FENIX®

STORAGE, HANDLING AND PROCESSING GUIDELINES.

FOREWORD

FENIX is an innovative material created for interior design, suitable for both vertical and horizontal application.

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The guidelines are intended to provide a general understanding of FENIX products and general recommendations on the processing, installation and use of these products.

Technical data sheets and other relevant guidelines for FENIX are available for download from the website www.fenixforinteriors.com. Before use, customers and end users of the product are required to check for updated technical information regarding product performance from the website www.fenixforinteriors.com.
Arpa refers exclusively to the technical information published on its websites. Arpa disclaims any liability in connection with any other technical information.

STORAGE AND TRANSPORTATION

Transportation and handling of the sheet material should only be carried out using suitable equipment. Sheets must always be handled with care to prevent damage to the external surface. FENIX is not an inflammable material; therefore fire prevention and protection measures must be adopted as per wood based products.

STORAGE

The sheets must be stored in a proper environment as for example a dry, clean and frost-free room. Place pallets and sheets on a flat surface that provides full support. Keep sheets in the original packaging whenever possible. Remove straps if sheets are to be stored for a long period of time. Prevent moisture forming between sheets. Do not place moisture-sensitive (paper) layers between sheets.
Partial (on one side only) exposure to moisture or heat can be prevented by:

- stacking the sheets one on the top of the other;
- avoiding gaps between sheets, e.g. when sheets have been machined;
- removing protective films from both sides at the same time;
- removing protective film within 24 hours after packaging removal.

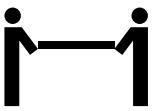
TRANSPORT

FENIX sheets should be handled and transported only by a moving or other professional with proper equipment with great care to avoid breakage and damage. If the sheets should be loaded or unloaded, they should be lifted and not slid during loading and unloading operations, unless they are back to back, in pairs. One sheet rubbing against another can cause surface scratches or abrasions.
Single sheets should be carried with the pigmented part facing the carrier's body. Two people are needed to handle large sheets, and we further recommend bending the sheets lengthwise.
Prevent dust from depositing on and between sheets. Use adhesive, easy to peel off stickers for marking / coding and remove immediately after installation.

Transport of FENIX Thin Sheets

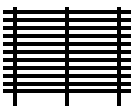
In case of thin sheets (less than 0.9 mm thickness), individual sheets may be rolled up for handling with the pigmented side facing inward, forming a cylinder about 600 mm in diameter or at least large enough not to damage the sheet. When transporting stacks of sheets, use a platform of suitable size and stability, securing the sheets with straps or stretch film in order to avoid dangerous slipping.
If the sheets have to be transported, secure the sheets using straps and place corner protection under the metal straps.

During transportation, the panel pigmented side should be facing face the carrier's body



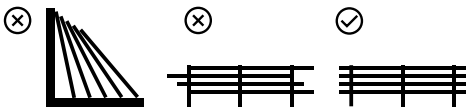
Two persons are always required to handle large sheets.

Fork length >1.5m with load capacity > 2500Kg

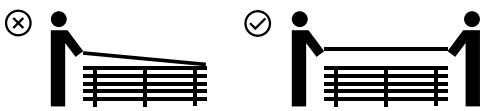


6m max height for stacking pallets

Panel should be stored in sheltered rooms



Correct panel positioning



Panel handling should be carried out by two people

Transport of FENIX Solid Panels

Secure the panels using straps during transportation. Place corner protection under the straps.

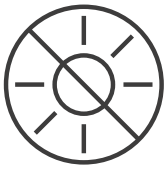
Sheets with adhesive protective film

The protective film is designed to temporarily protect the surface from dust, scratches and marks left by handling equipment; it does not protect from corrosion, dampness or chemical agents.

Sheets covered with protective film should be stored in a clean dry atmosphere at room temperature (ideally 20 °C), avoiding exposure to atmospheric agents and UVA rays.

The protective film should be removed from the sheet surface after application and before the final item. In case of thick sheets with protective film on both sides, the film should always be removed from both sides at the same time. In any case, the removal should take place within 6 months from the date of shipping by Arpa.
Arpa shall not accept liability for improper use of sheets covered with a protective film, nor for any consequences of an incorrect application.

Protective film symbols:



The protective film used is photosensitive; therefore storing sheets under direct sun light is to be avoided.

**The product has a slight directionality, which is only visible under some light conditions.
Direction is indicated on product packaging for extra precaution.**

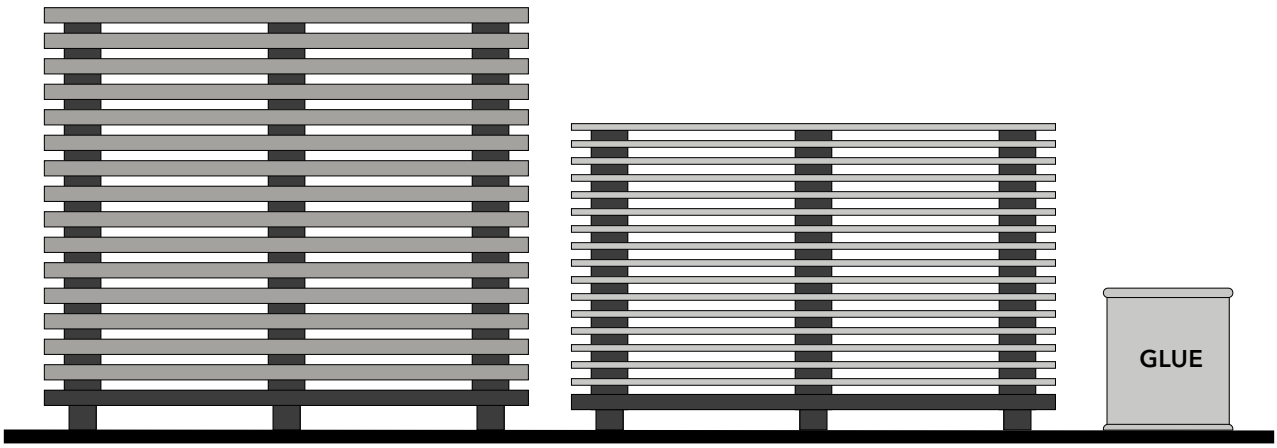
FENIX PROCESSING

FENIX sheets are composed of over 60% cellulose fibre. They are sensitive to temperature variations and, above all, to humidity variations, which can cause dimensional changes.
Dimensional changes of FENIX sheets can be different from those of the support and so cause warping of the finished composite sheet.
This issue can be solved by:
• pre-conditioning of both support and sheet before gluing;
• balancing the composite sheet so that both sides are made of sheets with identical properties;
• ventilation and humidity control of the room where the composite sheet is installed;
• installing the sheet so as to allow for dimensional changes, if any.

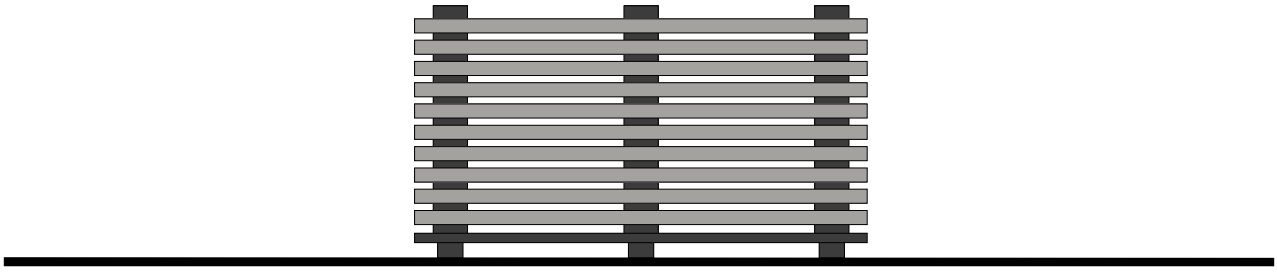
PRE-CONDITIONING
In order for FENIX sheets and its support to reach a balanced and constant level of humidity, both the sheet and support need to be pre-conditioned at the same time before gluing.
This operation makes it possible to reduce any differences in the materials to a minimum, particularly in case of changing environmental conditions that generate tensions.
Solutions include either "cold" or "hot" techniques as described below.

Cold pre-conditioning
Method A
Sheets and supports are stacked together for at least three days in a room where humidity and temperature conditions are similar to those of the place where finished sheets will be installed.
If these sheets are installed in a warm place with constant low humidity, their components should be conditioned in a warm and dry atmosphere to avoid subsequent shrinking.

Method B
Sheets, supports and glue should be placed for about ten days in a room with a temperature ranging between 18 °C and 20 °C, with a humidity percentage of 50% and good air circulation.

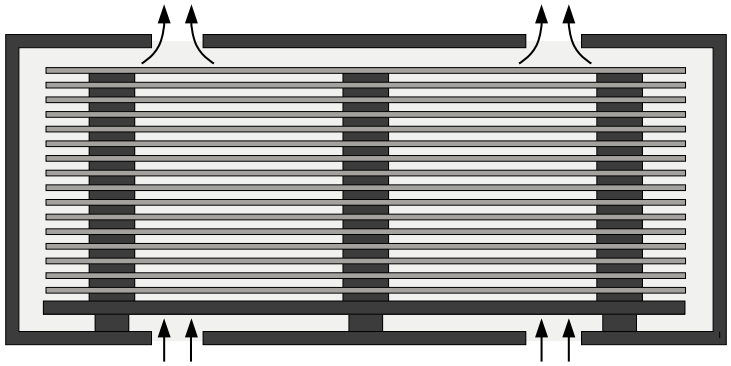


Method C
FENIX sheets that constitute the opposite sides of the same sheet are stacked back to back, in pairs, for at least three days in a dry room, until they reach a similar degree of humidity. After gluing, each movement caused by humidity variations will be similar in size and direction on each side of the sheet, thus reducing the risk of warping. With this method, conditioning of the support in the same location is not required.



Hot pre-conditioning
FENIX sheets are arranged in pairs, spaced apart, in order to allow hot air to circulate.
Duration and temperatures will vary depending on the type of glue used (e.g. for about 10 hours at 40 °C or 6 hours at 50 °C). If the operation needs to be speeded up, the sheets can undergo an accelerated partial drying process by placing them, separated by battens, in a small heated room (e.g. for about 3 hours at a temperature of 40 °C or for 2 hours at a temperature of 50 °C). To speed up the operation even further, a heat press can be used, whereby sheets are processed two at a time (face to face) (e.g. for about ten minutes). Gluing should be carried out a few hours later. The above guidelines can be applied when weather conditions at the sheet's intended location are temperate.

If the composite sheet's final destination is one with low relative humidity, it is advisable to pre-condition both the support and the sheet at a similar relative humidity and at room temperature, or at a higher temperature for a shorter period (e.g. 20 hours at 40 °C or 10 hours at 50 °C). It is never advisable to exceed 50 °C. Gluing should be carried out immediately after pre-conditioning, strictly in accordance with the manufacturers' recommendations.



Please note that the mentioned durations and temperatures are a general guide to good practice only and constitute no form of warranty or representation as to fitness for purpose in respect of the process. The user is required to verify and test for specific suitability.

FENIX SHEET BALANCING
For correct sheet balancing, the same type of FENIX sheet should be used on both sides (thickness 0.7, 0.9 mm or 1.2 mm and if possible from the same production batch). Stresses may occur between two different materials bonded together. To avoid subsequent distortion in the resulting sheet, it is therefore desirable to use materials with identical properties on both sides, subject to the same dimensional changes in relation to environmental variations. This is an essential strategy, especially if the sheet is self-supporting or not directly supported by a rigid structure.

The larger the area to be clad, the more essential it is to consider the following factors: choice of the most appropriate sheets for balancing the composite sheet, density, symmetry, and rigidity of the support. Ideally the sheets to be used for both sides of the finished composite sheet should be taken from the same sheet or from sheets from the same manufacturer and of the same type, thickness, colour, and production batch. It is important that the two sheet sides are cut in the same direction, i.e. in the direction of the paper, which is the same as the direction of sanding. Any dimensional changes to the sheet will then be minimal compared with what would occur if the sides were cut in the opposite direction.

Although not recommended as the risk of warping can then not be totally ruled out, it is possible, in standard and non-critical applications, to use materials other than FENIX on one side of a composite sheet provided, subject to correct balancing (e.g. HPL Arpa in 1.0 mm thickness for FENIX NTM in 0.9 mm, HPL Arpa > 1.2 mm thickness for FENIX NTM 1.2 mm, and a "dedicated" HPL Arpa in 1.0 mm for FENIX NTA in 0.7 mm).

Of course, it is important to choose materials with physical properties similar to those of FENIX, as the more these differ from those of FENIX, the more likely it is that stresses will be created due to the lack of symmetry.

VENTILATION AND HUMIDITY CONTROL
Both FENIX Thin and Solid sheets supplied by Arpa are always covered with protective film. In the case of Solid sheets, both sides are covered with protective film. To store them properly, the protective film should never be removed from just one side. It is also important to remember that FENIX sheets and wood fibre support are materials that are sensitive to humidity variations in the air. FENIX for example, expands by about 1.5 mm per linear metre in both length and width directions. Adequate space for expansion should therefore be allowed for between one sheet and the next.

FENIX THIN SHEETS: PROCESSING

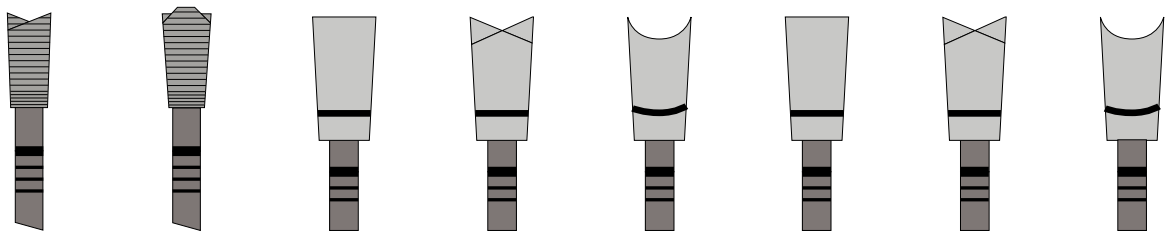
Processing FENIX Thin sheets should be done by a professional using proper equipment. The entire process is explained in more detail in the following chapters on cutting, milling, drilling, edging and gluing.

CUTTING

FENIX NTM thin should preferably be cut with saws using blades with tungsten carbide inserts or diamond ones in case of FENIX NTA.
The tungsten carbide ones are in fact long-lasting but must be handled with care as they can easily be damaged if they come into contact with metal surfaces.
During the cutting process, the material can produce inert powder. Staff performing the cutting process have to be adequately trained, and equipment used to cut the materials to size has to be adequate for the purpose and well maintained and calibrated.
Every fabrication company working with the panels needs to make sure that proper risk assessments have been performed.

Cutting by hand

If on-site work is required, hand-held circular saws are used. The tool must be well sharpened so that great pressure is not required, thus reducing the risk of chipping and/or cracking the material. The operation should always be carried out in compliance with codes of practice and safety regulations.



Profile of tungsten or diamond inserts fitted to the saw discs currently available

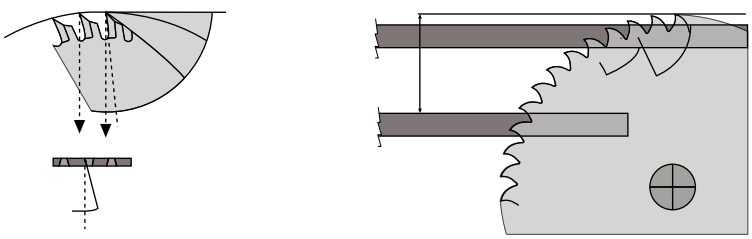
Cutting with bench machinery

This paragraph deals with circular saws. To get good results with bench circular saws it is essential to do the following.
- Place the FENIX sheet with the pigmented side in the opposite direction to the rotation of the blade. In addition, the sheet must be well supported and secured with an adjustable height pressure tool to prevent movement and vibration.
- Use an accurate guide.
- Make sure that the saw blade is aligned with the worktop and has the right protrusion. It is also possible to cut several sheets together. In the case of sheets with pigment on one side only, all sheets should be placed with their pigmented sides facing upwards. Alternatively, the stack of sheets should be placed on a “sacrificial sheet” that has the same or superior hardness and texture as those being cut to shape.

Recommended specification for circular saws:
- tooth pitch: 10 to 15 mm;
- cutting speed: 3,000 to 4,000 rpm;
- tip speed: 60 to 100 m/s;
- forward speed: 15 to 30 m/min.

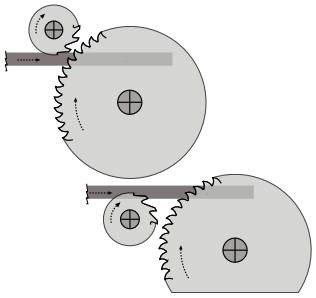
The blades should not be too thin. If they are less than 2 mm thick, they lose rigidity and vibrate, making the cut less precise.

Blade forward outlined



Cutting composite sheets
Everything mentioned so far also applies to the cutting of composite sheets with the pigmented part glued onto one or both sides of the support. In this case too, band saws are not recommended. Best results are achieved using fixed circular saws fitted with scribes and by carefully adjusting the blade height. The quality of the cut also depends on the profile and the number of teeth, the tip speed, the forward speed, and the blade's angle of entry and exit.
For cutting composite sheets, we recommend:
- choosing the most suitable blade;
- using a low forward speed and not "attacking" the material;
- operating a dust suction unit during processing.

Operations should be carried out in compliance with codes of practice and safety regulations.



Circular saws with a scoring blade

MILLING

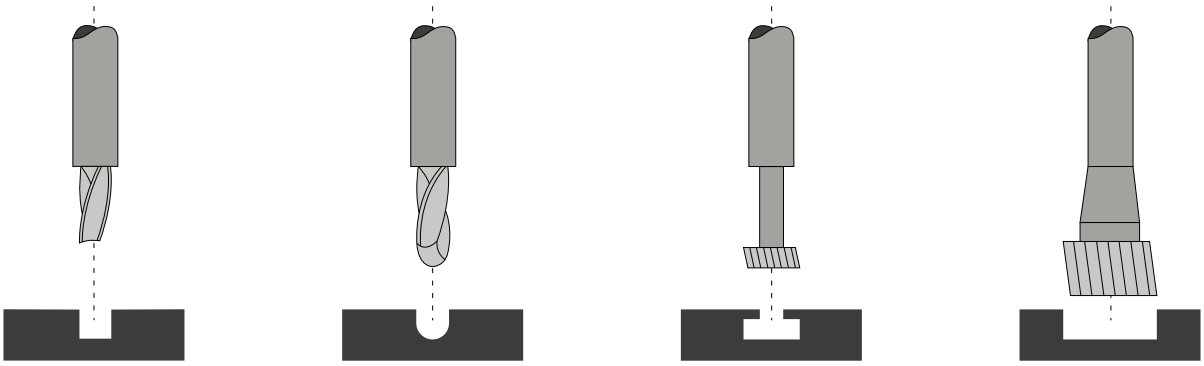
Depending on the circumstances, milling can be carried out in various ways using hand-held tools or fixed equipment.

Milling with hand-held tools
For an accurate job, it is always essential to use machining centres. Hand-held cutters as well as belt sanders or grinding wheels are used especially to trim the projecting edges of sheets already glued onto a support.

In such cases, the base of the cutter must be covered with felt to protect the pigmented side during the work. The laminate surface should be cleaned of any dust and grit. It is also essential to remove the chips by suction during the operation.
A rotation speed of at least 20,000 rpm is required for the machined part to be properly finished.
Cutters with two blades, one straight and one tilted, are suitable both for a square cut and for chamfering.
To avoid damaging the tools, the section of sheet to be milled should not project beyond the support by more than 2 to 3 mm. For continuous operations or for major jobs, the use of power tools with parallel blades is recommended.

Milling with fixed equipment
Milling machines or wood machining centres with spindles with interchangeable blades can be used.

The recommended tool attachments are cutters, discs or bits in solid tungsten carbide or in steel with tungsten carbide or diamond inserts, and with one or more vertical or angled teeth.
In the case of curved edges, it is better to cut out the rough shape required first, leaving a 1 mm surplus. The next step is then milling to the finished shape required.



Smoothing by hand
Various tools such as files or sandpaper can be used to finish the edges or chamfer the corners by hand.
Square (rather than milled) files are used to trim the edges or chamfer the sharp corners, making sure to use the files in a direction away from the pigmented side towards the core. It is also possible to use fine files or abrasive

paper and dual speed scrapers. To avoid scratching the surface, it is important to proceed gently and possibly in two stages: first with a coarser and then with a finer sandpaper.

DRILLING

The techniques shown apply both for drilling individual FENIX sheets and for drilling sheets that are already glued to a support. These operations should also be carried out in compliance with codes of practice and safety regulations.

For best results and to avoid the risk of future splits or cracks, it is important to bear in mind the following:

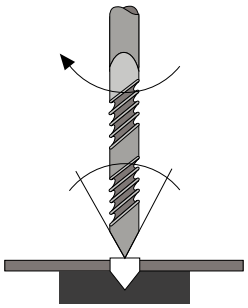
- Holes for screws should have a diameter at least 0.5 mm greater than the diameter of the screw itself. This is because the screw must have some clearance in all directions without touching the edges of the hole, to allow for slight dimensional movements in the sheet caused by changes in environmental conditions and to avoid cracks appearing around the hole itself.
- The drill speed should never be such as to overheat the surface of the pigmented sheet and damage it.
- To avoid splintering the material around the drill bit exit hole, we recommend placing the sheet on a hardwood board.
- To prevent roundhead screws from "gripping" too tightly, plastic or rubber washers can be used.
- After drilling, it is advisable to check that the edge of the hole is clean and smooth. If this is not the case, carefully rectify it as any micro-spalling can lead to cracking in the future.

Drilling tools

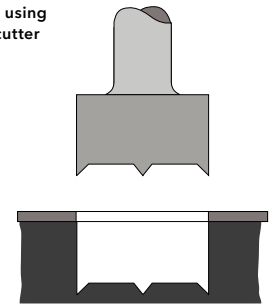
The choice of tools depends on the size of the hole that has to be made. Basically it involves hand tools, pillar tools, or a machining centre that can mill as well as drill.

- Twist drill bits: the most suitable bits for drilling FENIX sheets are special steel twist drills bits for plastics, with a tip angle of 60° to 80° (rather than the 120° of normal metal bits), a sharp helix angle, and a wide flute for rapid chip removal. The recommended rake angle is 7° with an 8° angle of attack.
- Hole cutters are recommended for larger holes.

Drilling using a twist drill bit



Drilling using a hole cutter



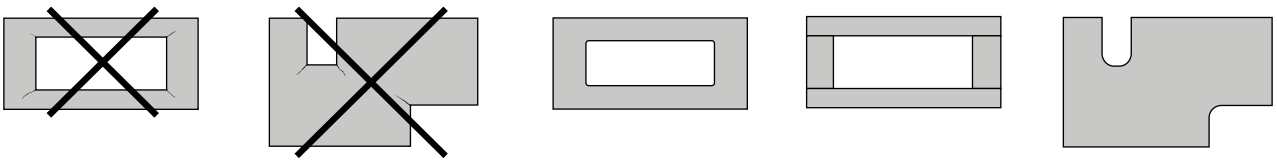
How to make internal cuts

The following refers both to FENIX sheets and to composite sheets with FENIX sheets applied to one or both sides. When carrying out internal fretwork, it is important to know that rightangled cuts may cause breakage or cracking of the material. In order to prevent this, all the corners of the internal cut-outs should be evenly rounded, polished, and brushed to remove any chips.

The inner radius of the rounded corner must be as large as possible. For internal cut-outs with side dimensions of up to 250 mm, the rounding of the corners should create a radius of at least 5 mm. If the length of the cut is greater, the radius of the corners should be greater too.

Before cutting the side of the opening, it is better to form the interior angles directly with the milling machine or drill, rounded to the required radius. If the design requires interior right angles, this should be achieved by assembling FENIX sheets together at each corner with butt joints.

Right angle cut-outs can cause breaking or cracking in the panel. Interior trim corners should be rounded.



EDGING

FENIX sheets in the thin version can be edge-banded using the same colour with 1.2 mm thickness (matched colour core) or using ABS or PP edge-banding strip developed in partnership with manufacturers of edge-banding material (e.g. Ostermann, Rehau and Döllken, BVR, GIPLAST, etc).
For FENIX NTM, a polyurethane glue should be used for edge-banding 1.2 mm thick FENIX NTM sheets. ABS or polymer edge-banding strips can be glued using hot-melt glues, with new laser systems or with air systems.
For FENIX NTA, we recommend using ABS edge-banding directly on FENIX NTA sheet in 1 mm thickness and exclusively hot melt glue.
FENIX NTM and FENIX NTA edge banding examples are available for download from our website fenixforinteriors.com

BENDING

0.9 mm FENIX NTM can be cold bent with external radius not below 15 cm using "form-counter form"/"mould counter mould" systems.
0.7 mm FENIX NTA can be cold bent with external radius not below 20 cm using "form-counter form"/"mould counter mould" systems.
We do not recommend hot bending, using dynamic post forming machinery, as the acrylic surface of FENIX sheets processed in this way can be subject to superficial micro-cracking on the pigmented part.

PRODUCTION OF COMPOSITE SHEETS

FENIX Thin is a semi-finished product that requires gluing onto a support in almost all its applications.

Supports

The support upholds the sheet and must resist distortion. The support should therefore be selected according to the characteristics of the application, the intended use of the composite sheet, and the installation environment, according to the following characteristics:

- stability
- planarity
- rigidity
- mechanical properties
- uniformity of thickness
- resistance to water and humidity
- fire performance properties

For the surface of FENIX sheets to appear perfectly smooth and uniform, the surface of the support should also be of similar characteristics. Imperfections on the support, in fact, tend to be transferred to the sheet surface, especially if the sheet is very thin. Plywood, chipboard and MDF sheets are generally excellent supports because they experience dimensional changes similar to FENIX sheets as they are themselves also made of cellulose. Metal or mineral-based, kraft paper, and foam plastic supports are also sometimes used.

Adaptability of supports

The table below contains a list of support materials that can be combined with FENIX sheets and their degree of adaptability.

Recommended supports

Support	Degree of adaptability
Panel of particle Board (Chipboard)	Fixing methods depend on the thickness of the composite panel. The structure of chipboard (chip shape, resin content, density etc.) greatly influences its surface quality and characteristics. The most appropriate chipboards for bonding to decorative laminates are multilayer chipboards. P3 EN 312-3 type chipboards are an ideal backing for FENIX in dry climate areas and can be produced also with fire-repellent properties. P5 EN 312-5 type panels are more resistant to moisture and can be installed in areas of greater humidity. To avoid damage due to shrinkage and distortion, the panels should be sanded evenly on both sides. Panels must meet the minimum requirements of the standards. The nominal density should be no less than 650kg/m3.
Medium or high density fibre board (MDF – HD)	They should be sanded before bonding (usually carried out by the manufacturer). They are made using a dry process and use synthetic resins for bonding the wood fibres together; they have a uniform structure and a fine texture that enables well-shaped finishes to be achieved with smooth edges. They can be treated to increase fire and moisture resistance. Their nominal density should be no less than 800kg/m3.
Plywood panels	Thin panels are not self-supporting. Fixing techniques depend on the thickness of the composite panel. Low density plywoods in hardwood such as poplar are particularly suitable for bonding to FENIX sheets.
Laminboard panels	Laminboard panels are suitable only if formed of narrow enough strips. Otherwise, surface undulations may appear in low humidity conditions.
Honeycomb Structure supports	These can be used as internal components of a support or combined with a frame. They can be made of wood, metal, impregnated paper, cardboard (recycled or otherwise), polycarbonate or polypropylene. In aluminum, they are ideal for creating panels that are both rigid and lightweight, with FENIX panel coating on both sides. They come in different thicknesses and various cell sizes and are bonded with epoxy resin-based adhesives. In non-impregnated Kraft paper, they are generally used as a core in plywood sandwich panels or panel doors; they are also used with direct lamination in applications where weight restrictions or impact resistance are more important. Impregnated Kraft paper resists moisture better when impregnated and is normally used in small cell formats. Plastics such as polycarbonate and polypropylene are durable, light and not sensitive to moisture.
Tempered Glass	A likely support onto which FENIX can be applied is tempered glass; to obtain uniform colors, also on the edge of the glass panel, it is suggested to use specific polyurethane glues in combination with the paint on the balancing side of the support.

Non-recommended supports

Support	Degree of adaptability
Mineral-based supports	Concrete, calcium silicate or vermiculite panels. There are several non-combustible supports, mostly calcium silicate-based. FENIX sheets must only be used on supports made of a unique block because these are more resistant to delamination.
Metal supports	Metals have different dimensional movement compared with FENIX sheets. Aluminum and steel are suitable supports if their surface is prepared carefully before bonding the FENIX sheets onto (with PUR or epoxy glue).
Foam plastics (polystyrene, PVC, polyurethane, Phenol based, etc)	Rigid foams are self-supporting substrates with good thermal insulation; they are suitable supports for direct lamination. Phenolic foams have good fire resisting properties. They can also be found as the “core” in timber frames.
Plaster or concrete Surface	The uneven surfaces of these supports do not normally lend themselves to the direct application of panels. In addition, the dimensional movements of the materials are mostly incompatible.
Simple plaster or wallpaper surfaces	The dimensional movement of the panel on the paper could result in breakage.
Solid Wood	This is unsuitable. The irregular dimensional movements cause surface undulations. As a support for panels, it can only be used in small areas.

How to bond FENIX sheets to supports

Firstly, prior to bonding, the sheet surface and support should be thoroughly cleaned of any dust, grease or other particles that could cause defects or stains.

Bonding temperature

Normally, bonding is best carried out at room temperature but never below 15 °C. At higher temperatures the setting time of the glue is reduced.
It is advisable to carry out tests to check how the glue reacts and to follow the glue manufacturer’s guidelines, which can differ for different glue types or environmental conditions.

Adhesives

The choice of glue, from among the many types available, should be determined by the type of support and the purpose of the finished product.

Classification of adhesives

1. **Based on their reaction to heat:**
   - Thermoplastic adhesives soften with heat. This group includes chloroprene and neoprene-based glues and those based on PVAc (polyvinyl acetate), silicones, acrylics, thermo-melting (hot melt), and special glues.
   - Thermosetting adhesives harden when heated, after initially softening. These include glues based on urea and formaldehyde, melamine and formaldehyde, resorcinol and formaldehyde, phenolic and polyurethane (one or two-component PUR) glues, and polyester and epoxy resins.

2. **Based on method of application:**
   - High-pressure adhesives:
     - High pressure and long duration. Pressure is exerted at a set temperature by a mechanical or hydraulic press on the sheet and support, which are in full contact. This group includes PVAc, acrylic, urea and phenolic-based glues, and resorcinol and formaldehyde-based glues.
     - High pressure and short duration. Pressure is exerted for a short time (static pressure contact adhesive) and distributed evenly by hammering or using a rubber roller, in other words placing a load on the sheet being built. This group includes neoprene, chloroprene, and PVAc B2-B2.
   - Low-pressure adhesives:
     - Low pressure and long duration. Polyester-based glues, PUR polyurethane glues, and epoxy glues.
     - Low pressure and short duration. Thermo-melting (hot melt) glues, to be applied with special equipment.

Hardeners

Neoprene-based adhesives are used with a hardening agent, which increases the heat resistance of the glue. Thermosetting adhesives are used with accelerators and catalysts, which ensure a good hold thus reducing the temperature and the period of application.

Bonding method

There are different types of bonding methods:
- Thermo-melting (hot melt) glues (to be applied with special equipment);
- Bonding using presses:
  - Cold presses. These can be used with steel sheets and limited pressure;
  - Hot presses. These can be used with stainless steel sheets, by placing a sheet in every empty compartment.

Types of Adhesives

Thermoplastic adhesives	
Neoprene/ Chloroprene	Polychloroprene based, available in solvent or in aqueous solution; with or without hardener.
PVAc	Polyvinyl acetate-based emulsion. Available as one or two-component glue: the latter shows greater resistance to heat and humidity. If the support is compact and uniform, this ensures a good bond, being easy to use and fast setting. Being liquid, it should be distributed carefully over the surface to prevent fibers or chips from lifting at a later stage.
Acrylic Compounds	
Silicone	
Hot melt (Thermo-melting)	Almost exclusively used for bonding edges and assembling pieces. They must not to be used near a hot surface.
Thermosetting adhesives	
Urea Glues (UF)	Urea and formaldehyde-based. Durable and resistant to high temperatures but with poor water resistance. Applied with a press at high temperature.
Melammine glues	Synthetic resins obtained by polycondensation of formaldehyde with melamine. Water, abrasion and heat resistant with considerable transparency to light radiation.
Resorcinol and formaldehyde-based glues	Use with hot or cold pressure for bonding the panel to moisture-resistant and some fire-resistant supports. Good weathering resistance.
Phenolic glues	Resistant to water, weathering and high temperatures. They reduce considerably in volume while setting.
Polyurethane glues	These are strong and flexible and adhere well to smooth or porous surfaces; they withstand low temperatures better than other glues, while not tolerating high temperatures well. They have good cavity-filling properties. One or two-component, they are excellent for bonding panels to difficult supports such as polystyrene, metal, plastics, etc.
Polyester	This type is more sensitive to heat than other adhesives.
Epoxy resins	They bond well to many materials and require only a light pressure. The wide range of hardeners available for epoxy glues allows setting times that range from a few seconds (if the temperature is high) to many minutes or hours (at room temperature). They are resistant and durable, have good cavity-filling properties, and shrink very little in volume after drying.

Gluing

The following precautions can help achieve optimum results and reduce the risk of undulations, surface distortions (or blisters) and cracking.

- Pre-condition the sheet in temperature and humidity conditions similar to those where it will be installed.
- Avoid the use of contact adhesives, in particular when applied by hand, if the sheet is to be installed in rather damp areas.
- Use contact adhesives only if the sheet is no more than 60 cm wide, applying the adhesive evenly to both surfaces in not too thick a layer.
- Cut the longer side of the composite sheet lengthwise, parallel to the direction of sanding. FENIX dimensional changes are in fact smaller lengthwise than crosswise.

Glues and supports

	Thermoplastic Adhesives				
Supports	Neoprene Chloroprene	PVAc	Silicone Acrylic compounds	Hot melt Acrylic compounds	Special Glues
Wood Based	• Treatment cold	• Treatment hot		•	
Paper Based with honeycomb structure	• Treatment cold	• Treatment hot			
Plastic foam based or honeycomb Materials Polystyrene			•		
PVC	•		•		
Phenol-Formaldehyde	•	•			
Polyurethane	•				
Metal based sheet or honeycomb structure	•			•	
Mineral supports in sheets or plaster based foams		•			
Concrete	•	•			
Concrete foam	•	•			
Glass foam	•	•			

Glues that can be used depending on the type of support

	Thermosetting adhesives						
Supports	Urea Glues UF	Melammine Glues	Resorcinol and formaldehyde based glues	Phenolic Glues	Polyurethane Glues	Polyester	Epoxies
Wood	•	•	•	•	•	•	•
Paper with honeycomb structure	•	•	•	•	•	•	•
Plastic foam or honeycomb materials Polystyrene					•		•
PVC					•		•
Phenol Formaldehyde	•	•	•	•	•	•	•
Polyurethane					•	•	•
Metal in sheet or honeycomb structure			•		•	•	•
Mineral supports in sheets or plaster-based	•						
Concrete					•	•	•
Concrete foam					•	•	•
Glass foam					•	•	•

FENIX SOLID PANELS: PROCESSING

Due to their composition, FENIX Solid panels can expand and shrink.
Temperature and humidity on front and rear sides should not differ over long periods of time.
The lower side of horizontal worktops and the rear side of vertical wall should therefore be well ventilated.
Panel edges should not remain wet for long periods of time.
If the panels are secured via profiles, these should be provided with draining elements. When fixing panels, it is important to allow for a maximum movement of 2.5 mm/m².
Drill holes and joints should be dimensioned accordingly. Do not tighten screws too much in order to allow the panels a minimum clearance.
FENIX Solid panels should be conditioned before processing and installation so that they can reach a balanced condition in their environment.
The homogeneous composition of the material makes it possible to machine both sides and the surface. FENIX panel machining is similar to that of high-quality hardwood.
The hardness of the panels makes greater demands on tools than when machining materials composed of softwood.
The use of hard metal tools is recommended. Diamond-tipped tools are recommended for large sized elements. This ensures a very good finish and a long tool life.

CUTTING

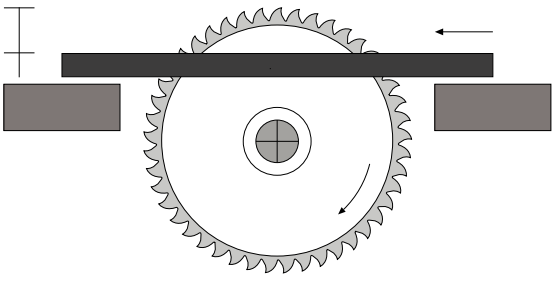
FENIX NTM should preferably be cut with saws using blades with tungsten carbide inserts and diamond ones for FENIX NTA.
If the cutting perimeter is not well defined, FENIX NTA should preferably be processed using blades and tools dedicated to aluminium and general alloy.
During the cutting process, the material can produce inert powder. Staff performing the cutting process have to be adequately trained, and equipment used to cut the materials to size has to be adequate for the purpose at hand and well maintained and calibrated.
Every fabrication company working with the panels needs to make sure that proper risk assessments have been performed.

The following general guidelines apply to cuts made on FENIX panels using circular saws.
- Feed: 7 - 22 m/min (23 - 72 ft/min).
- Teeth: alternate or flat-top V-shaped teeth.

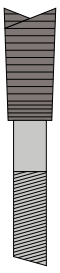
Positioning

Always position the teeth on the pigmented side of the panel.
Edge cutting: best results are obtained using bench machinery.
Sharp edges can be rounded by means of sandpaper or a milling machine.
Rake angle: best performance is obtained with a 45° rake angle.
Use rubber shims to prevent the panels from sliding if the machine is not equipped with a mobile work top.

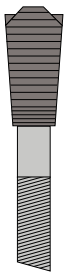
Saw blade height adjustment



Alternate teeth



Flat top V-shaped teeth



Cutting with bench circular saw

Keep pigmented side facing upwards when saw cutting, drilling and milling.
When a pigmented side must be slid over the machine's worktop while machining, we recommend placing a protective panel, for example of hardwood, on the worktop:

Diameter		Teeth	Rpm	Thickness of the blade		Blade height adjustment	
mm	inch			mm	inch	mm	inch
300	~12	72	~ 6.000/min	3,4	~ 1/8	30	~ 1
350	~14	84	~ 5.000/min	4,0	~ 3/16	35	~ 1
400	~16	96	~ 4.000/min	4,8	~ 3/16	40	~ 1

Cutting with hand-held circular saw

When using a hand-held circular saw, the panel side with no pigment should be facing upwards.

Diameter		Teeth	Rpm	Thickness of the blade		Blade height adjustment	
mm	inch			mm	inch	mm	inch
150	~ 6	36	~ 4.000/min	2,5	~ 1/8	15	~ 5/8
200	~ 6	36	~ 4.000/min	3,0	~ 1/8	20	~ 3/4

Jig saw

Jig saw (carbide-tipped): interior corners of cut-outs should be drilled first with 8 - 10 mm (≈ 5/16 - 3/8 in) hole diameter.
Consider the use of a specific jig saw blade for pigmented surfaces.

MILLING

Milling shapes:

- straight and slanted bits for cutting edges and bevelling
- hollow or round ground bits for rounded edges
- diamond circular saw blades for grooves

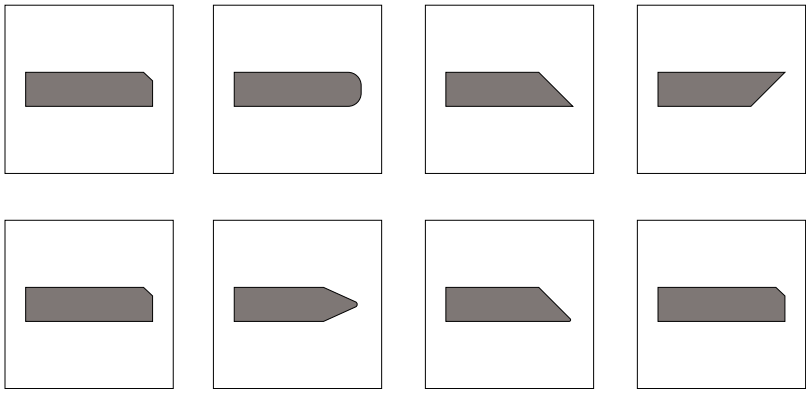
Material:

Hard metal or diamond cutters, manually operated milling cutter, or spindle moulder:

Diameter		Rpm		Speed		Feed	
mm	inch			m/s	ft/s	m/min	ft/min
20-25	~ 1	~ 18.000	- 24.000/min	20 - 30	~ 65-100	5	~ 16
125	~ 5	~ 6.000	- 9.000/min	40 - 60	~ 130-200	5-15	~ 16 - 50

Edging/milling templates

Edges should be safe, free from saw marks and jagged edges.
For better appearance it is advised polishing edges.
Several edge treatments can be considered for functional and aesthetic reasons.
Some examples follow:



DRILLING

The use of carbide-tipped HSS-drill bits or diamond ones with a 60-80° angle is recommended.
FENIX panels should be drilled using support sheets.

Large holes, e.g. for suspension and locking equipment, should be drilled using combination drill bits.
The exit speed of the drill bit must be carefully selected so as not to damage the product surface. The feed rate must be reduced by 50% shortly before the drill bit exits the work piece.
During drilling operations, the counter-pressure should be increased using hardwood or equivalent material in order to prevent the surface from breaking.

GLUING

FENIX Solid panels can be glued to each other and onto many materials using one or two-component adhesives, such as epoxy or polyurethane adhesive systems.
Gluing is often carried out together with a mechanical joint to provide sufficient pressure during drying.

Thickening the edges of panels with FENIX Solid strips:
- make sure panels and strips have the same "grain direction";
- pre-condition panels, strips and adhesive in the same way (temperature and humidity preferably adjusted in line with future conditions of use);
- remove grease from surfaces to be glued, roughen them slightly, and ensure they are dust-free;
- strictly follow the instructions provided by the adhesive manufacturer.

Type of glue	Application	Open time	Pressure	Set time
Epoxy adhesives	100-250 g/m²	Depending on the type	0,2 N/mm²	4-8 hrs at 20°C
Polyurethane	100-250 g/m²	Depending on the type	0,2 N/mm²	4-8 hrs at 20°C

It is advisable to carry out tests to check how the glue reacts and to follow the glue manufacturer's guidelines, which can differ for different glue types or environmental conditions.

INSTALLATION GUIDELINES

There are two major installation systems for FENIX Solid panels:
- mechanical (screws and rivets)
- chemical (glue)

Vertical application

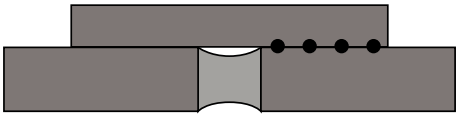
FENIX Solid can be used as so-called suspended cladding elements. This means that the material is assembled on a supporting sub frame. The panel can be fixed visibly or invisibly.

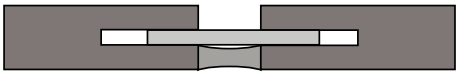
When determining the sub frame, it is important to take the following points into account:
- the load-bearing requirements;
- maximum fixing distances for the panels;
- the necessary ventilation or moisture regulating measures;
- the tolerance for panels to move;
- the available panel sizes;
- the thickness of any insulating layer;
- the anchoring options in the building (wall) construction;
- the legal requirements.

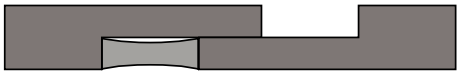
Corner solutions
When joining two panels in a corner, it is important to take the panel movement into account. To avoid tension at the joint, it is advisable to keep the leg length of the corner element as small as possible (max 400 mm).

Compact panels can be joined together in corners in various ways:
• glued aluminium or plastic corner profile
• glued aluminium or plastic strip
• built-in strip and groove joint with support

Joints and connections
Solutions for vertical joints include:
• expansion joint
• built-in groove
• rebated joint







To allow for dimensional changes as a result of moisture and temperature fluctuations, joints should be left free both for vertical and horizontal connections such that the panel can move by a maximum of 2.5 mm/m.
Thanks to the excellent workability of the material, it is possible to accurately seal vertical and horizontal joints without auxiliary profiles.
For panel thicknesses from 8 mm or more, it is possible to make connections in the form of rebated joints or as built-in groove connections.

Horizontal joints: either built-in groove or rebated joint connections can be used for horizontal joints. Joints must be made in such a way that the panels can move by 2.5 mm/m maximum. The recess in the rebated joint must measure at least twice the width of the joint itself.

Vertical joints: built-in groove connections can be used for vertical joints. Panel thickness on each side of the groove must be at least 2.9 mm. If aluminium grooves are used, a panel thickness of 8 mm is sufficient.

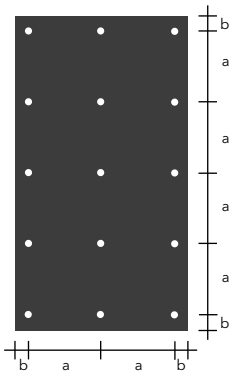
Joint sealing using mastic
When FENIX panels are used for interior applications where high standards of hygiene are required, wall constructions with airtight seals are often preferred.
The joints are then sealed with an elastic mastic. This sealing material must be mould repellent according to ISO 846 and resistant to disinfectants if it is used in the aforementioned applications.
Furthermore, for maximum bonding between the sealing material and the panel, it is necessary to avoid draughts, damp, dust and dirt.
We recommend using FENIX Solid panels in combination with silicone or polyurethane mastic.

Important guidelines for applying elastic sealing material:
- The joint must be absolutely clean, dry and free of grease.
- If necessary, a primer should be applied to facilitate bonding.
- The sealing material must on no account adhere to the reverse side (bonding on three x sides) as this can cause breakage of the panel. It is advisable to use a separating film or a polyethylene tongue.
- To ensure that the sealing material is not under excessive strain, grout joints should be wide enough and their depth should not be greater than their width.

Visible fixing with screws or rivets
FENIX Solid panels can be fixed to a timber sub-frame structure using fast fix screws, or they can be fixed to a metal sub-frame structure using aluminium rivets.
The sub-frame structure must be assembled in such a way that the area behind the panel is ventilated. This ensures that the temperature and humidity will be the same on both sides of the panel.

When fixing panels with screws or rivets, it is important to ensure that panels can move freely and evenly.

- The diameter of all pre-drilled holes in the panels must be 8 mm when using fast fix screws that have a diameter of 4 mm.
- When using rivets with a 5 mm diameter, one hole - centrally positioned in the panel - must be pre-drilled with a 5.1 mm diameter, and all other holes must be pre-drilled with a 10 mm diameter. A special nosepiece must be used on the riveting tool to keep the head of the rivet 0.3 mm away from the panel surface.
- All joints must be at least 8 mm wide.
- Panel thickness: minimum of 6 mm (for efficiency and performance purposes, a minimum thickness of 8 mm is recommended).

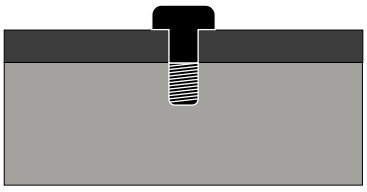


a = horizontal and vertical fixing distance (see table)
b = edge fixing clearance
20 mm minimum
10 times the panel thickness maximum
Recommended maximum panel height: 3050 mm

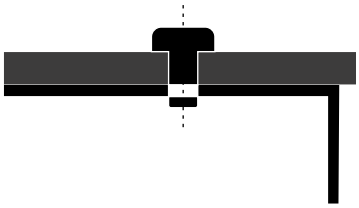
Note:
Fixing distances for ceiling application must be multiplied by 0.75.

Maximum fixing centres (mm)	Panel thickness (mm)		
	6	8	10
2 fixings in one direction	450	600	750
3 or more fixings in one direction	550	750	900

Visible fixing on screws on wooden support



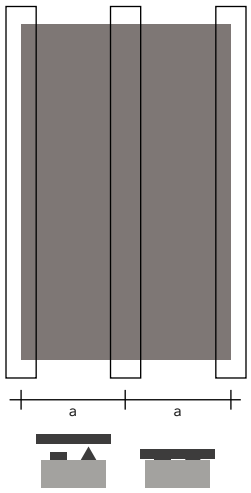
Visible fixing on screws on metal support



Invisible fixing with adhesive

FENIX panels can be fixed on to a timber or metal support using special adhesive systems that enable dimensional variation of both coating and support. The guidelines of qualified glue manufacturers must be followed in order to achieve high-quality connections.
Arpa is not responsible for the selection or use of adhesives in fixing systems.
The sub-frame structure must be assembled in such a way that the area behind the panel is ventilated. This ensures that the temperature and humidity will be the same on both sides of the panel.
The adhesive must be applied only in a vertical direction and always over the full height of the panel. All joints must be at least 8 mm wide.
The maximum installation size of the panel is 3050 mm x 1300 mm. For efficiency and performance purposes, thicknesses under 8 mm are not recommended.

Adhesive system including double sided tape for temporary fastening while the adhesive sets:



Maximum horizontal fixing distances (a):

Maximum fixing distances (mm)	Panel thickness (mm)	
	8	10
2 fixings in one direction	600	650
3 or more fixings in one direction	650	650

Horizontal Worktops
FENIX Solid panels can be used as worktops or as table tops.

Thickness
Minimum thickness: 10 mm.
Panel thickness and fixing distances as well as expected load capacity are directly linked and must be calculated correspondingly.

Fixing
Assemble using inserts or threaded screws.

Maximum drill hole depth equals panel thickness minus 3 mm. Drill hole diameter in panels should comply with the instructions of the supplier of the fixing means and be capable of withstanding the shank of the screw.

Drill holes in the support construction must allow for the panels to move: either drill slotted holes or make sure that the diameter of the drill holes equals screw diameter plus 3 mm. If more than two panels are joined together (e.g. for long wall benches), slotted holes of sufficient length should always be made in the support construction.

Support
Steel or aluminium supports should be sturdy and rigid enough to prevent panel warping as a result of the load applied on the upper surface. If any other elements are fitted under the panel (drawers, boxes, pipes), then the support must be dimensioned accordingly.
The distance between the support and the processed panel edge should be lower than 25 cm.

MATCHED COLOUR CORE PANELS INSTALLATION

Processing FENIX Solid matched colour core panels is the same as processing FENIX Solid black core panels. Although these products are compatible with most of the tools and techniques used for the processing of normal panels, additional techniques are necessary in order to take advantage of their full potential.

Handling and storage
The composition of FENIX Solid matched colour core panels makes them slightly more fragile than FENIX Solid black core panels, and they should therefore be handled with extra care.
They should always be stored horizontally. Vertical storage is not recommended given the risk of damaging the edges. Edges and corners are particularly exposed and could be damaged as a result of impacts. Storage conditions are the same as those recommended for normal compact panels.

Machining operations
All traditional tools and machinery used for FENIX Solid black core panels can be used for FENIX Solid matched colour core panels, and we recommend following all the general recommendations regarding machining.

How to cut the panels
Use the same standard equipment as used for other FENIX Solid panels.

Cutting tools and saw blades should always be kept sharp to avoid chipping. As FENIX Solid matched colour core panels are more brittle, to avoid chipping on the lower side during cutting operations with circular saws, precautions should be taken such as:
- lowering the saw in the bench;
- reducing the throat of the saw by placing a piece of hardboard under the cut; changing the saw blade for one with negative angle teeth;
- simply allowing an extra amount for edge trimming.

Large sheets may be cut by scoring but extra care must be taken to prevent shattering.

Gluing
The use of non-pigmented or transparent quick drying adhesives are recommended to achieve a visually satisfactory end result.

Assembly
To obtain a good result when joining two panels of FENIX Solid matched colour core, it is advisable to use a mechanical fixing system.

Loss of structure
Various machining and scoring operations can be carried out on FENIX Solid matched colour core panels. However, please note that the scoring will alter the FENIX surface structure and lead to the loss of all specific characteristics of the product.

ARPA INDUSTRIALE S.p.A. GENERAL TERMS AND CONDITIONS OF SALES

1. Definitions and intepretation
In these GTC (unless the context otherwise requires), the following words and phrases shall have the following meanings:
"GTC" means these general terms and conditions of sale.
"Contract" means a contract for the sale of goods made by or on behalf of Arpa Industriale S.p.A. (The "seller") with the party to whom the seller supplies goods (the "buyer") which arises upon the acceptance of an order and/or the signing of an agreement by the authorized representative(s) of the seller.
"Goods" means all products of any kind manufactured by the seller and all equipment, product and services supplied by the seller.
"Order" means an order for the goods received by the seller from the buyer, containing the following items: (a) order number and order date; (b) month to which the order applies; (c) quantities and product codes of the goods ordered; (d) date of delivery of each good, being at least 30 days after the date of receipt by the seller of the order; (e) prices calculated pursuant to art. 3, On the basis of the quantities and features of the goods.

2. Scope
2.1 These GTC shall govern every contract made by the seller in connection with the supply or sale by the seller of the goods. Once these GTC have been signed by the buyer, in default of a written agreement expressly overriding any or all of these GTC, no other terms or conditions whatsoever arising whether express or implied, or whether contained in any order or otherwise implied by custom, practice or course of dealing, shall govern or affect any contract with the same buyer. Any quotations issued by the seller do not constitute an offer and the seller reserves the right to withdraw or revise a quotation at any time before the seller accepts an order.
2.2 The seller's acceptance of an order shall be effective only where such acceptance is in writing (including by e-mail) and signed by the authorized representative(s) of the seller. The seller undertakes to provide only the quantities of good set forth in the relevant contract.

3. Price calculation
3.1 The price payable by the buyer for the goods will be the price quoted in a valid quotation issued by the seller or, in the absence of a valid quotation, the current list price of the seller for the goods, less any discount if agreed in writing by and between the buyer and the seller. The seller's quotations are valid for a period of 30 days from the date thereon unless otherwise agreed by the seller in writing. Copies of the current price list of the seller are available on request.
3.2 The seller reserves the right to change the prices at any time. In the event of a price increase, the buyer will be entitled to withdraw from the contract within 20 days from the date of receipt by the buyer of the written notification of such price increase. This right to withdraw from the contract does not apply in the event of price increases that directly result from increases of the production costs of the relevant goods not attributable to the seller, including, without limitation, increases in applicable value added-tax or freight or customs rates and/or general increases of the price of the relevant raw materials.

4. Delivery
4.1 Terms of delivery shall not be deemed as time of the essence [termine essenziale], unless otherwise agreed in writing. Delivery by the seller as agreed upon between the parties will take place only if the agreed-upon place of destination can be reached by and is accessible to a vehicle weighing up to 40 tons. If this is not the case, the goods will be delivered by means of lighter vehicles, with any additional costs, including those of transhipping and wages, being borne by the buyer. The buyer must ensure that a properly functioning forklift truck is present at the destination agreed upon, with a loading capacity of at last 2,500 kilograms and a fork of at least 1.5 Meters in length.

5. Payment
5.1 Payment must be made to the seller within 30 days from the date of the relevant invoice, unless otherwise agreed in writing. Term of payment shall be deemed as a term of essence [termine essenziale] for the seller, pursuant to art. 1457 Of the Italian civil code ("I.C.C.").
5.2. Payment-related costs, including without limitation fees charged by banks and the costs incurred in offering shipping documents, must be borne by the buyer.
5.3 Notwithstanding the provisions of art. 1243 of the I.C.C. To the contrary, the set-off is possible only if its counter-claim is acknowledged in writing by the seller o in a final and binding decision of a competent court.

6. Late payment
6.1 If payment is not made by the buyer within the terms set forth pursuant to art. 5.1 Above (a) the buyer will be deemed as being in default by operation of law, and default interests calculated pursuant to the provisions of legislative decree no. 231 of 2002 shall apply; (b) without prejudice to the seller's other rights, the seller reserves the right to discontinue forthwith the provision to the buyer of any further goods whatsoever under any contracts then existing between the seller and the buyer without any liability whatsoever upon the seller.

7. Complaints
7.1 A "complaint" shall mean any complaint of the buyer with respect to the quality of the goods, exclusively due to defects in material and workmanship in the manufacturing process. Promptly upon receipt of goods, the buyer is obliged to verify whether the goods supplied are in compliance with the contract and do not have any defects.
7.2 The buyer shall present a complaint by giving written notice to the seller of any defects of the goods supplied, providing all reasonable particulars, within 8 days from the date of delivery (in case of visible defects) and, in case of hidden defects, promptly upon their discovery by the buyer. Complaints must be submitted in writing, stating order details, charge number[s], as well as invoice and bill of landing numbers and any reasonable details relating to the alleged defect.
7.3 Goods about which a complaint has been submitted shall not be returned by the buyer to the seller, unless the seller's express written consent has been obtained. Without prejudice to the provisions of art. 10 Below, if the seller recognizes as founded a complaint the seller shall have the option - at its discretion, and taking the buyer interests and the nature of the complaint into account - to: (a) deliver any missing part or parts; and/or (b) give a price reduction; and/or (c) repair the goods supplied; and/or (d) replace the goods supplied; and/or (e) refund the purchase price in exchange for the goods supplied being returned at the buyer's costs.
7.4 For the avoidance of doubt, it is understood that no compliant for defects not attributable to the materials used by the seller and/or lack of the seller's workmanship in manufacturing the goods will be accepted by the seller. Except as set out in this art. 7 Of these GTC as to complaints, all conditions, warranties and representations express or implied by statute, law or otherwise in relation to the supply or delay in supplying the goods are excluded to the fullest extent permitted by law.

8. Instructions And Advice
8.1 The seller may provide the buyer with written instructions, regulations and guidelines for the storage, working or processing, use or application of the goods to be delivered or already delivered. To the extent that the buyer resells or otherwise transfer the goods supplied to any third party, whether or not after working or processing such goods, it shall make said instructions, regulations and guidelines, to the extent applicable, available to said third party. The seller shall not be liable for any damage suffered by the buyer or its buyers/agents/contractors due to the non-compliance or improper compliance with instructions, regulations and guidelines provided by the seller. The seller shall not be liable in any manner whatsoever for the contents of any advice or consultancy provided without a specific, separately agreed, consideration to the buyer.

9. Force Majeure
9.1. "Force majeure" means any circumstance beyond the seller's control that temporarily or permanently prevents fulfilment of the contract, such as war or war risk, riots, whole or partial mobilization, strikes, lack of raw materials, a delay in the supply of goods and/or raw material by suppliers, unforeseen circumstances within the company, transport difficulties, import and/or export restrictions, frost, fire, epidemics, acts of god and any other unforeseen impediments that make the manufacture or transport of the goods fully or partially impossible. The provisions laid down in this article will also apply in the event that the circumstances referred to occur in respect of plants, suppliers or other traders from which or whom the seller purchases goods or services.

10. Liability
10.1 Without prejudice to the provisions of art. 7 above, the seller's liability pursuant to a contract, including liability for any non-delivery or late delivery of or any defects in the goods supplied, will be limited to the net amount invoiced for the relevant goods. The seller will not be liable for any damage against which the buyer is insured. The same limitations set forth under this art. 10.1 will apply in the event that the seller is held liable by the buyer on grounds other than breach of the contract.
10.2. The sending of messages to the seller by any electronic means, unless the seller and the buyer have concluded a specific written agreement for that purpose, will be at the buyer's risk. The seller will not be responsible or liable for the non-arrival, incomplete arrival or incorrect arrival of any message sent by electronic means.
10.3 The limitations of liability referred to above will not apply in case of fraud or gross negligence on the part of the seller. Notwithstanding the provisions of art. 1460 of the I.C.C. to the contrary and pursuant to art. 1462 of the I.C.C., the buyer shall not be entitled for any reason whatsoever (including, without limitation, any failure of the seller to duly perform any of its obligation under a contract) to withhold or delay performance of its obligations - in particular the payment of the price within the terms set forth pursuant to art. 5.1 above - arising under a contract.

11. Retention of title and transfer of risk
11.1. Goods supplied by the seller shall be at the buyers risk immediately upon delivery to the buyer or into custody on behalf of the buyer. Title to the goods supplied shall not pass to the buyer until the buyer has paid, satisfied or undertaken any and all obligations arising on the buyer under any contracts. The buyer (i) shall render its co-operation in all reasonable measures the seller wishes to take to protect the goods supplied and/or its title to such goods and (ii) is obliged to observe due care in keeping and properly insure the goods supplied subject to a retention of title.
11.2 In the event that any third parties levy an attachment (sequestro and/or pignoramento) with respect to the goods supplied that are subject to a retention of title, or in the event that third parties wish to set forth or enforce any rights with respect to such goods, the buyer shall promptly notify the seller thereof in writing. The buyer may not pledge or otherwise encumber the goods subject to the retention of title. After working or processing said goods, the seller will be the (co-) owner of the goods so created, and the buyer will automatically start holding these goods also on the seller's behalf.
11.3 In the event that the buyer fails to fulfil its payment under the contract, or fails to fulfil such obligations on time, or in the event that there are good grounds to fear that this will be the case, in addition to any other rights and remedies of the seller, also pursuant to the provisions of these GTC, the seller will be entitled to repossess any goods supplied that are subject to a retention of title as referred to in this article, and to remove the goods from the buyer or third parties holding the goods on the buyer's behalf, or to have such goods repossessed. The buyer shall render any and all co-operation required in this respect.

12. Intellectual Property Rights
12.1. The buyer is not entitled to any rights in any patent, copyright, registered or unregistered design, trade names, trademarks or logos, owned or used by the seller (the "seller's IP rights") and the buyer shall inform the seller as soon as it becomes aware of any potential, threatened, alleged or actual infringement of any of the seller's IP rights and shall provide all assistance and information reasonably required by the seller in connection with any such infringement and shall, if the seller so requests, at the expense of the seller, join in any court or other proceedings relating to such infringement.

13. Packaging
13.1 In the event that the goods are delivered to the buyer in packaging borrowed by the seller to the buyer, the buyer must return to the seller such packaging carriage paid, in proper condition and without product residue within three months of delivery, at the latest. In the event that the packaging is not returned within the time period set forth above, or if it is damaged and/or contains product residue, the costs of replacing or repairing and/or cleaning or disposal of such packaging will be charged by the seller to the buyer.

14. Failure on the buyer's part
14.1. In the event that the buyer is in default and/or the seller has good grounds to fear that the buyer will fail to fulfil its payment obligations or fail to fulfil such obligations on time, the seller will be entitled, without being obliged to pay any damages and without prejudice to all rights to which the seller is further entitled to: (a) demand advance payment or to demand adequate guarantee and security; (b) suspend the performance, in whole or in part, of all contracts with the buyer; (c) revoke agreed-upon terms of payment, so that all outstanding claims will be immediately due and payable; or (d) suspend performance of its obligations, also those arising under other agreements with the buyer.

15. Termination rights
15.1 Without prejudice to the provisions of these GTC and any other rights and remedies of the seller, the seller shall be entitled to terminate any contract with the buyer pursuant to art. 1456 of the I.C.C., suspend further deliveries to the buyer and stop goods in transit forthwith upon the happening of any of the following events: (a) buyer" failure to pay any sums due to the seller on the due date in respect of any contract as total consideration, advance payment or balance; (b) buyer's breach of the provisions of art.S 5, 6, 8, 11, 12, 16.2 of these GTC.
15.2. In the event of early termination, without prejudice to any other rights and remedies of the seller, the seller shall be entitled: (a) to enter into premises in the buyer's possession, occupation or control or to which the buyer has any right of access and to repossess any goods owned by the seller, it being understood that no good can be sold or otherwise delivered by the buyer to any third party after six months from the date of the termination of a contract; (b) to be paid all sums then due to the seller by the buyer in respect of all goods provided by the seller to the buyer; and (c) to be paid forthwith on invoice an amount equal to the loss of profit and the actual cost of work, service and materials of partially completed goods and to be paid forthwith on invoice the contract price due in respect of completed goods whether delivered or not.

16. Confidentiality - assignment of the contract
16.1 The buyer shall treat all products, business information, drawings, designs and specifications and any other information and data submitted by the seller as confidential and shall not disclose them to any third party without the seller's prior written consent or use them for any purpose except where authorized to do so by the seller. Upon the sellers request and, in any case, upon termination of a contract, the buyer shall return to the seller all documents, files and correspondence submitted by the seller as confidential or otherwise covered by any of the seller's IP rights.
16.2 The buyer may not assign any of its rights, interests or obligations under any contract without the prior written consent of the seller and any attempt to assign any contract without such consent shall be of no effect towards the seller.

17. Language - applicable law and competent court
17.1 These GTC, in English language also, are available in the last updated version on the web-site www.arpaindustriale.com. The Italian version of these GTC prevails at all times in case of disputes with regard to the interpretation thereof.
17.2. Italian law will apply to any contracts. The "incoterms" issued by the international chamber of commerce in paris shall apply, always in the newest version applicable, upon conclusion of the relevant contract.
17.3 All disputes arising out of or in connection with any contract are subject to the exclusive jurisdiction of any competent court in Cuneo (Italy).

ARPA USA INC. GENERAL TERMS AND CONDITIONS OF SALES

The following are the General Terms & Conditions (.T&CS.) that dictate the transaction between the Parties to the Invoice located on the reverse of this document.By accepting goods from Arpa USA Incorporated (Arpa USA), Buyer hereby agrees to each and every one of the T&Cs.

1. Autority of Arpa USA's agents
No agent, employee or representative of Arpa USA has any authority to bind Arpa USA to any representation or warranty concerning the goods or materials comprising the System or Panels (collectively, Goods.), or concerning the services or other Deliverables, including without limitation, the Arpa USA Shop Drawings, sold pursuant to the Invoice. Unless a representation or warranty made by an agent,employee or representative of Arpa USA is specifically included in writing in the Invoice, it is no part of the basis of the sale and shall not be enforceable against Arpa USA. Buyer represents that no representations other than those specifically contained in writing in the Invoice have been made or relied upon.

2. Transportation and claims
All Goods received by Buyer from Arpa USA shall be deemed to be accepted and received in good and marketable conditions unless Buyer indicates otherwise on the carrier's Bill of Lading upon receipt of product. Risk of damage shall be on the Buyer when Goods are delivered to a common carrier F.O.B. shipping point.

3. Title to system and deliverables
Title to the Goods remains with Arpa USA until the System Price is paid in full.Title to each Deliverable remains with Arpa USA until such time as the price of such Deliverable is paid in full. Arpa USA reserves a security interest in the Goods until the System Price is paid in full and reserves a security interest in each Deliverable until the price of such Deliverable has been paid infull.

4. Time for bringing action
Any legal action brought by Buyer pertaining to the Invoice must be commenced within one(1) year after the cause of action has accrued.

5. Delay and non-delivery
This Invoice is subject to and Arpa USA shall not be responsible or liable for delay and/or non-delivery directly or indirectly resulting from and/or contributed to by any foreign or domestic embargoes, seizure, acts of God, insurrections, terrorist acts, war or the adoption or enactment of any law, ordinance, regulation, ruling or order directly or indirectly interfering with or rendering more burdensome the production or delivery hereunder, the lack of the usual means of transportation, fires, water damage, floods, explosions, strikes or other accidents, events or contingencies beyond Arpa USA's control, either of the foregoing nature or of any other kind, nature or description.

6. Applicable law & venue
The Invoice and the transaction to which it pertains shall be interpreted in accordance with laws of the State of Florida, without regard to the principles and applications of choice of law provisions. In event that any dispute should arise between Arpa USA and Buyer pertaining to the Invoice and the transaction to which it pertains, Buyer agrees and consents to having exclusive jurisdiction over it and the subject matter of the transaction established in the courts of Duval County, State of Florida.

7. Limitation of liability
Arpa USA shall in no event have any obligation or liability to buyer or any other person or entity (including buyers customers or contractors) for any loss or injury to earnings, profits, goodwill, or loss of use, or incidental, special or consequential damages (even if Arpa USA has been advised of the possibility thereof) arising out of or in connection with the sale, delivery, use, repair or performance of any of Arpa USA's Goods or Deliverables pursuant to the invoice.

8. Indemnification
Buyer agrees to indemnify and hold Arpa USA, its parent and affiliated companies, and their employees, officers, boardmembers, agents, successors and assigns (collectively, Indemnified Parties.) harmless from any and all claims or obligations (including but not limited to any claims for cost, damage, expense or liability of any kind) arising out of or related to acts or omissions in connection with the System and/or the Deliverables done by Buyer and/or any one claiming by, through or under Buyer, including, but not limited to, any unauthorized representation and/or warranty with regard to the System or the Deliverables.

9. Maximum liability
Arpa USA's liability arising out of the invoice, including without limitation any and all claims combined, will not exceed the system purchase price. In no event will Arpa USA be liable for the cost of substitute Goods by buyer, buyers contractors, customers, or any other person or entity.

10. Liability
In the event that any provision or provisions of the Invoice shall be construed to be invalid or unenforceable for any reason, such invalidity or unenforceability shall not be deemed to affect the remaining provisions thereof, and the Invoice shall be construed and enforced as if such invalid or unenforceable provision or provisions had never been included therein.

11. Waiver
The failure of either party to enforce, at any time or for any period of time, the provisions of the Invoice will not be interpreted to be a waiver of such provisions or of the right of such party to thereafterenforce each andevery provision. Commencement of performance and/or delivery underthe Invoice will not be considered to be acceptance of the Buyers different terms and conditions,which will be of no further force and effect what so ever in respect to Buyers purchases under the Invoice.

12. Disclaimer of agency
The relationship between Arpa USA and Buyer established under the Invoice is that of seller and purchaser. Buyer shall in no way be construed as acting as agent or representative of Arpa USA in any dealings which Buyer may have with any other person, firm or corporation, and Buyer shall have no power to act for or to legally bind Arpa USA in any such transaction or transactions. Buyer agrees that it will not in any way conduct its affairs to conveyor suggest to third parties a status or identify inconsistent therewith.

13. Assignement
Buyer shall not assign this Invoice or any rights hereunder without Arpa USA's prior written consent. Any purported assignment without the prior written consent of Arpa USA shall be void. For purposes of this paragraph, the transfer by Buyer of a controlling stock interest in Buyer without Arpa USA prior written consent shall constitute a prohibited assignment under the Invoice. Arpa USA may assign the Invoice to any person, firm, corporation or other entity without Buyers consent, prior, written or otherwise. Subject to the terms of this paragraph, the terms and conditions of the Invoice shall be binding upon and inure to the benefit of the respective parties here to, and their successors, representatives and assigns.

14. Notice
Any notice, request, demand or other communication required or permitted hereunder shall be deemed to be properly given provided such notice, request, demand or other communication is transmitted to the address (and facsimile number) of recipient last known to sender in by first class U.S. mail, postage prepaid and by facsimile.

15. Attorneys fees
In the event suit is brought by either party to the Invoice to enforce the terms or to collect money damages for breach thereof, the prevailing party shall be entitled to reasonable attorneys fees,expert or consulting fees, court costs, costs of investigation, and other related expenses incurred in connection with such suit.

16. Past due sums
Any sums not paid when due shall bear a late charge percent rate of one and one half (1.5%) per month,annual percentage rate of 18%,until paid provided thatif such rate oflate charge is not permitted by law, the highest legal rate shall be charged. In the event payment is not made as provided herein, Arpa USA shall have the right to with hold further Goods or Deliverables until payment is made, or to terminate the Invoice and receive damages until paid.

17. Bankruptcy
In the event Buyer is adjudicated bankrupt or files a voluntary petition in bankruptcy, makes an assignment for the benefit of creditors or applies for or consents to the appointment of a trustee or receiver over a substantial part of Buyers property, Arpa USA shall have the right to terminate the Invoice and collect for all work performed thereunder.

18. Credit acceptance
Arpa USA reserves the right to secure full or partial payment in advance if, in Arpa USA's opinion, the financial condition of Buyer does not justify credit extension.

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