

I MATERIALI



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T e c h n i c a l   I n f o r m a t i o n

ABET LAMINATI

# 1

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## INTRODUCTION AND GENERAL RULES

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- a) HPL laminate in thicknesses between 0,6 and 1,8 mm is a surfacing material designed to be glued onto rigid cores.
- b) The quality of the core, choice of glue and the gluing pressure and temperature affect the appearance and general quality of the finished product.  
Using too thin an HPL will accentuate any defects in the core (technically known as telegraphing).  
Glossy and other smooth finished usually tend to show up such defects more than opaque, textured finishes.  
Good results depend not only on the material used, but also on correct application, the criteria for which are detailed below.

N.B. the following indications refer to:

PRINT HPL  
PRINT HPL F1  
PRINT HPL POSTFORMING

As far as special covering products as:

PRINT HPL COLORPACT  
PRINT HPL MAGNETICO  
PRINT SERIE METALLI  
PRINTWOOD  
DIAFOS  
FIBRAMEL

Some recommendations may not be valid.

Please refer to the specific documentation or contact the Information Service of Abet Laminati.

# 2

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## TRANSPORTING AND STORING HPL PLASTIC LAMINATE SHEETS

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### 2.1 TRANSPORT

Every care must be taken when handling the panels, and they should be lifted to avoid scratching the decorative surfaces.

It is also recommended that large panels be transported curved along their longest axis.

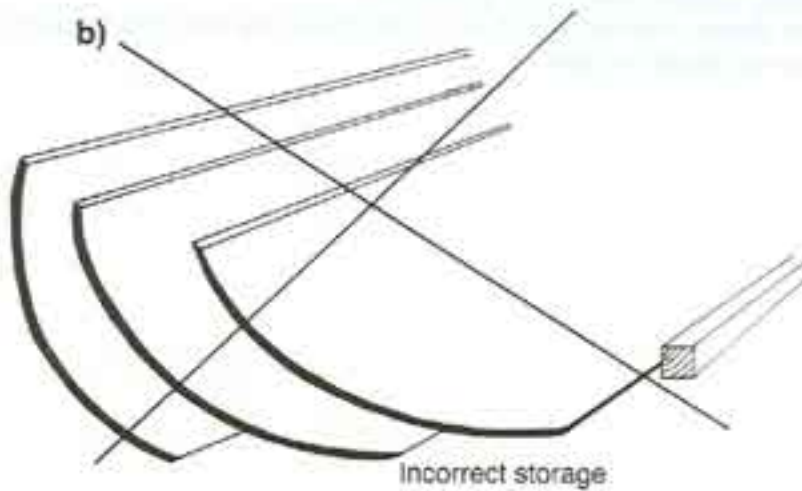
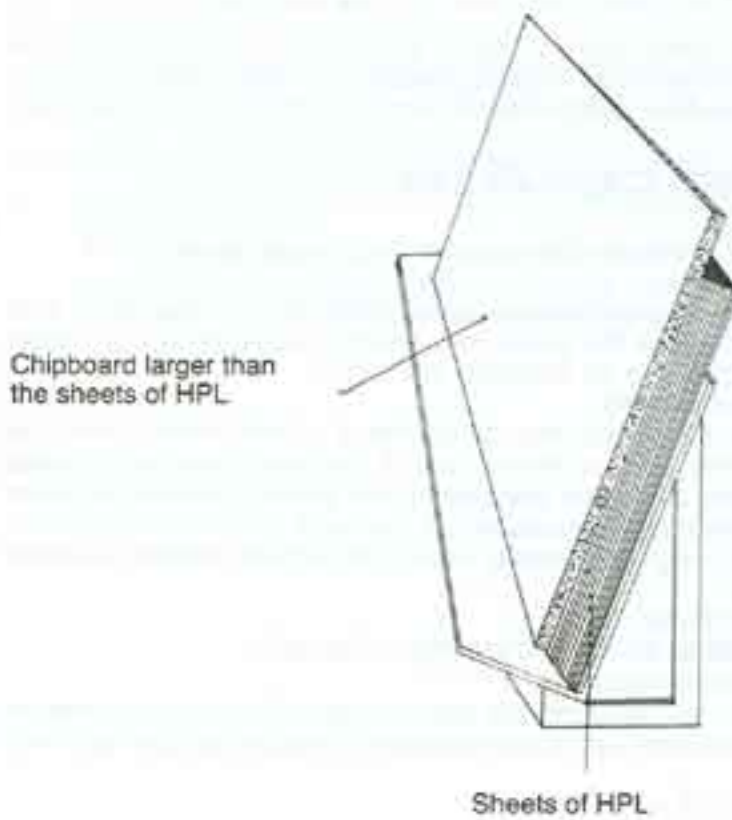
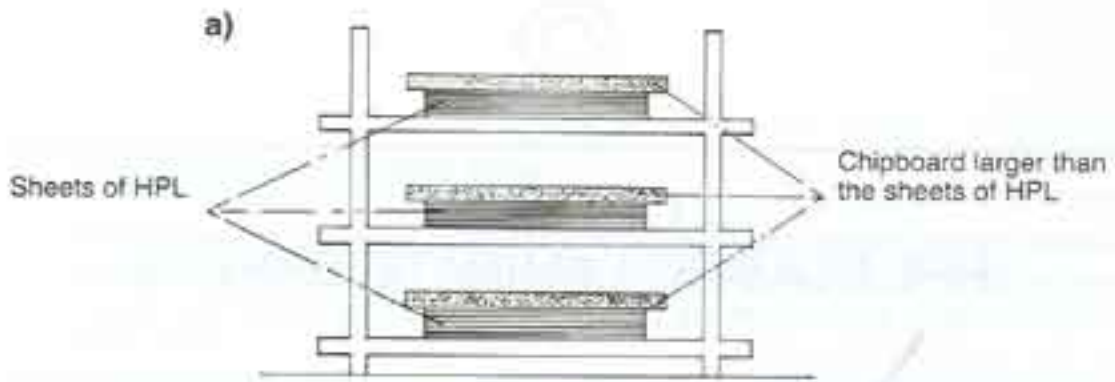
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### 2.2 STORAGE

It is best that the panels be stacked flat, each exactly on top of the other. When sheets cannot be stacked horizontally, it is recommended that they are stored inclined at an angle of 60° to 70° against a surface that supports their entire area, with a stop on the floor to prevent them from sliding. The sheets must always be stored in pairs, decorative face to decorative face. The last panel on the stack (if the panels are stacked flat) should be laid with the decorative surface facing downwards. In order to avoid excessive distortion and make further conditioning easier, it is recommended that the sheets be stored in a closed dry room with ambient conditions of between 10°C and 30°C and humidity of 40-65%.

- a) Right position
- b) Wrong position

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# 3

## CUTTING HPL PLASTIC LAMINATE SHEETS

### 3.1 CUTTING WITH A PORTABLE ELECTRIC SAW

Circular or other types of saws may be used to good effect. Follow a guide-rule to make straight cuts. The laminate must be placed decorative side face down, resting on a very clean surface which if necessary, should be covered with felt.

### 3.2 CUTTING WITH A FIXED CIRCULAR SAW

The following conditions are essential if good results are to be achieved:

- An accurate guide-rule;
- Sufficient pressure exerted on the piece (positioned with the decorative side upwards) at the point where the blade cuts, using a pressure tool or, better still, pressure drums that can be adjusted for height;
- Correct projection of the blade.

For rough-shaping work, the panels may be cut two at a time, face to face. The projection of the tips of the teeth on the surface of the panel must be adjusted to match the shape of the tooth and diameter of the blade. It should be noted that in this case, splinters may be produced on the back of the sheet (decorative surface downwards). Highspeed steel (HSS) circular saw blades must not be subject to vibrations:

- Tooth Pitch less than 10 mm
- Cutting Speed from 20 to 50 m/s, according to the teeth
- Feeding Speed 30 m/min maximum.

Circular saw blades with tipped teeth last much longer. They must be treated with care, however, since they are quite sensitive to knocks and contact with metal surfaces.

- Tooth Pitch from 10 to 15 mm
- Cutting Speed from 70 to 100 m/s.
- Feeding Speed from 15 to 30 m/min.

In most cases, blades less than 2 mm thick are not rigid enough, vibrate and cut leaving jagged edges.

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### **3.3 CUTTING WITH A BAND SAW**

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Band saws can only be used for cutting laminates under certain conditions. They will often be required for cutting shaped pieces. Satisfactory results can be achieved with fine-toothed blades such as those used for light metals.

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### **3.4 CUTTING OF PANELS WITH HPL LAMINATE ON ONE OR BOTH SIDES**

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For cutting bonded laminate panels, the same rules apply as those given for cutting sheet laminate. For circular saws, the cutting angles depend on the height at which the blade is attached. When, in the case of panels with two decorative surfaces, the top edge of the cut splinters, the blade must be positioned higher up; if the bottom edge is affected, however, the blade must be positioned lower down.

The optimum height must therefore be found by trial and error. Belt saws are generally not recommended for cutting bonded boards with two decorative surfaces because the side facing the resting surface splinters.

# 4

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## MACHINING HPL PLASTIC LAMINATE

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### 4.1 SMOOTHING BY HAND

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#### 4.1.1 With a File

Square rather than milled files must be used to level off edges or smooth sharp corners. The file must be moved from the decorative side towards the substrate.

Soft files or sand paper (100-150 grain) and two-speed scrapers must be used to smooth sharp corners. Milled edges must be worked as follows:

- gently rub sharp edges and parts that are not smooth with sand paper; grind the edge with a scraper;
- rub down the edge again with fine sand paper.

Be careful of the projecting grains of sand.

#### 4.1.2 With a Plane

The edges may also be milled using small hand planes for laminates. Metal planes are recommended since their resting surface does not wear out by being rubbed against the edge of the laminate. The cutting angle of the blade must be approx. 15°.

### 4.2 MACHINING WITH A PORTABLE LEVELLING MACHINE

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4.2.1 Preferably portable levelling machines should be used, as well as belt or grindstone polishers if necessary to mill the protruding edges of glued panels. A piece of felt may be glued to the resting surface. Shavings must be removed from time to time, without rubbing the surface, preferably by air suction. Milling machines with 2 tipped blades can be used both for cutting straight and at an angle.

4.2.2 That part of the laminate sheet that extends beyond the substrate must be minimal (2-3 mm) so as not to damage the tools, since vibrations would be created in the protruding laminate.

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### **4.3 MACHINING WITH A FIXED VERTICAL MILLING MACHINE**

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**4.3.1** When working with wood milling machines, cutters or blade-holder heads with interchangeable knives may be used.

Cylindrical heads are used:

- with vertical blades for laminated panels with one or two surfaces;
- with crosscut inclined blades for laminated panels with one surface;
- with double-twist inclined blades for laminated panels with 2 surfaces.

**4.3.2** When milling panels that are not glued, which have a maximum thickness of 5 mm, using a cutter with a diameter of 100 mm, for instance, the operating speed should be 12,000 rpm.

In the case of panels glued to the substrate, a lower number of revolutions (approx. 3000-6000 rpm) are recommended.

**4.3.3** The milling machine must be moved every 100-150 m so that the blade is always sharp. With substrates laminated on one side only, a blade-holder and cutter-holder head, 40 mm high, may be adjusted up to 15 times for height before it needs to be sharpened.



# 5

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## DRILLING HPL PLASTIC LAMINATE

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### 5.1 DRILLING TECHNIQUE

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- 5.1.1** The most suitable bits for drilling laminates are those used for plastic materials; these are twist bits with a bit angle of  $60^\circ$  a  $80^\circ$  (as opposed to  $120^\circ$  for bits normally used on metals) and a sharp helix angle (high-speed angle) with a wide space for drillings (wide flute). The recommended rake is  $7^\circ$  and the recommended attachment angle  $8^\circ$ . Holes with a diameter of up to 15 mm can be achieved using twist bits. For holes with a diameter of 15 to 40 mm, expanding drill bits with one or more blades and a guide pin are used, and for even bigger diameters adjustable circular blades with a guide pin are used. In the latter case, if possible, the piece must be drilled from both sides.
- 5.1.2** The speed of penetration of the bits must never be increased so much as to heat up the decorative surface of the laminate, which would thus be damaged.
- 5.1.3** Using a hard-wood base will prevent the material from chipping where the bit comes out. Better results may be achieved in mass productions by using drilling templates with couplings on all sides so that the part being drilled can be held firmly in place.

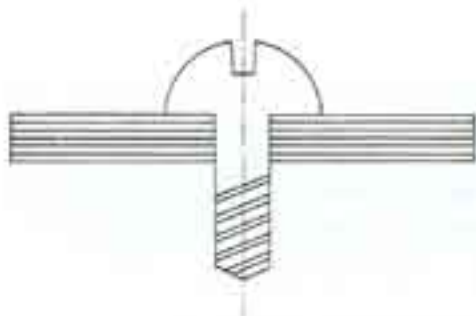
### 5.2 PRECAUTIONS FOR USE

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The diameters of the screw holes must of course be greater than the diameters of the screws themselves and measure 0,5 mm more than the diameter of the screw. The screws must not touch the edges of the hole, but have a clearance in all directions, so that the material may move slightly in the event of changes in temperature and humidity.

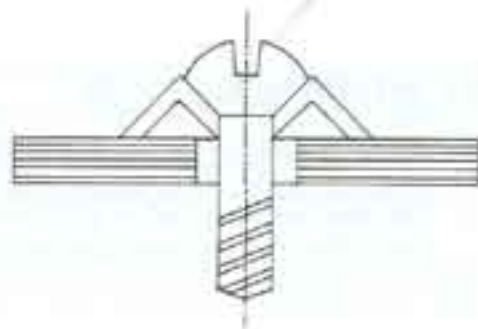
In all cases, plastic or rubber washers should be used to prevent round-headed screws from being over tightened. Oval-headed screws must never be used since they would not give the laminate any clearance.

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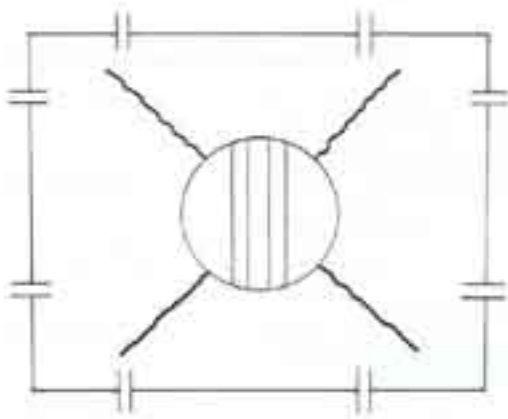
**WRONG**

There is no free space around the screw. This may cause cracking due to stress.

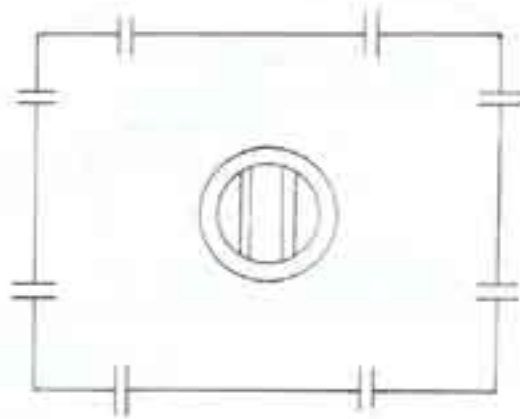


**CORRECT**

Screw is fixed in a large hole and by means of a washer.



**Screw fixed wrong**



**Screw fixed correct**

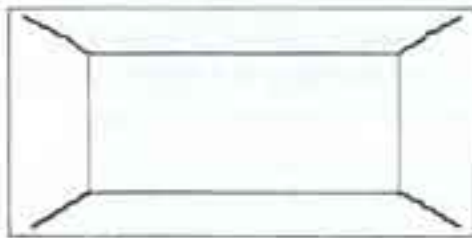
# 6

## BORING HPL PLASTIC LAMINATE

### 6.1 INTERNAL CUT-OUTS

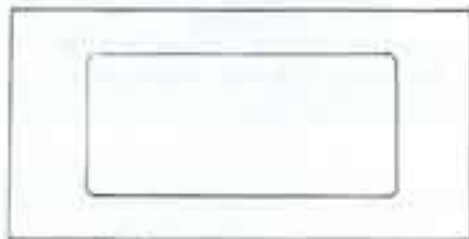
Both for internal drilling and cutting, the corners must always be rounded. The internal radius must be as great as possible. The inner cutting angle must be rounded off at a radius of 5 mm for an inner side which measures up to 250 mm. This radius must gradually be increased for openings with bigger sides.

WRONG

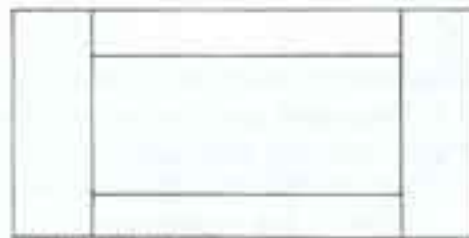


Square corners cut out.

CORRECT

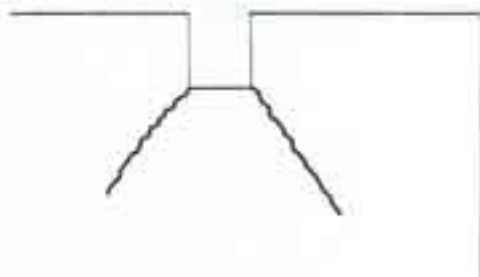


Radius corners to cut out.



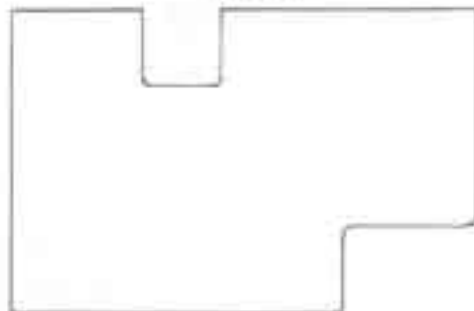
HPL jointed at square corners.

Wrong



Internal cut-outs.

Correct



All internal cut outs should have radius corners.

# 7

## SUBSTRATES

**7.1** Laminate is a semi-finished product which, when less than 2 mm thick requires, for most of its applications, a core material that does not undergo too many dimensional variations and has as flat a surface as possible; these are the preliminary conditions for ensuring that the surface of the laminate is flat once on the substrate.

The following table lists those materials that can be combined with laminate and their use. The substrate used must be chosen on the basis of the intended

- dimensional stability
- flatness
- surface quality
- even thickness
- stiffness or general mechanical characteristics
- resistance to water
- resistance to fire.

Classification	Types	Method of Use
SOLID TIMBER	Soft Wood (e.g. poplar, okoume, zamba, pine, deal) Hard Wood (e.g. oak, sapelle, beech)	Use restricted to small areas, due to marked distortion.
PLYWOOD	Preferably soft woods (e.g. poplar, okoume, zamba)	In view of their consistency and relative thickness, they are used as self-supporting substrates, for large areas.
CHIPBOARD	Single-layer Multi-layer	
BLOCKBOARD	With a layer of veneer (e.g. poplar and okoume) with softwood blocks inside, or similar	
FIBRE PANELS	Medium hard, Hard, Extra hard or Impregnated Woods	
HONEYCOMB STRUCTURES	Wooden, Impregnated Paper, Non-impregnated Paper, Metal	Used as a filler for composite substrates or as a direct substrate with a frame.
EXPANDED MATERIALS	Rigid expanded foam comprising polystyrene synthetic resins such as: PVC, phenol and polyurethane	Used as self-supporting substrates for a vertical surface or as a filler for composite substrates. They have good heat and sound-proofing properties.
METAL SHEETS	Ferrous Metals Non-ferrous metals	
MINERAL SUPPORTS	Plasterboard panels Plaster Panels Cement Panels with plastic binders	



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## TREATMENT

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### 8.1 GENERAL RECOMMENDATIONS

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We recommend that the HPL laminate and the chosen substrate should always be conditioned at the same time so as to stabilise them before application. If used damp HPL laminate, like substrates in general, has a tendency to contract and in extreme conditions, delaminate or crack. By contrast, if used too dry, it tends to expand and blister if an insufficient amount of glue has been applied.

As a rule, when used in temperate climates, we recommend that HPL should be fitted fairly dry.

We set out below a few of the most commonly adopted treatments and drying methods.

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### 8.2 TREATMENT IN THE WORKS

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#### 8.2.1 Under Controlled Conditions

This system gives the best results. It requires a room kept at a temperature of approx. 20 °C and 50% humidity, storing the material (HPL and substrate) for at least 10 days by stacking the panels in pairs on battens so as to encourage air circulation.

#### 8.2.2 HPL Laminate Drying Process

When time and production requirements dictate, the laminate can be made to undergo an accelerated partial drying process. This is done by placing the laminate, again kept apart by battens, in a small heated room under the following conditions:

- approx. 3 h at 40 °C or
- approx. 2 h at 50 °C

It is also possible, using a hot press, to put two panels in at a time (face to face) for a limited period (e.g. 10 minutes at 70 °C).

This operation should be performed a few hours before gluing.

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### 8.3 PRECAUTIONS TO TAKE WHEN FITTING ON SITE

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All of the previous recommendations apply.

We stress the need to work in dry, closed rooms which should be heated when necessary.

# 9

## BALANCING

### 9.1 BALANCING COMPOSITE PANELS

In order to achieve effective balancing of a composite panel, stresses must be symmetrical in relation to the medium plane. Since there is always stress between two different materials and laminate is not a completely inert material, when covering a free-standing panel, not fixed directly to a rigid structure, materials that exhibit the same dimensional behaviour with temperature and humidity changes must be applied on both sides of the substrate.

**9.1.1** The best results for balancing are achieved by using laminates identical to those used on the decorative side. In this case, both sides of the support must be glued at the same time and the two panels applied in the same direction (remembering which is the reverse side of the laminate).

**9.1.2** Satisfactory results may be achieved by using phenolic balancers, made by laminate manufacturers. However, we recommend that tests be carried out first.

**9.1.3** The larger the areas to be balanced, the more necessary the precautions concerning:

- 1) choice of balancing materials;
- 2) density, symmetry and rigidity of the substrates;
- 3) correct conditioning of the materials.

# 10

## GLUING

Since there are many types of glues available on the market, they must be chosen to match the materials used and the final intended purpose.

### 10.1 CLASSIFICATIONS OF GLUES

#### 10.1.1 Thermoplastic glues

- a) Neoprene glues
- b) PVAC glues
- c) Special Acrylic Compositions
- d) Hot Melt glues

#### 10.1.2 Thermohardening glues

- a) Urea-formaldehyde glues
- b) Melamine-formaldehyde glues
- c) Resorcinol-formaldehyde glues
- d) Phenol-formaldehyde glues
- e) Polyurethane glues
- f) Polyester glues
- g) Epoxide glues

### 10.2 GENERAL CONDITIONS CONCERNING PRESSURE, TIME FOR WHICH PRESSURE IS TO BE APPLIED AND TEMPERATURE

#### 10.2.1 Glues that require strong pressure to maintain contact between laminate and support:

##### a) pressure applied for a long time

- PVAC glues
- Acrylic glues
- Urea-formaldehyde glues
- Phenol-formaldehyde glues
- Resorcinol-formaldehyde glues

The pressure required for these glues must be exerted by a mechanical or hydraulic press

##### b) pressure applied for a short-time (so-called contact glues)

- Neoprene glues.
- Pressure may be achieved by hammering or using a rubber roller.

#### 10.2.2 Glues that require only a slight pressure to maintain contact between laminate and support:

##### a) pressure applied for a long time

- Polyester glues
- Polyurethane glues
- Epoxide glues

##### b) pressure applied for a short time

- Hot Melt glues which can only be used on special machines.

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**10.2.3 Temperature conditions:**

**Gluing Temperature**

Each gluing operation may be performed at a minimum ambient temperature of 15 °C. Higher temperatures reduce the glue's adhesion time.

**10.2.4 Hardeners**

Neoprene glues may be used with a vulcanising agent hardener which increases the glue's resistance to heat. Thermohardening glues are used with accelerators and catalyzers, which ensure that the glue takes and also reduce the temperatures and time for which pressure must be applied.

**10.3 TABLE SHOWING THE USE OF GLUES DEPENDING ON THE SUBSTRATES USED**

Substrates	Thermoplastic Glues				Thermohardening Glues						
	Neoprene	PVAC	Acrylic	Hot Melt	Urea-formaldehyde	Melamine-formaldehyde	Resorcinol-formaldehyde	Phenol-formaldehyde	Polyurethanes	Polyester	Epoxide
Wood-based substrates	x	x		x	x	x	x	x	x	x	x
Paper-based Honeycomb Substrates	x	x			x	x	x	x	x	x	x
Plastic-based Expanded or Honeycombe Materials:											
- Polystyrene			x <sup>1</sup>						x <sup>1</sup>		x <sup>1</sup>
- PVC <sup>2</sup>	x		x					x	x		x
- Phenol-formaldehyde	x	x			x	x	x	x	x	x	x
- Polyurethanes	x							x	x		x
All Metal Substrates in the form of Sheets or Honeycomb Structures	x			x			x <sup>3</sup>		x	x	x
All Mineral Supports in Sheets or Foams with a basis of:											
- Plaster		x			x						
- Cement	x	x						x	x		x
- Expanded Cement	x	x						x	x		x
- Expanded Glass	x	x						x	x		x

<sup>1</sup> Without solvent capable of dissolving polystyrene.

<sup>2</sup> Unless instructed otherwise by the PVC manufacturer.

<sup>3</sup> May be used on aluminium and light alloys.





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