

Processing instructions

EGGER Laminates



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Product description

EGGER Laminates are decorative laminates based on curable resins. They have a multi-layer construction and consist of impregnated decorative paper and one or more impregnated kraft papers that are pressed together under high pressure and heat. The laminate construction, resin and paper quality, surface texture, use of special overlays and the press parameters during production determine the laminate quality and therefore the subsequent use or area of application.

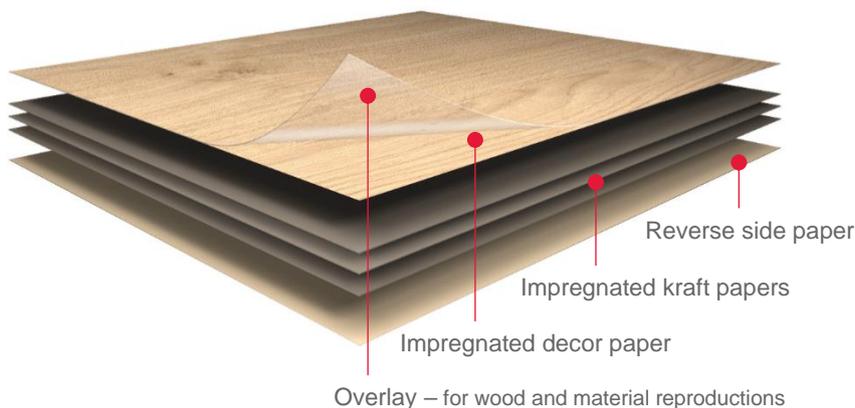


Figure 1: Laminate composition, using EGGER Laminates – 0.80 mm nominal thickness

EGGER Laminates are tested according to the standard EN 438 with respect to all relevant quality requirements. To describe the respective laminate grade, two different systems of classification are used in the EN 438-3 part of the standard: The alphabetic system uses three letters to describe the laminate type and the associated application – see Table 1. Alternatively, a numerical system is also defined in the standard which is related to the three most important requirements to the laminate characteristics – see Table 2.

Standard part	First letter	Second letter	Third letter
EN 438 part 3 – Laminates	H – Horizontal application	G – General purposes	S – Standard quality (cold-formable)
	V – Vertical application	D – Heavy duty	P – Postformable (hot forming)
EN 438 part 9 – Laminates with alternative core	B – Coloured core	C – Compact Laminate	S – Standard quality
	R – Metal reinforced core	D – Laminate	F – Flame-retardant

Table 1: Alphabetic classification according to laminate standard EN 438

Mechanical stress	Key figures		
Initial abrasion point (revolutions)	First digit – resistance to surface wear		
	2	3	4
	≥ 50	≥ 150	≥ 350
Impact resistance by small diameter ball (Newton)	Second digit – resistance to impact		
	2	3	4
	≥ 15	≥ 20	≥ 25
Scratch resistance (rating)	Third digit – resistance to scratch		
	2	3	4
	2	3	4

Table 2: Numeric classification according to laminate standard EN 438

For applications/areas of use, quality requirements as well as technical data and delivery options of the respective laminate grades, please refer to the corresponding data sheets. The laminate grades are available in formats and/or rolls depending on the nominal thickness and thanks to our production technology. Flexible lengths for format materials are possible for nominal thicknesses ≥ 0.40 mm. Roll materials are possible for nominal thicknesses ≥ 0.15 to ≤ 0.60 mm.

You will find an overview of the EGGER laminate portfolio below:

Laminate grades	Laminate type according to EN 438		Nominal thickness [mm]	Length version
	alphanumeric	numeric		
Laminates	HGP	3 / 2 / 3	0.40 / 0.50 / 0.60	Roll & format material
		3 / 3 / 3	0.80 / 1.00 / 1.20	Format material
Laminates Coloured Core	BTS	3 / - ¹⁾ / 3	0.80	Format material
Laminates in Door Sizes	HGP	3 / 3 / 3	0.80	Format material
Laminates in Variable Length	HGP	3 / 2 / 3	0.60	Format material
Laminates XL	HGS	3 / 3 / 3	0.80	Format material
PerfectSense Premium Laminates Matt ²⁾	HGS	3 / 2 / 4	0.60	Roll & format material
		3 / 3 / 4	0.80	Format material
PerfectSense Premium Laminates Matt Coloured Core ²⁾	BTS	3 / - ¹⁾ / 4	0.80	Format material
PerfectSense Premium Laminates Gloss ²⁾	HGS	3 / 3 / 4	0.80	Format material
PerfectSense Premium Laminates Gloss Coloured Core ²⁾	BTS	3 / - ¹⁾ / 4	0.80	Format material
PerfectSense Laminates Matt	VGS	3 / 2 / 3	0.60	Roll & format material
		3 / 3 / 3	0.80	Format material
Laminates Flammex Flame Retardant	HGF	3 / 2 / 3	0.60	Roll & format material
		3 / 3 / 3	0.80	Format material
Laminates Micro ³⁾	Postformable based on EN 438		0.15	Roll material
Laminates Painting grade / Bonding Grade	Postformable based on EN 438		0.15	Roll material
			0.30 / 0.40 / 0.60	Roll & format material
Laminates AC4	VGS	4 / 2 / 3	0.15	Roll material
			0.40 / 0.50 / 0.60	Roll & format material
Laminates Balancer	HGS	4 / 3 / 3	0.80 / 1.00 / 1.20	Format material
Laminates Balancer	HGS	3 / 2 / 3	0.40 / 0.50 / 0.60	Roll & format material
		3 / 3 / 3	0.80 / 1.00 / 1.20	Format material

¹⁾ Property is not defined in the standard for laminates with coloured core construction.
²⁾ Based on the EN 438 standard, as lacquer-based laminates are not currently described in the standard.
³⁾ Separate processing instructions on www.egger.com.

Table 3: Classification of EGGER laminate grades

Environment and health

Please always use personal protective equipment (PPE) when handling and processing laminates. The following environmental and health information relates to machining and processing laminates.

Emissions

Processing and use outside the technical properties and standard classification of the laminates can increase emissions and thus lead to health hazards. Please observe the marked emission class for the product.

Resins

For the production of laminates, we only use polymerised resins which do not exhibit any hazardous properties after curing the product and are harmless for the intended use of the product. In particular, free melamine is not contained in Laminates in a concentration that would trigger additional information obligations, for example under Regulation (EC) No. 1907/2006 (REACH). Furthermore, laminates naturally comply with the existing migration thresholds according to Regulation (EU) No. 10/2011 on plastic materials and articles intended to come into contact with food.

Health hazard due to dust generation

Dust may be generated during machining and processing. There is a risk of sensitising the skin and respiratory tract. Depending on the processing and the particle size, especially in the case of inhalation of dust, there may be further health hazards. The generation of dust must be taken into account when assessing the risks at the workplace.

Particularly in the case of machining processes (e.g. sawing, planing, milling), effective extraction must be used in accordance with the applicable occupational health and safety regulations. Suitable breathing protection has to be worn if no adequate extraction system is in place.

Fire and explosion hazard

Dust generated during machining and processing can lead to fire and explosion hazards. Applicable safety and fire protection regulations must be observed.

Recycling / disposal

Due to their very high calorific value, laminates are very suitable for thermal/energetic disposal in appropriate combustion plants.

The waste code according to the European waste catalogue is: 17 02 01/03.

Specific national laws and ordinances on disposal must be observed in general.

The protective films used for the laminate are recyclable. If recycling is not possible, the protective film may be disposed of in suitable domestic waste landfill or in a domestic waste incineration plant approved for this purpose.

For further environmental and health information, please refer to the [Environmental and Health Data Sheet \(EHD\) – Laminate](#).

Working with laminates

The following section describes transporting, storing and handling laminates. Improper handling can lead to safety-relevant damage. This can lead to functional impairments and health risks. It is therefore imperative to follow the manufacturer's instructions for use.

Transport

Laminates are generally transported on pallets – see Figure 2. The pallet is suitable for the long-term storage of laminates.



Figure 2: Horizontal transport of laminates on a pallet (Laminates XL are transported without foil).

Cardboard packaging is used for minimum quantities and for deliveries via courier service – see Figure 3. We recommend unpacking the laminates after delivery and storing them according to the chapter [Storage and conditioning](#). Optimal conditions for the further processing of the laminates are only guaranteed under these circumstances.

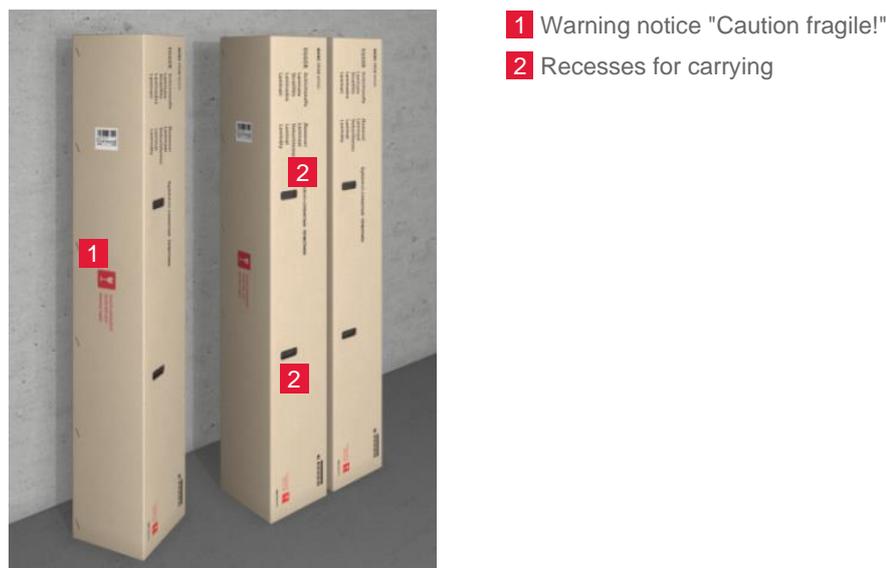
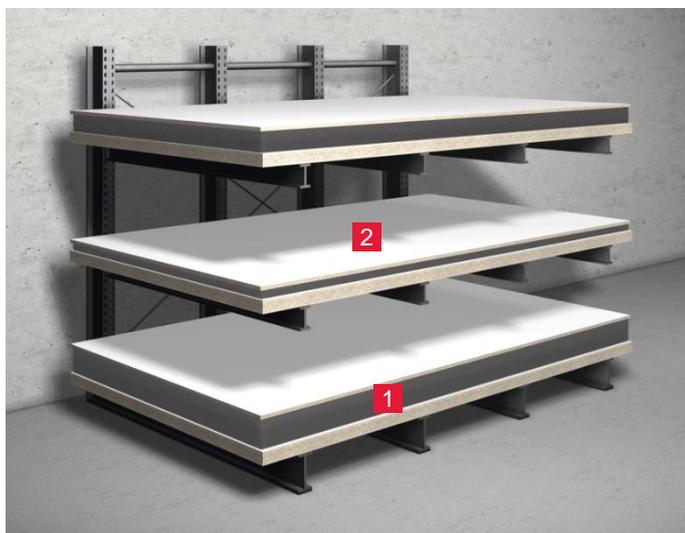


Figure 3: Vertical transport of laminates in cardboard packaging

Storage and conditioning

Laminates must be stored in an enclosed and dry room, protected from moisture, in normal, temperate environments. Laminates that are delivered in cardboard packaging must be stored flat before processing. Before processing, the substrate and the laminate must be conditioned for at least 24 hours if possible under the climate conditions of later use to balance the moisture content of the two materials. In particular, material that is too moist when it is processed leads to faulty bonding and shrinkage, which can result in cracking and warpage.

When the original packaging is removed, the laminate must be stored on full-surface, horizontal cover boards. Direct floor contact and/or exposure to the sun must be avoided. The uppermost laminate should be laid with its decor side facing down and should be covered with a cover board of at least the same format – see Figure 4.



- 1 Laminate stack
- 2 Laminated protective board

Figure 4: Horizontal storage of laminates

Where horizontal storage is not possible, the laminates should be stored at an angle of approximately 80°, in an inclined rack, providing support to the surface area and ends – see Figure 5. Using a cover board of at least the same format is required for this storage as well.

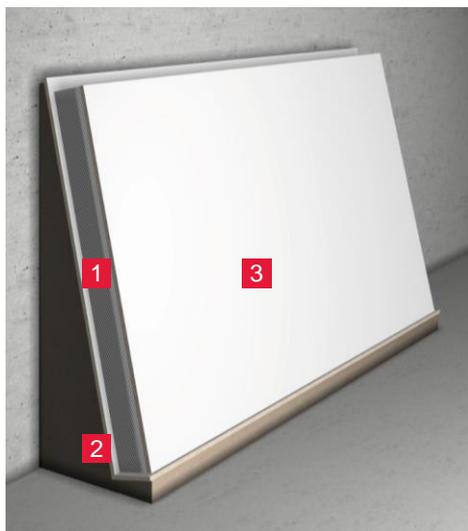


Figure 5: Correctly stored laminates



- 1 Laminate stack
- 2 Counter-bearing with support at 80°
- 3 Laminated protective board

Figure 6: Incorrectly stored laminates

In general, EGGER Laminates can be stored and processed for a very long time if stored correctly. With increasing storage time, laminates harden, i.e. they become more brittle and the postforming properties decrease with increasing age. Depending on the storage conditions, the period for optimal postforming properties is approximately 6 months. In general, laminate can be processed without a time limit. The time period can be determined by the date of manufacture, which is shown on the reverse side of the laminate through injection print – see Figure 7.



Figure 7: Injection printing on the laminate reverse side

For laminate surfaces coated with a self-adhesive protective film (standard for PerfectSense laminate grades), this must be removed no later than 6 months after the delivery date. Otherwise, adhesive residues may remain on the surface.

For detailed information on laminates with protective film, please refer to the technical data sheet [EGGER Laminates with protective film](#).

Handling

The laminate must be inspected for visible damage after removing the packaging and prior to processing. Laminates with protective film should be checked for visible film damage.

In principle, all persons transporting and/or handling laminates should wear personal protective equipment (PPE) such as gloves, safety footwear and suitable work clothing.

It is to be avoided that the laminates are pushed against one another or dragged over one another. The laminates should be either raised, or the reverse side can be pulled over the reverse – see Figure 9.

When transporting or carrying laminates, rolling up the laminate has proven successful. When doing so, the decor side should be on the inside, the surface clean and dust-free and abrasive movements should be avoided. A sufficient number of large, flat and stable pallets must be used for transporting laminate stacks. The stacked laminates must be secured against slipping.

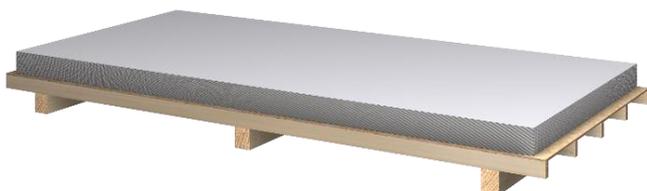


Figure 8: Delivery of the laminates on a pallet



Figure 9: Lifting the laminate

For laminates delivered in a cardboard box, it is recommended to open the box horizontally and then remove the laminates to avoid damage – see Figure 11.



Figure 10: Delivery of the laminates in a cardboard box



Figure 11: Final packing of the laminates from the cardboard box

Due to the self-adhesive effect of the protective film, handling laminates with protective film by means of vacuum aggregates is at your own risk and is only possible to a limited extent (especially for laminates with a higher deadweight). Ideally, the protective film should remain on the laminate until after installation.

Afterwards, the protective film should be removed by pulling evenly (e.g. by hand) at a slight angle to the surface.

If the film is highly adhesive, the adhesive layer can be softened by careful heating, e.g. using a hair dryer, causing the adhesive to lose adhesion. Please note the maximum temperature resistance.

For detailed information, please refer to the technical data sheet [EGGER Laminates with protective film](#).

Processing laminates

As described in the chapter [Storage and conditioning](#), care must be taken to ensure adequate conditioning before processing laminates. The laminates must be conditioned for at least 24 hours under normal climatic conditions before processing. Only use suitable machines and tools for processing. Cutting, drilling and milling tools should always be selected in coordination with the tool manufacturer. Furthermore, it must be ensured that only sharp tools are used, as this is decisive for the processing result.

Cutting

Laminates can be cut to size using standard woodworking equipment, e.g. panel saws, bench circular saws or hand-held circular saws, and CNC milling machines. Panel saws or bench circular saws are generally used to cut to size. Various factors such as correct saw blade projection, feed rate, tooth shape, tooth pitch, RPM and cutting speed must be considered for good cutting results.

Example – cutting with a bench circular saw:

- » Cutting speed: approximately 40 to 60 m/s
- » RPM: approximately 3,000 to 4,000 rpm.
- » Feed: approximately 10 to 20 m/min.

In addition, it is important to ensure that the laminate is pressed against the surface, as "fluttering" can cause very fine cracks that can later lead to notch or stress cracks. With the exception of panel saws and CNC routers, cutting is carried out by hand feed. Use a cutting guide if using a hand-held circular saw or jigsaw. Cutting must be from the underside of the board. Due to the high-quality resins and UV paints used for the surface of laminates, the tool stress is significantly higher than for conventional wood-based materials. We recommend that you use carbide metal-tipped or even diamond-tipped saws or router bits.

Use the following tooth shapes depending on the standard of finish you require (coarse or fine cut) and the substrate used:

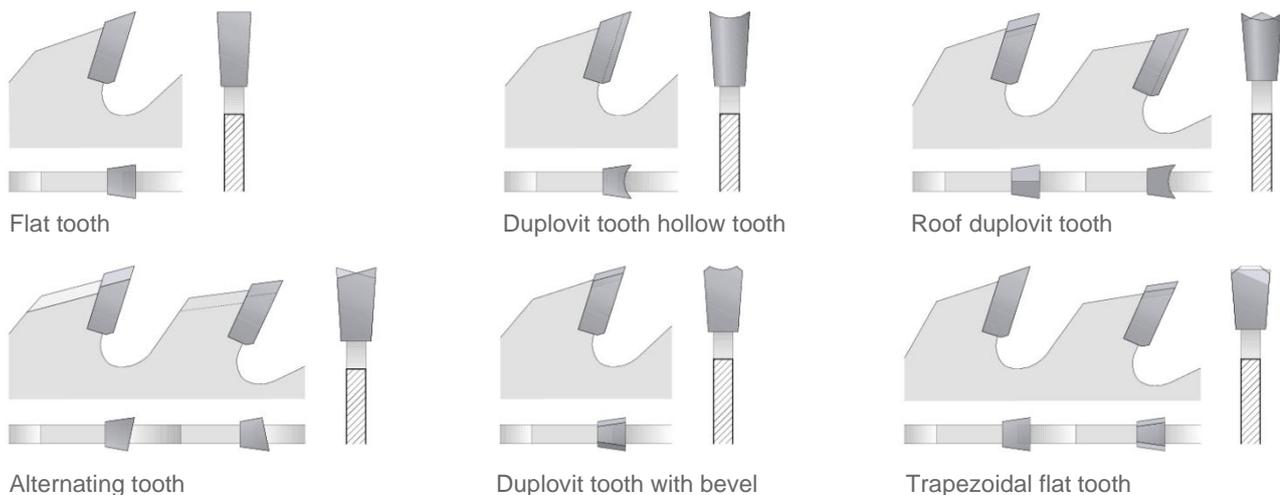


Figure 12: Examples for common tooth forms of saw blades

Bonding / pressing

Core material and preparation

Depending on the requirements and later application, the laminate can be bonded to different core materials with different types of adhesives. Classic wood-based materials are particularly suitable – see Figure 13.



Figure 13: EGGER core materials for coating with laminates (chipboard, MDF, HDF and lightweight boards)

Prior to series production, own pressing tests should be carried out. It should be noted that blockboards and plywood boards do not achieve the homogeneity of, for example, chipboards in their structure since veneer and/or solid wood is used. Veneers or solid wood have components that do not achieve the uniformity of dimensional change under alternating climates as is ensured by chips. Therefore, when solid wood, plywood or multiplex panels are used as core boards, an increased risk of warping must be expected.

However, a flat and tension-free core board is a prerequisite for a smooth surface, therefore core board calibration (calibration

sanding) and a wood moisture content test (indoor applications $\leq 8\%$) must be carried out. Materials that are processed in an excessively humid state tend to shrink and crack over time and can result in warping. When using multiplex boards, veneer boards made of soft woods (e.g. poplar, birch) should preferably be chosen. Also with blockboards, primarily strip boards with softwood top layers and narrow strips should be used to avoid surface unevenness. The core material has to be under no stress with a smooth, level surface. Gluing laminates to solid wood is not recommended. The laminate and core material must always be cleaned thoroughly before gluing. Even before the adhesive is applied the materials must be free from dust, grease, oil or spots of sweat. Calibration sanding of the core material is recommended for this purpose, as this ensures a clean and optimal adhesive surface and at the same time achieves the necessary surface calm.

Adhesive type and bonding

In general, EGGER Laminates are optimally prepared for bonding with their reverse side sanding. The reverse side colours of the laminates have no influence on the processing and are due to the different laminate types. It is important to bond the laminate on the front and reverse side in the same production direction. The production direction can be recognised by the reverse side sanding and accordingly the laminate must be aligned the same on both sides – see Figure 14.

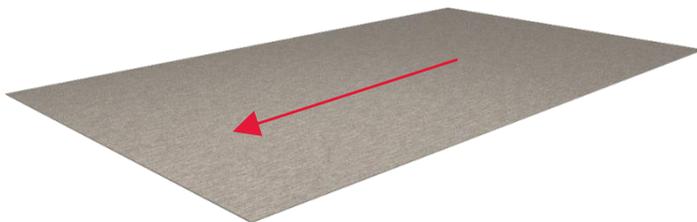


Figure 14: Reverse side sanding shows the production direction

In addition to the laminate alignment and a symmetrical construction of the composite element (see section [symmetrical construction and pressing](#)), an even application of adhesive on both the front and the reverse side is important, otherwise warpage problems may occur.

Basically, the final strength of the adhesive systems used is only reached after a few hours to a few days (take into account the manufacturer's information on curing times). For this reason, particularly large components should be handled with care immediately following bonding, given that bending or twisting may damage the adhesive joint.

Surface-compacted chipboard achieves improved adhesion when glued with dispersion adhesives (PVAc/white glue) after calibration with an 80-120 graining.

In the case of P3 chipboard and higher-density surfaces (e.g. MDF), as well as more moisture-resistant and possibly phenolic resin-bonded materials, it is more difficult to dissipate water from dispersion adhesives. Therefore, a longer pressing time must be taken into account and the final strength of the adhesive joint is only reached after a few hours to a few days (follow the manufacturer's instructions).

Contact adhesives are often used for producing bent elements and to glue laminates with non-absorbent materials, such as metals. The contact adhesive usually consists of polychloroprene and a solvent. Prior to assembly, these solvents must be ventilated and the adhesive film must dry (finger test: the adhesive film must feel dry).

The adhesive strength is created by the action of pressure, as the polychloroprene crystallises under high pressure. Consequently, the stability of the bond depends on the pressure with which the parts are pressed. This means that in order to achieve a good bond, it is necessary to press the bonding surfaces under the highest possible pressure in a short period of time.

The risk of possible faulty bonding (e.g. bubble and crack formation) is increased when using contact adhesives. Therefore, we recommend this adhesive system only in connection with small components and short-term applications (e.g. trade fair construction).

Trial bonding under local conditions is always recommended and the adhesive manufacturer's specifications must be strictly observed.

The information in the following table refers to the use of wood-based material core boards. These are guide values that are influenced by:

- » The type and quality of core material
- » Processing conditions
- » The type of adhesive corresponding to the later degree of exposure D1, D2, D3 or D4¹⁾

Adhesive types	Class ¹⁾	Temperature resistance	Adhesive application rate	Setting time	Press pressure	Pressing temperature/time [min.]							
						20°C	40°C	60°C	70°C	80°C	90°C	100°C	120°C
Dispersion adhesives													
PVAc	D2/D3	< 50 °C	90-150 g/m ² on CPL or core material	max. 10 min.	> 3 bar	8 to 30	4 to 12	3 to 5	-				
2k PVAc	D3/D4	< 100 °C				Observe manufacturer's instructions							
Condensation resins													
UF resin	D2	-	50-150 g/m ²	Pot life: < 7 h.	> 2 bar	-	-	-	5	3	2	1	0.5
MUF resin	-	-	120-180 g/m ²	Pot life: < 4 h.	3-10 bar	-	-	16	7	2	1.75	1.25	-
Contact adhesives													
without curing agent	-	< 50 °C	application on both sides necessary	after ventilation of the solvent	> 5 bar	single contact pressure (follow manufacturer's instructions)							
with curing agent	-	< 100 °C											
Hot-melt adhesives													
EVA	-	< 50 °C	~ 80 g/m ²	< 40 sec.	Roller / calender pressure	Observe temperature & heat tack							
PA/PO	-	< 70 °C	~ 80 g/m ²	< 40 sec.									
PUR	-	< 120 °C	~ 80 g/m ²	5 to 800 sec.		Observe processing temperature							
MR PUR	-	< 120 °C	~ 80 g/m ²	5 to 800 sec.									

¹⁾ Groups D1, D2, D3 and D4 according to EN 204 classify glue according to minimum shear strength values and conduct upon exposure to moisture and water.

Table 4: Adhesive types at a glance – created in cooperation with [Jowat Klebstoffe](#)

With regard to other parameters, such as setting time, initial stability, density or viscosity, it is difficult to make general statements about an adhesive type, as the differences are sometimes very large. For this, please contact the respective adhesive manufacturer and refer to their documentation.

Some manufacturers of adhesives are listed below:

- » Jowat Klebstoffe www.jowat.com
- » Henkel www.henkel-adhesives.com
- » Kleiberit Klebstoffe www.kleiberit.com
- » H.B. Fuller www.hbfuller.de
- » Follmann www.follmann.com

Symmetrical construction and pressing

In general, when manufacturing laminate bonded elements, tension equalisation must be ensured with a suitable laminate. The same laminate (thickness/decor/texture) is used on the front and reverse side or matching neutral laminate balancer on the reverse side.

Using a laminate balancer with the same nominal thickness is generally appropriate. It is, however, recommended to verify the selection of a suitable laminate balancer through pre-testing prior to producing the element. The production of asymmetrical composite elements is the responsibility of the fabricator.

For more detailed information, please refer to the technical data sheet [EGGER Laminates Balancer](#).



If EGGER Laminates coloured core are selected for the composite element, this requires a special selection of adhesives. The reason for this is the stiffness of these laminates, as well as the need for the adhesive joint to not show for visual reasons. It is therefore advisable to discuss the specific application with the adhesive supplier.

In general, compression takes place with the aid of veneer, short-cycle and double-belt presses in a hot or cold process. The pressing parameters, such as the pressing pressure, the pressing temperature and the pressing time, are described by the adhesive manufacturer in the product data sheet. For veneer presses, for example, further recommended values for the pressing pressure are indicated by the manufacturers on the information label on the presses – see Figure 15 and Table 5.

Example – Pressing laminates with a core board:

- » Press: conventional veneer press with pressure table
- » Adhesive: PVAc adhesive (white glue) with the following specifications according to the data sheet:
 - > Pressure: 0.3 N/mm² ≈ 3 kg/cm²
 - > Temperature: Room temperature 40 °C 60 °C
 - > Time: approximately 15 min. approximately 10 min. approximately 5 min.
- » Core board size: 200 x 100 cm
- » Press pressure: 220 ato ≈ 220 bar – see Table 5



L \ B	20	40	60	80	100	120	130
20	5	10	15	20	20	25	30
40	5	15	20	30	35	40	45
60	10	20	25	35	45	55	60
80	15	30	40	55	70	85	90
100	20	40	55	85	105	125	140
120	25	55	85	115	140	170	185
140	30	65	105	140	175	210	230
160	35	70	105	140	175	210	230
180	40	85	125	170	210	255	275
200	45	95	145	195	245	290	315
220	50	105	165	220	270	320	345
240	55	115	185	245	295	345	370
250	60	125	205	270	320	370	395

1 = spez. Pressdruck 3.0 kg/cm²
 2 = spez. Pressdruck 4.0 kg/cm²

Die Ablesbaren Werte verstehen sich in ato und sind am Druckschalgerät einstellbar

Figure 15: Veneer press with sample pressure table

Table 5: Pressure table (pressing pressure per component size)

Some manufacturers of veneering presses or laminating lines are listed below:

- » Format-4 www.felder-group.com
- » Höfer www.hoefer-maschinen.com
- » Itaipresse www.italpresse.com
- » Joos www.joos.de
- » Langzauner www.langzauner.at
- » Wieder www.wieder-maschinenbau.at
- » Robert Bürkle www.burkle.tech/de-de

The production of laminate bonded boards can be implemented, for example, in a continuous process with hot-melt adhesives and laminating systems – see Figure 16.

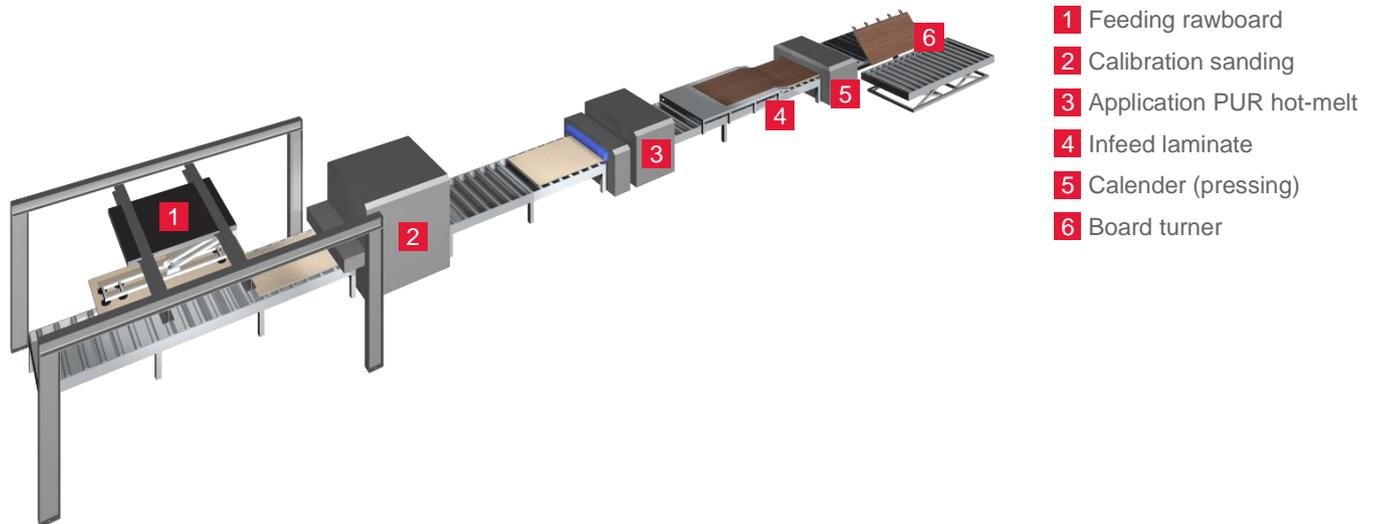


Figure 16: Example of laminating line with PUR hot-melt from [W. & L. Jordan GmbH](#) in Kassel

In this production example, the core board is first sanded and possible soiling is removed using cleaning brushes. Then the PUR hot-melt is applied to the core board. In the next step, the laminate is fed as sheets from above onto the core board and finally pressed by means of a calender. The laminated board coated on one side is then turned over and the reverse side is coated in the same continuous process.

Processing laminate bonded boards

The main processing steps for laminate bonded boards are described below. During processing, the general safety regulations must be observed and personal protective equipment (PPE) must be taken into account.

Drilling

Drilling tools for plastics are especially suitable for drilling laminates. HSS drills (High Speed Steel) are suitable for hand-held machines and HM drills (carbide) are recommended for machines with mechanical feed.

Example – drilling with a twist drill:

- » Cutting speed: approximately 0.8 m/s for HSS drill; 1.6 m/s for carbide drill
- » RPM: approximately 1,000 to 3,500 rpm.
- » Feed: approximately 0.02 to 0.05 mm/rev [at 1,000 revolutions immerse from 20 to 50 mm per min].

When drilling, pay attention to the immersion speed (feed), otherwise the laminate could be damaged. When drilling through-holes, the laminate must rest on a firm base.

Depending on the required size of the hole (e.g. pilot hole, cup band hole, etc.), the following drill types are used:

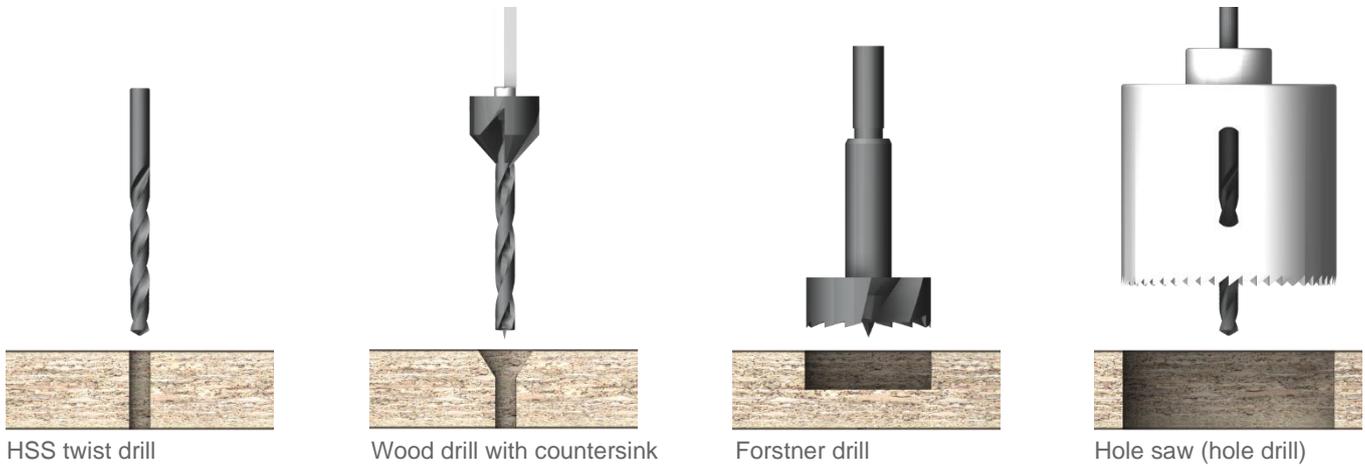


Figure 17: Examples of proven drill types

If fittings, wall profiles, etc., are fixed to the laminate surface (or composite element), the laminate must be predrilled in the area of the screw joint. The holes must be at least 0.5 mm larger than the screw diameter in order to avoid tension in the material – see Figures 18 and 19. This must also be taken into account with self-tapping bolts, as stress cracks can also occur here.

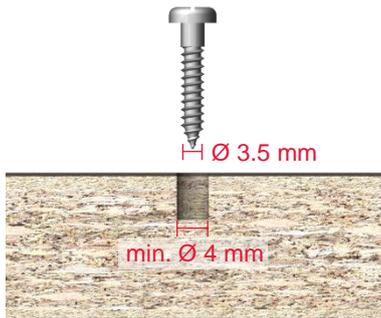


Figure 18: Example of a 3.5 mm screw

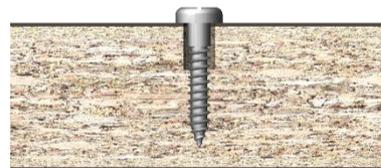


Figure 19: Screw joint with pre-drilling

It is generally recommended to deburr the holes in the laminate. For example, a drill with an integrated countersink can be used for this – see Figure 17. When drilling with a hole saw, deburring is always necessary due to possible stress cracks. For larger diameters, surface milling cutters are generally used.

Milling

Milling can be carried out by means of a manual machine, such as a hand router, or by a stationary machine, such as a bench router or a CNC machining centre. In addition to sharp milling tools, an even better result can be achieved by using diamond-tipped tools (DIA) instead of carbide-tipped milling cutters (HM), especially for large series (longer tool life).

Hand machines

All woodworking machines for milling are suitable for laminate bonded boards or laminates. Due to the wide variety of possible applications for hand machines and milling tools, it is difficult to give detailed processing and tool recommendations. Therefore, please observe the recommendations of the machine and tool manufacturers when using milling tools.

Example – Flush trimming with a hand router:

- >> Cutting speed: approximately 10 to 25 m/s
- >> RPM: approximately 20,000 rpm
- >> ø - milling cutter: approximately 10 to 25 mm

Depending on the requirements, hand machines can be equipped with different milling tools, for example:



Figure 20: Examples of milling cutters for hand machines

The edge processing of a laminate bonded board after pressing the laminate can be done with a hand router (also called flush trimming). The protruding laminate is trimmed at the lateral board edges with the help of a profile miller with a thrust ring (flush trimmer) – see Figure 20.

Stationary machines

The stationary milling machines, such as the bench milling machine or the CNC milling machine, are equipped with milling bits or end mills for spindles. The possible applications of these milling bits are even more extensive and accordingly a detailed machining and tool recommendation can only be made by the respective manufacturer.

Depending on the milling required, a machining centre is often used in the area of stationary machines. The following are two milling tools that are often used:



Figure 21: Examples of milling tools on woodworking centres

Cut-out

In general, before processing, ensure that the composite elements are supported securely and that sawing, drilling or milling is not likely to cause any damage. In particular, narrow joining areas in the board can break or crack if the board is not fully supported during processing. The board cut-outs should also be secured to ensure that they do not suddenly fall out or break. This could injure persons or property.

The cut-outs should always be rounded with a minimum radius of 5 mm, as square-edged corners are detrimental to the material and lead to cracking – see Figures 22 to 25. This applies particularly to applications where, due to frequent exposure to heat, the laminates dry out for example, and the shrinking tension is therefore much greater.

The cut-outs should preferably be made with a hand router or CNC milling bit – see section [Milling](#).

If using a jigsaw, you need to pre-drill the corners to the correct radius and saw from radius to radius. You should cut from the underside of the board to prevent the laminate coating from ripping off. The edges must be finished – also known as "edge breaking" using sandpaper, files or hand milling – in order to avoid notch cracks. The same careful finishing should be considered when using "circular cutters" for e.g. recessed/spot lights – see section [Drilling](#).

Always read through the instructions and use the assembly templates provided by the manufacturers.

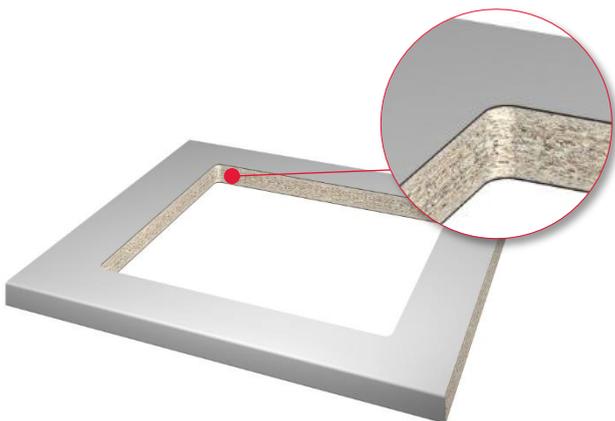


Figure 22: Cut-out with correct radius of 5 mm

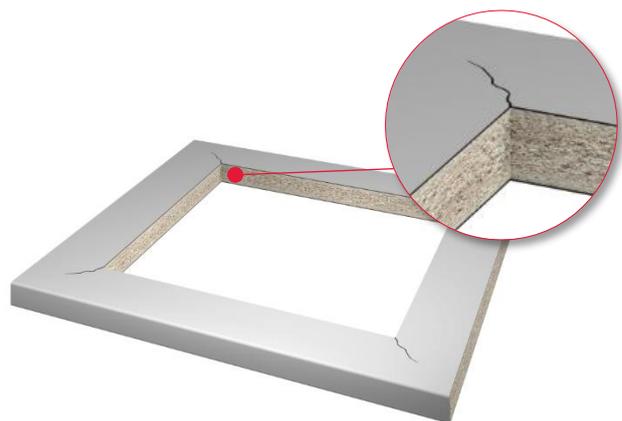


Figure 23: Cut-out with incorrect, too small radius

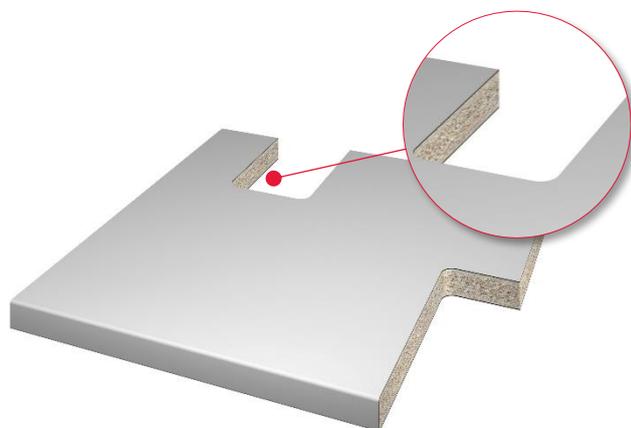


Figure 24: Recess with correct radius of 5 mm

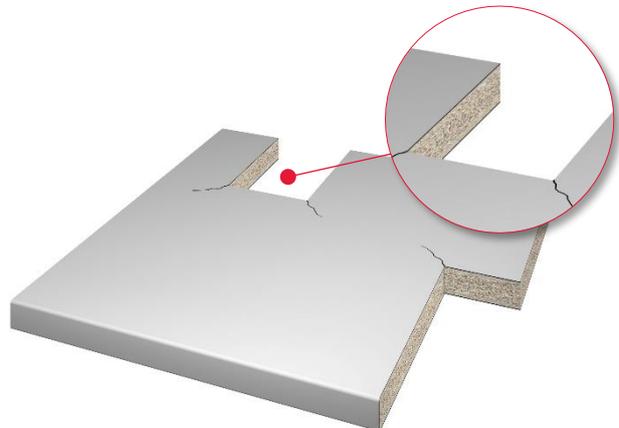


Figure 25: Recess with incorrect, too small radius

As a rule, laminate elements, such as worktops, fronts, etc., are effectively protected from moisture penetration by the laminate surface. Moisture and damp can still reach the core material, however, via unprotected edges such as cut-outs, butt joints, corner joints, rear edges, drill holes and screw holes. The necessary final sealing operations should always be carried out during the final assembly phase, especially with horizontal surfaces, such as worktops.

For concealed cut edges, sealing profiles and cross-linking sealing compounds made of silicone rubber or polyurethane have proven their suitability. When using sealants, a primer also has to be applied; either one that forms a film or a cleaning primer depending on the material.

You must follow the manufacturer's instructions carefully when using these materials.

Apply the sealant leaving no gaps or holes and then smooth over with water and detergent. Areas near joints should be masked off to prevent the surface from becoming dirty. Pipes or conduits must be centred so that a minimum clearance of 2 to 3 mm is maintained on all sides of the feed-through. Careful sealing is also required – see Figure 26.

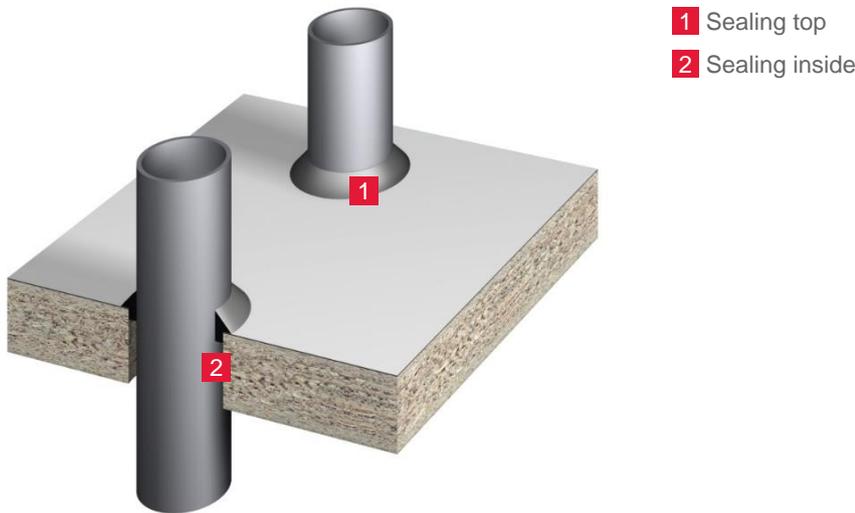


Figure 26: Sealing a pipe opening against moisture penetration

Cut edges can also be sealed using a two-part lacquer or two-part adhesive. Manufacturers supply sealing rings, profiles or collars with attachments such as mixer taps, sinks and hobs. Always follow the manufacturer's instructions when fitting these items.

For further details on e.g. flush-mounted or undermount sinks and the necessary cut-outs, please refer to the [Processing instructions EGGER Worktops](#).

Edging

The narrow surfaces of the laminate bonded element can be processed in different ways. We recommend edging visible cut surfaces with EGGER ABS or PP edges in the same decor – see Figure 27. The edges provide a matching finish to all decorative coatings and have a protective function in addition to the design function. As part of the decor and material combination, EGGER also offers the matching edging for the decorative laminates.

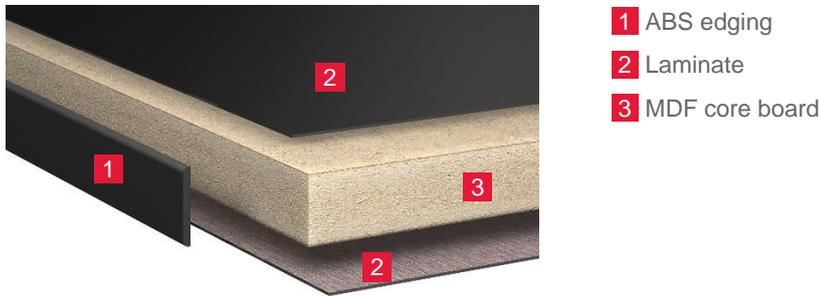


Figure 27: Construction of a laminate bonded board with EGGER ABS edging

Commercially available edge bonding machines or processing centres are normally used for edging. Manual edge bonding by means of a gluing stand or edge press is also possible. The reverse side of the edge is coated with a primer, which ensures perfect bonding. This coating has been optimised for use with EVA, PA, APAO and PUR hot-melt adhesives. The laminate bonded elements and the edging material must be conditioned beforehand at room climate.

Further information on EGGER Edging can be found on our website www.egger.com/edging.

An alternative to ABS or PP edges are solid wood glues, which are usually glued to the narrow surface of the core material before gluing the laminate – see Figure 28.



Chipboard with ABS edging

Chipboard with solid wood glue

Figure 28: Comparing ABS edging and solid wood glue

Another method of edging is the postforming process described below, in which the laminate is deformed around the narrow surface and finishes on the reverse side of the core board.

Postforming / hot-forming

In addition to the flat laminate bonded boards, with their angular edge designs, EGGER Laminates are also used for postforming purposes. Postforming elements are characterised by their seamless laminate transition from the surface across the edging. Postforming of laminate requires the use of a laminate type P (postformable) – see Table 3.

Preferably, profiles are designed in the form of convex radii and produced using stationary or continuous postforming equipment. Concave profile designs can only be achieved with stationary equipment and require the core board to be prepared in a specific way. Experience of postforming and the subsequent processing is also necessary.

As described in the chapter [Storage and conditioning](#), EGGER Laminates can generally be processed for a very long time if stored correctly. With increasing storage time, laminates harden, i.e. they become more brittle and postforming properties deteriorate. Depending on the storage conditions, this period is approximately 6 months (from date of production).

Selecting and processing core material

Correctly selecting the core material plus factors such as board temperature, timber moisture content, surface quality, board structure, profile design, gluing system, glue application quantity, etc., determine the subsequent quality of the postforming

elements. EGGER Eurospan raw chipboards have proven themselves with their calm and even surface, as well as a homogeneous board structure. Particular care needs to be taken when using chipboards on a dense, solid middle layer; failure to do so may result in adhesion problems or "pressing through" of the middle layer. Correct core board selection must be observed already upon profile execution, i.e., depending on profile depth, the use of MDF boards may be necessary. Particular care must be taken when using plywood panels and veneer boards. A low timber moisture content of the boards ($\leq 8\%$) as well as the conditioning of the different materials are particularly important – see chapters [Storage and conditioning](#) and [Cutting](#). Because of the layers of glue and the changing arrangement of fibres between the layers of veneer, it is more difficult to mill a profile than it is with chipboards or MDF boards; milling these boards also results in uneven wear to the saws. Cutting should follow the direction of the fibres in the top layer of veneer.

Profile milling

Carbide-tipped or diamond-tipped milling bits (for large series) are generally used for profiling the core boards. There are various factors that determine the milling quality, including feed rate, RPM, the number of cuts and the quality of the core board. The quality of profile milling (blade marks, protruding chips, etc.) can be improved by using diamond sanding disks or sanding units. The choice and design of tools should be discussed and agreed with a tool manufacturer. It is important for profiles to be milled with precision, and stepped cuts and incomplete milling should be avoided; there may otherwise be difficulties at the postforming stage. The creation of small radii in particular demands extreme milling precision. It is also important that any dust and loose chips are removed by brush, air jet or suction once the milling process is complete.

Bonding

In addition to the recommendations and adhesives for surface bonding mentioned in the section [Adhesive type and bonding](#), certain restrictions apply to postforming. Irrespective of the postforming process, bonding of the laminate is generally carried out in two production stages:

- » Step 1: Bonding the surface of the laminate (front and back) on the profiled core board
- » Step 2: Bonding in the profile area (rounding) within the postforming process

As a general rule the amount of adhesive applied for gluing a surface should be such that none oozes out into the profile or rounding, especially when using condensation resin (urea-formaldehyde resin). The adhesives used for gluing in the profile area are special PVAc adhesives with rapid initial adhesion and a quick setting time. This is necessary to "accommodate" the aligning forces of the laminate.

Always follow the instructions of the respective adhesive manufacturer.

Stationary postforming procedure

There is a considerable variety of stationary postforming procedures, but only the commercial process that uses contact heat is explained here in more detail. It allows the production of convex postforming elements in small and medium batch sizes. Before the actual postforming (forming) is started, first the following preparatory production steps must be performed:

- » Step 1: Bonding the surface of the laminate (front and back) on the profiled core board
- » Step 2: Flush trimming the laminate on the rear and/or any necessary profiling on the rear of the core board
- » Step 3: Applying special PVAc adhesive to protruding laminate and the profile area of the core board

During the first production step, it must be ensured that the laminate protrudes over the core material to the front in the necessary width according to the core board thickness and profile design. This is known as a laminate flag or laminate projection – see [Figure 29](#). The postforming itself – the reshaping of the laminate and the simultaneous bonding with the core material – is carried out using a flat, heated, pressurised and movable metal bar – see [Figures 30-32](#).



Figure 29: Laminate projection



Figure 30: Postforming by means of a movable metal rail



Figure 31: Postforming the laminate



Figure 32: Postforming the laminate



Figure 33: Finished postforming edge

The contact heat from the heated metal bar has the effect of heating the laminate up to the required postforming temperature. The necessary temperature of EGGER Laminates lies in the range of approximately 150 °C to 200 °C. The temperature may be influenced by the following factors:

- » Laminate thickness and decor
- » Adhesive type and quantity in the postforming area
- » Deformation rate

Precisely controlling the laminate temperature in the postforming area with the help of a temperature sensor is therefore very important. Once the postforming temperature has been achieved, the metal bar, remaining under constant pressure, automatically follows the outline of the profile on the postforming element, thus joining the laminate to the core board. The speed of the sequence of movements in the postforming process can be controlled, thus enabling the temperature to be adjusted. If the optimum temperature is exceeded, the result may be delamination of the laminate (blister formation); if, on the other hand, the temperature is too low, the likely result is that cracks (fractures) will form.

The deformation rate essentially depends on the amount of energy and the laminate thickness, but also on the profiling of the core board. To prevent the laminate from drying out and heat from being lost, the laminate must be warmed through and postformed as quickly as possible. EGGER Laminates should preferably be postformed in the same direction as that in which they were fabricated, this can be recognised from the direction of the sanding marks on the reverse side – see section [Adhesive type and bonding](#).

Postforming in a continuous operation

Postforming in a continuous operation is more economical than the stationary postforming process described above. It requires the production of large series and is not suitable for item production/batch size 1. This method is only suitable for producing convex curves. Here, again, the laminate should be deformed in the same direction as that in which it was initially fabricated. Although transverse deformation is possible in principle, it does involve considerable limitations with regard to postformability (minimum radius) and the component dimensions; the postforming process is, moreover, considerably longer and more difficult. Depending on the design of the facility, the necessary production steps are carried out sectionally and/or continually. It is a requirement with both plant designs that the profile milling of the core material (see section [Profile milling](#)) and bonding of laminate and substrate (see section [Bonding](#)) take place before the actual postforming. Both concepts have their advantages and disadvantages.

In the following, the postforming process in a continuous operation using the EGGER model series 200 (also L-profile):

- » After the profile has been milled, the postforming element (also press part) is pressed by surface bonding of the laminate on the front and reverse side – see [Figure 34](#).
- » In the first section of the postforming system, the pressed part is progressed to its final profile shape by additional milling units. With the L-profiles, only the rear side of the laminate is milled flush with the core board and the front laminate is cut to the required projection – see [Figure 35](#).
- » In the second section, the special PVAc adhesive is applied evenly to the core board and the laminate flag using a glue roller and/or spray nozzles. To ensure an adhesion both now and in the future, it is extremely important the bond is applied evenly to both surfaces – see [Figure 36](#).
- » In the third section, the special PVAc adhesive that has been applied is aerated, the water contained in the adhesive evaporates, thus activating it for the deformation that is to follow. At the same time, the laminate is heated up by an infrared heater to prepare it for the deformation process. This is sometimes referred to as "plasticising" – see [Figure 37](#).
- » In the fourth section, the deformation process itself takes place. The forming rod (also bending rod) is used to draw the laminate in the direction of the profile. In the pressure zone behind the rod, the laminate is changed to its final shape using profile and pressure rollers, i.e. the profile and pressure rollers generate the compression force required for adhesion and within a short time the laminate is bonded with the core board – see [Figures 38-41](#).
- » In the fifth section, the final reworking of the postforming elements is carried out. With L-profiles, the projecting laminate on the front side is milled flush to the rear side of the element, and the fibre milling rebuffed as necessary. For U-profiles, a sealant and/or hot-melt sealant should be applied – see [Figure 42](#).



Figure 34: Bonding laminate to core material



Figure 35: Laminate projection

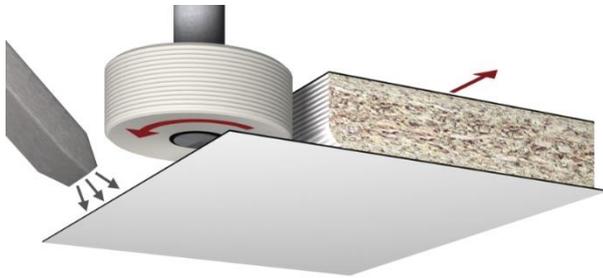


Figure 36: Gluing the edge

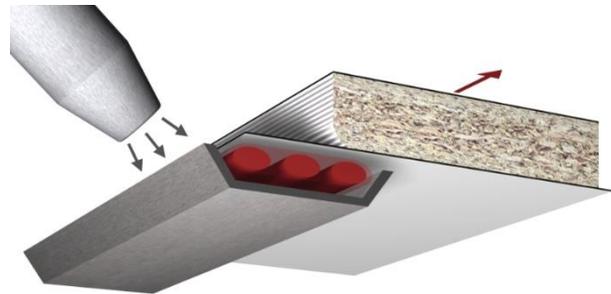


Figure 37: Heating the laminate projection

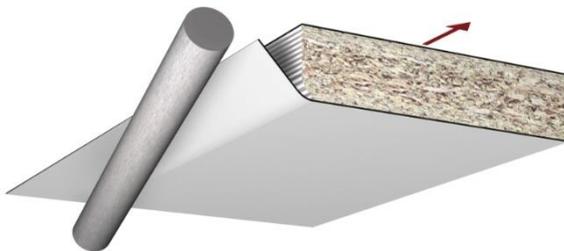


Figure 38: Postforming the laminate

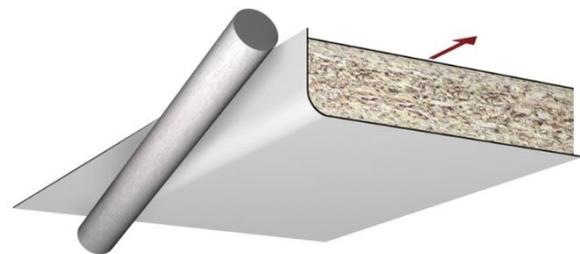


Figure 39: Postforming the laminate

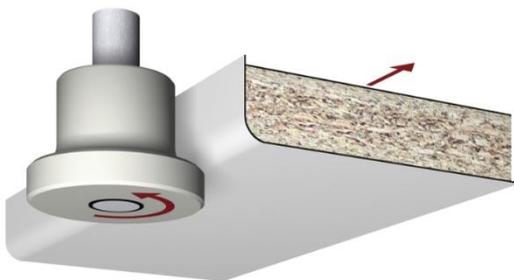


Figure 40: Pressing the laminate to the radius

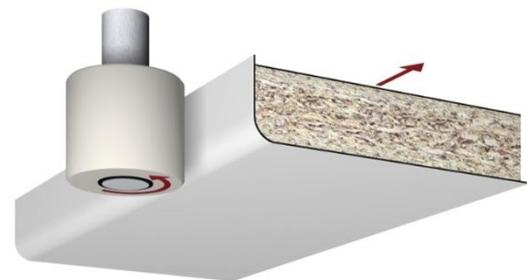


Figure 41: Pressing the laminate to the edge

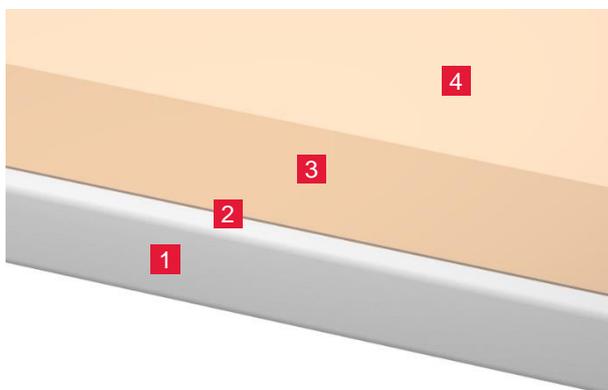


Figure 42: Underside EGGER Postforming Worktops

- 1 Postforming edge
- 2 Model 300/3 sealing
- 3 UV lacquer coating
- 4 Balancer

Shape gluing / cold-forming

One advantage and processing option of laminates is the implementation of curved, i.e. concave or convex, laminate bonded elements. EGGER Laminates are ideally suited as decorative coating material for these elements. Laminates with a nominal thickness of 0.80 mm are used as standard; thinner laminates, such as 0.60 mm, allow smaller radii. However, these shaped parts require special core materials that meet these requirements. The use of bendable plywood panels or alternatively slotted MDF boards is recommended – see Figures 43 and 44. Bendable plywood panels are preferred as they provide easier edging and higher screw pull-out strength compared to slotted MDF boards.



Figure 43: Bendable plywood

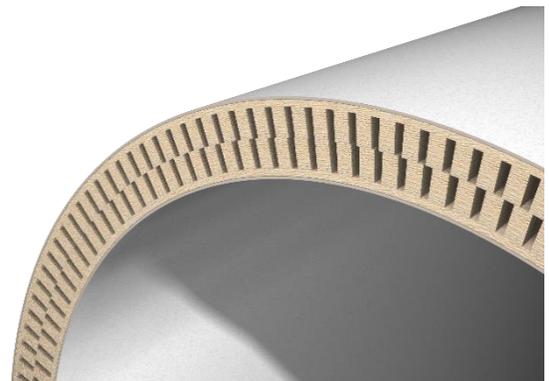


Figure 44: Slotted MDF core board

Cold-forming and perfect bonding of the laminate can only be achieved in combination with templates – see Figure 45. The templates are shaping and are used in the usual manufacturing processes, e.g. manually by clamps, ferrules, veneer presses or by means of special vacuum presses. With an appropriate template, even more complex shapes such as a piano lid are possible – see Figure 46.

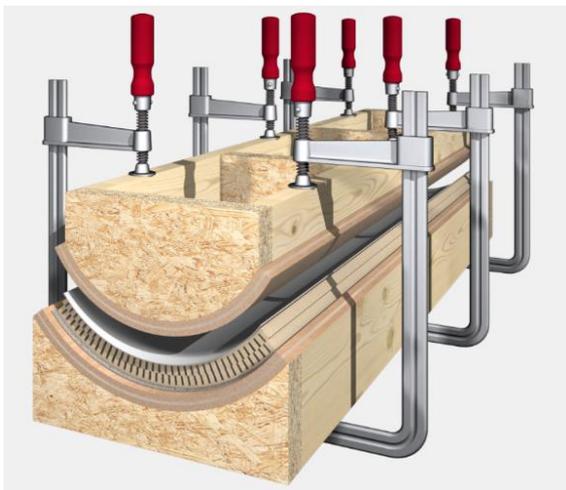


Figure 45: Gluing a shaped part using a template

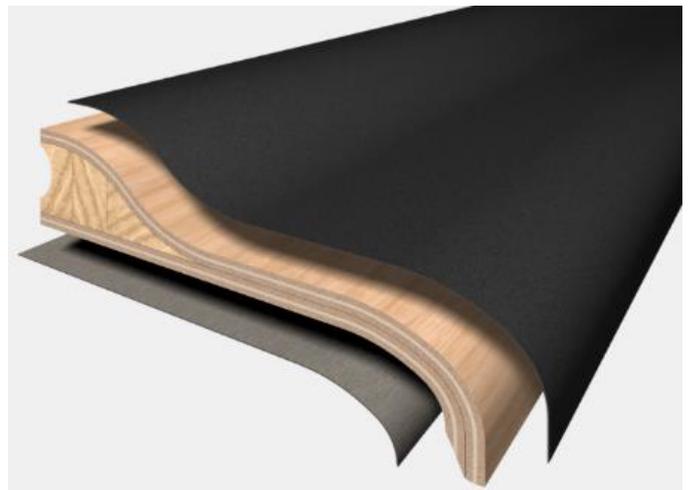


Figure 46: Bendable plywood with laminate

The choice of adhesive and glue requires special consideration, i.e. the size of the shaped part as well as the time for the necessary process steps must be taken into account. An important criterion is, for example, the processing time of the adhesive, which must be matched to the individual plywood layers to be glued. These individual plywood layers are placed in the template together with the laminates for the front and reverse side and then pressed.

A symmetrical construction must also be ensured for shaped parts, i.e. a laminate balancer of the same nominal thickness must be used – see section [symmetrical construction and pressing](#).

In the classic postforming process, the laminate is briefly heated with exposure to high heat. In this process, deformation parallel to the direction of manufacture is common and the possible radii are normatively defined for type P laminates.

In the production of shaped parts, the laminate is cold-formed using a template and pressure. There are no normative specifications for this cold-forming, i.e. the minimum radius of the laminate depends on various criteria:

» **Laminate type**

A laminate type P is advantageous for small radii. Laminate grades of type S (e.g. laminates with coloured core) require larger radii.

» **Age of the laminate**

Laminates are more flexible immediately after manufacture. Laminates harden and the process is influenced by storage conditions. Rule of thumb: up to 6 months after manufacture is ideal. The date of manufacture is printed on the reverse side.

» **Laminate insert**

Post-forming transverse to the direction of manufacture is easier with cold-forming than parallel to the manufacturing direction – see Figures 48 & 49. The manufacturing direction of the laminate can be seen from the reverse side sanding – see Figure 47.

» **Size of component**

The necessary process steps make smaller components easier to handle.

» **Production possibilities and fabricator experience**

Due to these influencing criteria, it is recommended to carry out appropriate preliminary tests before series production.



Figure 47: Manufacturing direction

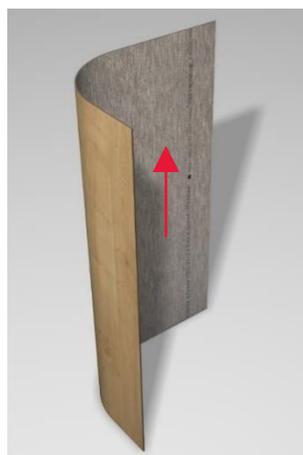


Figure 48: Parallel mfg. direction



Figure 49: Transverse mfg. direction

If prefabricated shaped parts are subsequently bonded with laminate, e.g. with the help of contact adhesives, then care must be taken to ensure uniform surface pressure. It is important to ensure uniform adhesion and not selective pressure, as otherwise faulty bonding could occur in the shaped part. The use of contact adhesives for shaped parts can only be recommended to a limited extent because processing errors cannot be corrected.

For special shaped parts and/or series production, there are companies that specialise in curved and rounded shaped parts and can realise almost all applications.

The following is an example of a contact for special shaped elements and/or series production:

- » **Holz in Form Niedermeier GmbH**
Schloßstraße 65
D - 84163 Marklkofen / Warth

Phone: +49 8734 937550
E-mail: info@holz-in-form.de
Website: www.holz-in-form.de

Lacquering

For subsequent lacquering, it is recommended to use EGGER Laminates Painting Grade / Bonding Grade. With this laminate grade, the unsanded coloured front side (black or white) can be lacquered or also glued. The reverse side is sanded (as standard) and can be bonded with commercially available adhesives.

An application example is the coating of door elements that are subsequently painted in individual colours – see Figure 50. For the coating of e.g. door elements, the door industry uses the laminate nominal thickness of 0.15 mm.



Figure 50: Painting a door with EGGER Laminates Painting Grade / Bonding Grade

For lacquering the front side, a "cleaning sanding" with grain 240-280 is always recommended to ensure that there is no residue on the surface. Due to the wide variety of primer and varnish systems, preliminary tests are also urgently required here.

In any case, observe the processing instructions of the respective lacquer manufacturer.

Flame retardant coating

Laminates are the ideal solution for horizontal and vertical surfaces with medium to high stress, as well as for curved or rounded elements. EGGER Laminates Flammex Flame Retardant are offered for the production of flame retardant laminate bonded boards. Laminates Flammex are suitable as decorative and flame retardant coating material in combination with flame retardant core boards. Combinations with corresponding composite elements enable applications with increased requirements for fire resistance. They meet the requirements of the German building material class B1 and the French fire resistance class M1.

Non-combustible products of the "A2-s1, d0" variant can be purchased in the decors of the EGGER Decorative Collection from the following manufacturers:

» **Eurodeco Wallsystem GmbH**

Ramsried 20
D - 93444 Bad Kötzing

Phone: +49 9941 908850
E-mail: info@eurodeco-wallsystem.de
Website: www.eurodeco-wallsystem.de

» **Ed. Heckwerth Nachf. GmbH & CO. KG**

Siemensstraße 13
D - 32120 Hiddenhausen

Phone: +49 5223 987-0
E-mail: info@heckwerth.de
Website: www.heckwerth.de

Wall cladding

Thanks to their robustness and suitability for everyday use, laminate bonded boards are particularly well suited for use as interior wall cladding. We recommend a minimum board thickness of 16 mm for such applications. The substrate (wall surface) should be completely dry before attaching the composite element. Always ensure sufficient rear ventilation or acclimatisation of the boards. The material may not be exposed to trapped moisture. All parts to be joined together must follow the same production direction.

Substructure and rear ventilation

Laminate bonded boards must be attached to a stable, corrosion-resistant and force-fit substructure that securely supports the weight of the wall cladding and ensures ventilation behind the elements – see Figure 51. In dry construction applications, the attachment of the substructure and the laminate bonded board must be anchored to the stud framing.

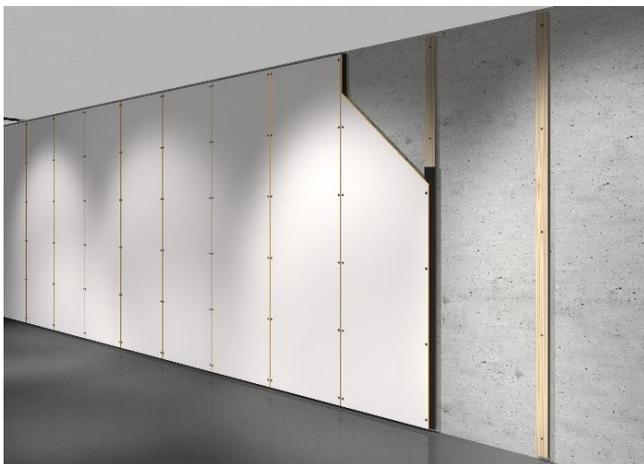


Figure 51: Substructure for wall cladding with laminate bonded boards

The selection of the fasteners has to be tailored to the substructure and the weight of the wall cladding. Different climate conditions in front of and behind the elements can lead to warpage. It is therefore essential that wall cladding with laminate bonded boards always makes provision for adequate ventilation to the rear of the boards, which allows temperature and humidity to equalise. Ventilation must be towards the room side.

If there is no rear ventilation or a rear ventilation gap < 2 cm, absorbent mineral substrates, such as walls or plaster, must be pre-treated with waterproof, elastic barriers. These barriers are generally painted on and prevent water from penetrating into the masonry, which is essential for an application in humid conditions.

Vertical battens generally permit air circulation. Where substructures are arranged horizontally, an appropriate construction must ensure that adequate ventilation is provided. The substructure should be vertically plumb to allow tension-free mounting across the entire surface.

Suitable substructures include vertical strips of wood, aluminium or wood-based materials.

The maximum spacing of the battens or the substructure depends on the composite element thickness used. It is important to ensure that air inlet and outlet areas remain unobstructed so that air circulation is not impeded. Also ensure that the moisture of the surface to be panelled does not differ significantly from the moisture of the finished component. The mount of the laminate bonded boards to the substructure can be mechanical or glued.

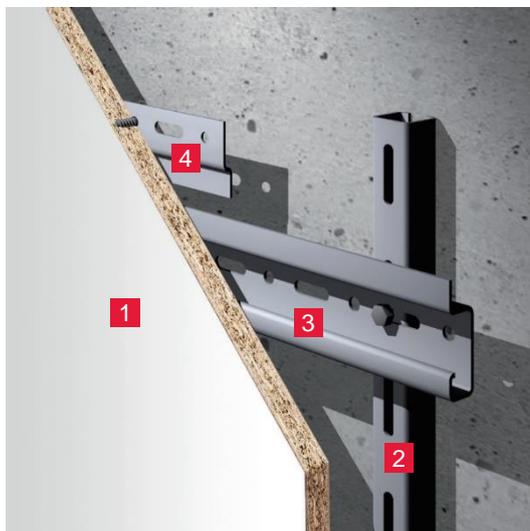
Mechanical mount

Mounting is done via screws or rivets on the substructure. A sufficient expansion play and the right positioning of floating and fixed points must be taken into account. An EPDM tape (ethylene propylene diene rubber) must be used for decoupling when using wood as substructure.

The concealed mount of laminate bonded boards by hanging permits straightforward disassembly and appears more visually appealing in comparison to visible mounting methods. Removing the boards is quick and simple. Cables and pipework installed behind the elements are easy to reach. Depending on the chosen mounting system, another advantage is that the elements can be adjusted later on. Tension-free mounting of the elements is also possible. For all mounting methods that involve hanging, sufficient space must be allowed to raise and lower the elements. This air space or "hanging space" remains visible as a shadow gap.

If profile strips are used, the horizontal substructure is grooved to accommodate the rebate rail attached to the laminate bonded board. For ease of fitting, the tongue of the rebate rail should be thinner than the groove. The rebate rails on the composite elements should not extend across the full width of the elements, they should be intermittent to permit vertical air circulation. Rebate rails made of plywood or metal Z-profiles can be readily used. If a secure screw joint cannot be achieved with thin composite boards, additional gluing is also possible.

Alternatively, systems with metal mountings are also offered for non-visible mechanical mounting – see Figure 52. The chosen system must be used according to the manufacturer's recommendations to ensure secure installation.



- 1 laminate bonded board
- 2 vertical substructure
- 3 horizontal substructure with mounting for suspension
- 4 non-visible screw connection of the metal fitting

Figure 52: Substructure system with metal fittings

Glued mount

Laminate bonded boards can also be fixed by bonding using an adhesive system on a force-fitted substructure – see Figure 53. When using wood as a substructure, it is necessary to apply a primer as a preliminary step to ensure secure adhesion and moisture decoupling.

In any case, observe the processing instructions of the respective adhesive manufacturer.



- 1 laminate bonded board
- 2 substructure
- 3 adhesive
- 4 double-sided adhesive tape

Figure 53: Bonding to a substructure made of compact laminate

Care and cleaning recommendation

Due to their resistant, hygienic and dense surface, EGGER Laminates do not require any special form of care. Generally, the surfaces are easy to clean. This also applies to textured surfaces. Do not use sanitary cleaners or detergents with abrasive components, as using such cleaners may lead to changes in the degree of gloss and/or scratch the material.

For detailed information, please refer to the technical data sheet [Cleaning and usage recommendations for EGGER product surfaces](#).

Additional documents / product information

If you have any questions regarding processing, please get in touch with our contact persons:

- » Laminates: Application technology Gifhorn plant
- » Laminates XL: Application technology St. Johann plant

You will find further information in the following documents:

- » Processing instructions "EGGER Laminates Micro"
- » Technical data sheet "EGGER Laminates Balancer"
- » Technical data sheet "EGGER Laminates with protective film"
- » Technical data sheet "EGGER Laminates for whiteboard use"
- » Technical data sheet "EGGER Laminate resistance to chemicals"
- » Technical data sheet "Cleaning and usage recommendations for EGGER product surfaces"
- » Technical data sheet "EGGER Laminates"

Provisional note:

These processing instructions were prepared based on the best available information and with due diligence. The information provided is based on practical experience and in-house testing and reflects our current level of knowledge. It is intended for information only and does not constitute a guarantee in terms of product properties or suitability for specific applications. We accept no liability for any mistakes, errors in standards, or printing errors. In addition, technical changes may result from the further development of EGGER Laminates, as well as changes to standards and public law documents. Therefore, the content of these processing instructions cannot serve as instructions for use nor as a legally binding agreement. Our General Terms and Conditions of Sale and Delivery apply.