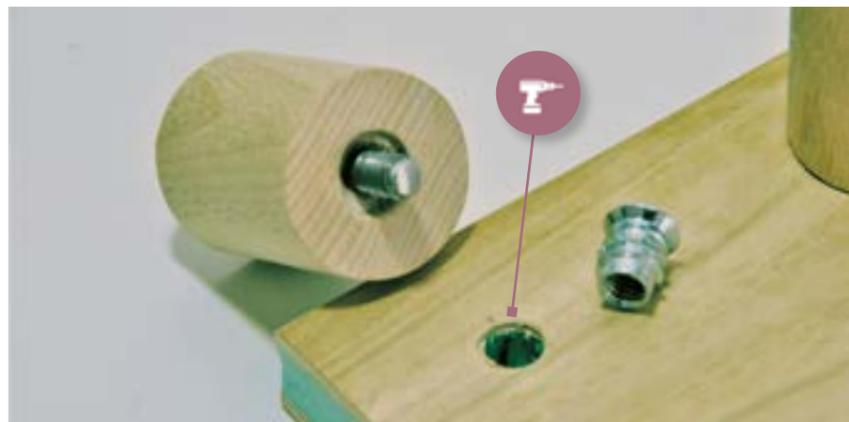
Insert for metric screw (concealed) for furniture feet, connections on the same plane with metric screws.

ADVANTAGES:

- ✓ Insert for connection with metric screws and bolts to affix all sorts of components, furniture feet, other panels on the same plane, extra thicknesses

SUPPLIER:

Regular supplier



Tools



saw



drill

Blind rivet

Blind rivet for furniture feet, connections on the same plane with metric screws.

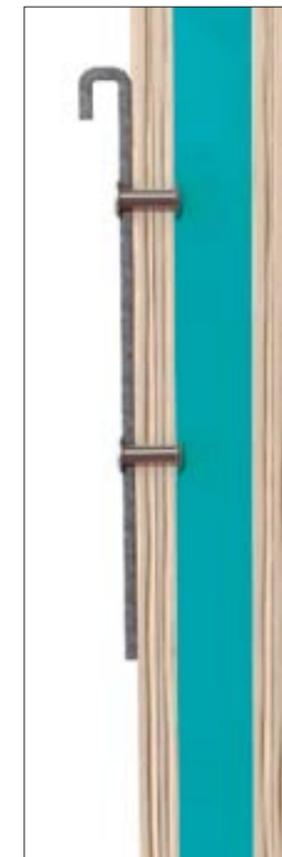
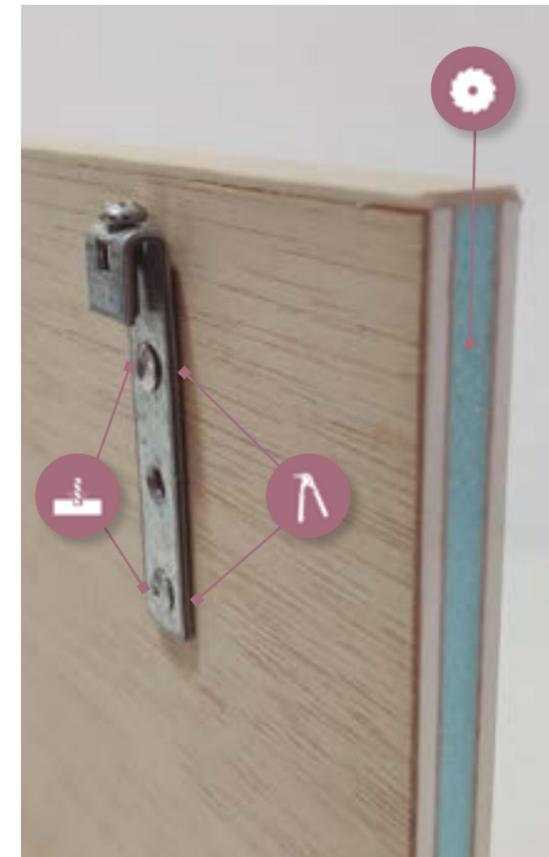
** The drill diameter must be that which is defined by the rivet manufacturers.*

ADVANTAGES:

- ✓ Permanent connection

SUPPLIER:

Regular supplier



Tools



saw



cutter



rivet gun



insert



insert

Würth Coldmelt Technology

Würth Coldmelt Technology for mounting screws and fittings on lightweight panels.

* The website of the supplier indicates the technology necessary for this system.

ADVANTAGES:

- ✓ Technology for adhesive-free insertion of adjustable plastic anchors in lightweight panels
- ✓ For mounting screws and fittings

SUPPLIER:

www.wuerth.com



Tools



special

Sliding door system

Sliding cupboard door system

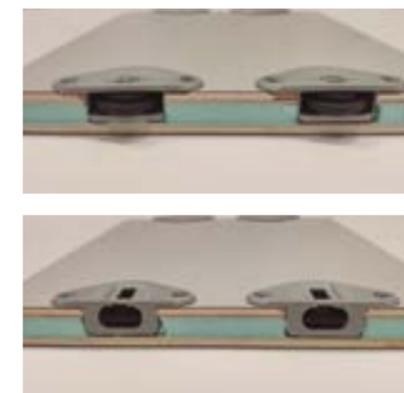
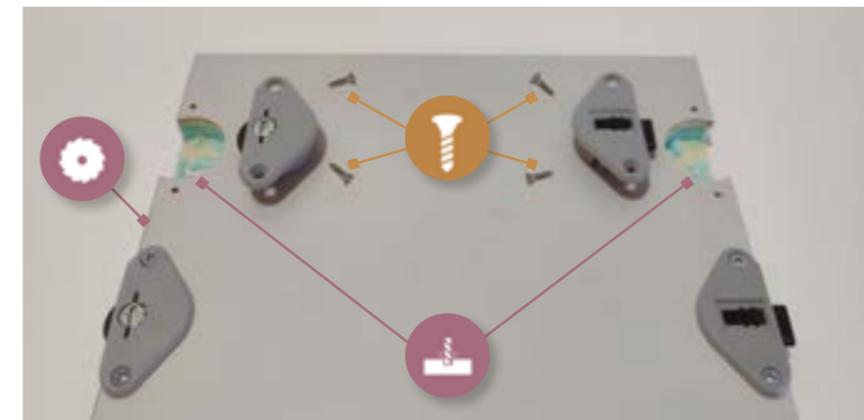
* The wood screw used must apply grip force between 2 and 8 mm of the shank.

ADVANTAGES:

- ✓ Easier to move due to lightweight Ultralight panel
- ✓ Less wear on the fitting due to lightweight Ultralight panel
- ✓ High screw pull-out resistance

SUPPLIER:

www.gedotec-beschläge.de | www.ducasseindustrial.com



Tools



saw



cutter

Accessories



wood screw



filled edge



filled edge

Filled

Reinforced edges.

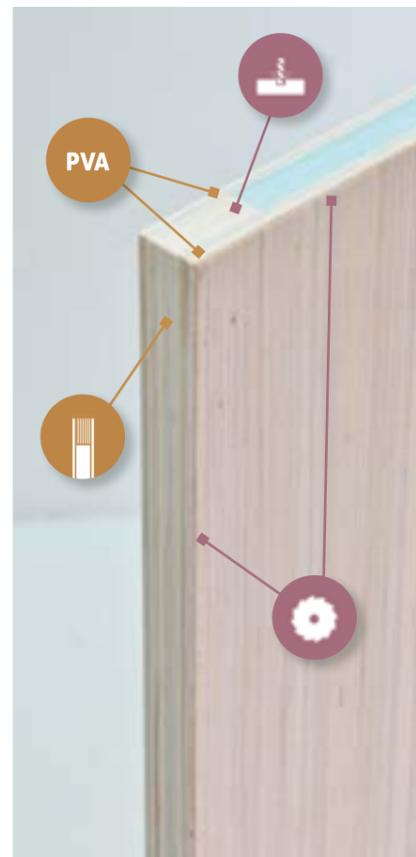
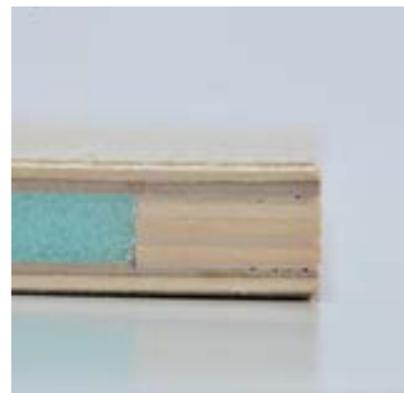
* The cutting gear must be central on the edge and 1 mm thicker than the XPS.

ADVANTAGES:

- ✓ Gives plywood characteristics to the edge
- ✓ Can be machined like a solid plywood panel
- ✓ High screw pull-out resistance

SUPPLIER:

Regular supplier



Tools



saw



cutter

Accessories



filled



PVA adhesive

Edges

Edge protection.

* The right adhesive for the type of edging must be used.

** Due to the lower density of Ultralight when compared with conventional plywood panels, it may be necessary to reduce the roller pressure during the edging process.

ADVANTAGES:

- ✓ Ultralight panels can be edged with all types of edges, PVC, ABS, veneer and melamine

SUPPLIER:

Regular supplier



Tools



saw

Accessories



edge



PVA adhesive



PU adhesive



ultralight



X:
@garnicaplywood



Instagram:
@garnicaplywood



YouTube:
Garnica Plywood



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www.garnica.one

garnica

Challenge the ordinary