



Technical Catalogue

ENGLISH

01 **WHY POPLAR?**

Advantages of its cultivation, industrial use and sale

A 100% ITALIAN PRODUCT WITH EXCELLENT INDUSTRIAL PERFORMANCE

Panguaneta uses only 100% Italian poplar to manufacture its plywood panels, the first to be certified as "100% Made in Italy"!

In our more than 60 years in the business, we have developed our expertise and shared our experiments, knowledge and techniques with long-standing suppliers and research centres. That's how we selected the I-214 clone as the one that best meets the high quality standards of a Panguaneta product.

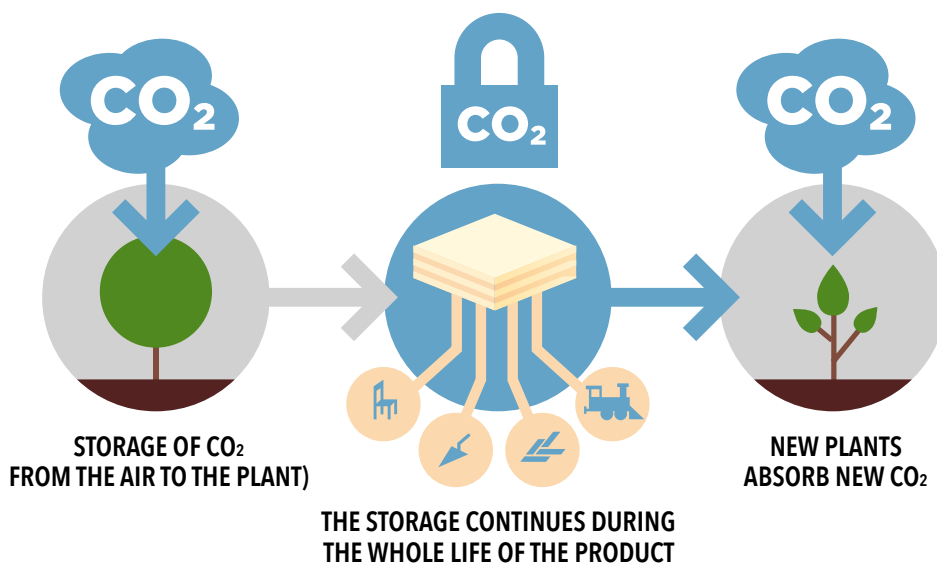
PANGUANETA'S SUSTAINABILITY

A virtuous and responsible journey

The fight against climate change is the most critical global challenge in world history. An unprecedented contribution is needed to ensure long-term sustainable growth. We at Panguaneta have developed our own climate strategy, which has allowed us to achieve ambitious goals even outside of Italy. And we consistently update this strategy to keep up the fight against climate change. We use only **100% Italian poplar** for our plywood. A sustainable raw material that will soon replace wood obtained from tree-felling.

Another competitive advantage of **100% Italian poplar** is that it's a fast-growing tree (short rotation forestry), since it grows in just ten years, taking approximately half the time of poplars from other European countries, which are cut after 15-20 years.

From its cultivation to the finished product, poplar absorbs more carbon dioxide than it releases (a carbon sink). Moreover, poplar groves have a positive impact on their natural habitat and support biodiversity, and prevent soil erosion and groundwater pollution. Controlled and certified forest management not only helps combine the sale and industrial use of wood with environmental protection but also ensures workplace safety while protecting the rights of local populations and their social and economic wellbeing.



02 WHY POPLAR PLYWOOD?

Technical features of a hi-tech material

Transforming poplar wood into plywood increases its elasticity, cut resistance, traction, bending strength and compression.

Panguaneta panels ensure higher performance compared to other panels (OSB, chipboard, etc.).

- While solid wood is 25-45 times more resistant longitudinally than transversally, a poplar plywood panel ensures a homogeneous mechanical response. Cross-bonding adjacent veneers make the plywood more resistant in every direction.
- The balanced construction of a plywood panel, with veneers joined at right angles, tends to balance the tension, thus minimising expansions and deformations. Poplar panels don't shrink, swell or deform.
- Plywood structural works are as resistant as any other structural work but are lighter than solid wood or laminated ones, thus less material is used. Thanks to its cross-bonded layers, plywood can be nailed or screwed near the edges without cracking.
- Panguaneta plywood is available in large and optimised sizes of up to 3120 x 2120 mm.
- In plywood production, we can use all the wood obtained from the tree, thereby avoiding waste. Processing scraps and round timbers are used in many industries.



03 **WHY PANGUANETA PLYWOOD?**

From cultivation to product innovation

VERIFIED

We at Panguaneta check every step of the supply chain, starting from cultivation. The poplar we use comes from private cultivations or controlled growers who are our best partners. Our poplar supply chain is entirely local. The production cycle, including planting, cultivation, cutting, and industrial processing, takes place in Sabbioneta and the surrounding area. Panguaneta poplar plywood is an Italian speciality.

CERTIFIED

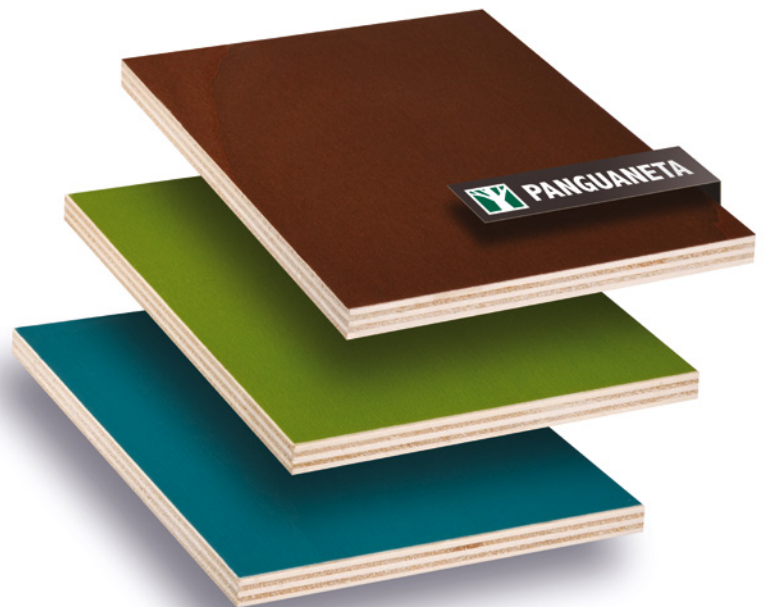
When it comes to raw material supply, Panguaneta applies the standards of the most renowned international certifications: FSC® (Forest Stewardship Council®) and PEFC™ (Programme for Endorsement of Forest Certification schemes). Efficient management and the sustainable use of forest lands promote the biodiversity, productivity, renewal and vitality of the whole system. This way, we can meet local, national and global environmental, economic and social requirements without damaging other ecosystems.

GUARANTEED

Sustainability is guaranteed even during the processing stage. In this regard, we have obtained the ISO 9001 (system), ISO 14001 (environmental), ISO 50001 (energy saving) certifications. Moreover, we have reached the end-customer, thanks to the Environmental Product Declaration (EPD®). This declaration provides environmental data about the life cycle and environmental impact of products in compliance with the international ISO 14025 standard, which covers the entire lifespan of the poplar plywood panel. Traceability allows Panguaneta to prove the sustainable and controlled origin of the raw materials used. This way, our customers can choose a product based on real and trustworthy data.

BEYOND POPLAR

The Panguaneta range also includes composite plywood and plywood obtained from other types of wood to keep up with the market's evolution, especially in terms of industrial transformation. We check the origin of these materials, ensuring the traceability, legality, and environmental sustainability of the entire range of Panguaneta plywood.





04 TECHNICAL FEATURES

The technical features of both poplar and composite plywood panels are listed below.
 You can find the technical sheets in the product pages of our website.

TUTTO-PIOPPO PLYWOOD (100% POPLAR)

FEATURE	STANDARD	UNIT OF MEASUREMENT	THICKNESS (LAYERS)											
			4 (3)	8 (5)	10 (5)	12 (7)	15 (7)	18 (9)	20 (9)	25 (11)	30 (11)	35 (15)	40 (17)	
DENSITY	UNI EN 323	kg/m³	400 - 450 (tolerance +/- 10%)											
BENDING STRENGTH (thickness 3-40 mm)														
LONGITUDINAL	UNI EN310	N/mm²	40 ≥ 25											
TRANSVERSAL	UNI EN310	N/mm²	15 ≥ 30											

COMPOSITE PLYWOOD

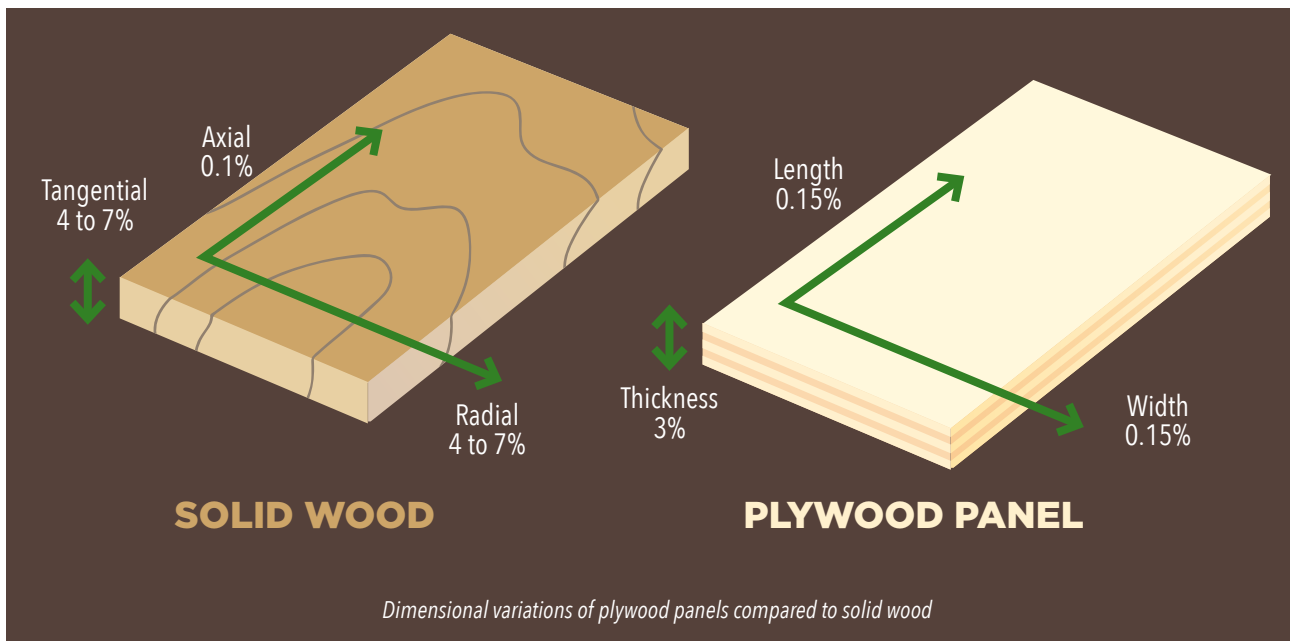
(Ceiba-Classic, Okoume-Classic, Ilomba-Classic, Eucalyptus-Classic,
 Ilomba-Superior, Maple-Superior, Birch-Superior, MDF-Superior)

FEATURE	STANDARD	UNIT OF MEASUREMENT	THICKNESS (LAYERS)											
			4 (3)	8 (5)	10 (5)	12 (7)	15 (7)	18 (9)	20 (9)	25 (11)	30 (11)	35 (15)	40 (17)	
DENSITY	UNI EN 323	kg/m³	450 - 550 (tolerance +/- 10%)											
BENDING STRENGTH (thickness 3-40 mm)														
LONGITUDINAL	UNI EN310	N/mm²	40 ≥ 40											
TRANSVERSAL	UNI EN310	N/mm²	30 ≥ 35											

DIMENSIONAL VARIATIONS

Humidity in the air can alter the panels' humidity level, which may change their length, width and thickness. These dimensional variations are common for all types of wood and are reversible. However, they should not be confused with irreversible degradation resulting from prolonged water exposure (condensation, rain, etc.). That's why we recommend stabilising the environment where the panel will be applied beforehand and following the instructions for storing materials.

Dimensional variations of plywood panels are considerably lower than those of solid wood (see figure). This is due to the presence of glue, which slows down or shields moisture penetration and the intersecting grains, which combat tangential shrinkage.



Of all wood-based panels, plywood has lower dimensional variations (roughly two times less than an MDF or a chipboard panel). The dimensional variations of the panels are given by the variation rate of the panel size at 25 °C between dry conditions (30% air humidity) and humid conditions (85% air humidity). These variations are established based on the method indicated in the UNI EN 318:2002 standard "Wood-based panels. Determination of dimensional changes associated with changes in relative humidity".

BENDING STRENGTH AND ELASTICITY MODULUS

The mechanical features of plywood panels depend on many factors, such as wood species, thickness, layer composition, grain direction of the faces, peeling and pressing conditions. Depending on the panel composition, both the bending strength and elasticity modulus can be different based on the direction (longitudinal or transversal). However, the mean value measured is a constant feature of the species used. You can view the values of the various product ranges in the respective technical sheets. Bending strength and elasticity modulus are established in compliance with the UNI EN 310 standard "Determination of modulus of elasticity in bending and of bending strength".

PHYSICAL PROPERTIES

DENSITY

The average density of plywood panels varies depending on the wood species used. Density is established in compliance with the UNI EN 323 standard "Wood-based panels. Determination of density".

MOISTURE

The moisture contained in Panguaneta plywood panels ranges from 8% to 12%. As with solid wood, the panel's moisture is measured in relation to the anhydrous weight with the following formula:

$$H (\%) = 100 \times (M_h - M_0) / M_0$$

where:

M_h is the weight (g) of the specimen during sampling,

M₀ is the weight (g) of the anhydrous specimen once it is completely dry.

The operating method is established in UNI EN 322 "Wood-based panels. Determination of moisture content".

The loss of weight, calculated as a percentage of the weight of the anhydrous specimen, corresponds to the amount of moisture in the panel.

HYGROSCOPIC BEHAVIOUR

Plywood panels partially maintain the hygroscopic behaviour of solid wood. However, due to the presence of glue, the moisture content of a panel varies less rapidly. Moreover, the hygroscopic equilibrium of plywood is 1-2% lower than that of solid wood.

FIRE-RESISTANCE

CALORIFIC VALUE

The calorific value of a material is the amount of heat released from 1 kg of material during its complete combustion. Generally, it is expressed in megajoules per kilogram (MJ/kg). As a part of fire-prevention regulations, the net calorific value (NCV) is used to calculate the surface calorific value threshold, in particular in installations inside high-rise buildings (HRB) and public access buildings (PAB). By convention, the NCV of plywood panels matches the NCV of wood, meaning 17 MJ/kg (4000 kcal/kg) with 12% of moisture. However, the calorific value of the plywood panels is slightly lower, especially for fire-proof panels.

REACTION TO FIRE

Reaction to fire is the response of a material in contributing, under specific conditions and by its decomposition, to a fire to which it is exposed. Reaction to fire aims at assessing the component that can catch and develop a fire. Panguaneta products comply with UNI EN 13986 "Wood-based panels for use in construction" and with all CE marking regulations for construction products. Panguaneta products fall in reaction to fire class D-s2,d0 - Dfl-s1 (for thicknesses greater than 9 mm and density exceeding 400 kg/m³).

THE PANGUANETA FIRE RANGE

Panguaneta has developed a range of products with specific characteristics to meet new market demands in terms of passive fire protection for buildings in general and wall and/or ceiling applications.

CERTIFICATIONS

For specific uses, Panguaneta products are available with the following certifications:

FIRE-DESIGN

Euroclass B-s1,d0

Certified products:

Tutto-Pioppo

Okoume-Twin

The EN 13501-1 standard classifies the reaction to fire of products and construction components. Construction products are classified in Euroclasses A to F, based on harmonised testing methods. A-class materials are non-combustible (e.g., glass or concrete). FIRE-DESIGN products (PANGUA-FIRE) are certified B-s1,d0 and come with CE marking in compliance with UNI EN 13986 and Regulation (EU) No 305/2011 concerning construction products for use as non-structural elements in a dry environment.



FIRE-SEA

IMO-MED certification

European Directive 2014/90 (Marine Equipment Directive - MED) covers equipment and materials to be placed on board non-military ships. The technical regulations applicable to marine equipment concern the resolutions of the International Maritime Organization (IMO). Specifically, these instruments include radiocommunication and navigation equipment, materials for setting up the ship, and fire-fighting equipment. These products carry the distinctive "wheelmark".

Certified products:

Tutto-Pioppo

Tutto-Okoume

FIRE-RAIL

EN 45545-2 standard

Certified products:

Tutto-Pioppo

Tutto-Okoume

The fire protection of vehicles and the analysis of the reaction to fire/fire resistance of the materials used are fundamental aspects when developing products for the railway industry. That is why Panguaneta has developed a product with high resistance to fire and reduced smoke emission. FIRE-RAIL is a material produced in compliance with EN 45545 and meets the highest hazard level (HL3-R1). In addition to the railway industry, these profiles can be used as cable ducts in indoor environments and tunnels, as well as industrial components.



RESISTANCE TO FUNGI

Environmental conditions are essential to contrast the presence of lignicolous fungi on wood or panels. To develop, these fungi need air, a temperature ranging between 10 °C and 35 °C, and wood moisture ranging between 20% and 80%. Without these conditions, fungi are unlikely to develop.

Therefore, for works carried out in dry environments (furniture, carpentry, etc.), the risk that fungi can develop is null.

However, precautions must be taken for uses that could subject the panels to moisture levels between 20% and 60% for a long time (small and non-ventilated spaces). For works where the risk of moisture exists, precautions must be taken especially on the panel sides, where humidity can be absorbed more quickly. Surface discontinuity, slots, hook or screw holes are all areas where humidity can enter.

For outdoor use (sheltered area or direct exposure), the panel edges should have a sealant or a protection device (metal or plastic profiles). However, even if panels are treated against fungi, hygiene rules must always be complied with. In particular, ventilation must be ensured at the back of the panels.

If used in extremely humid environments (risk class 4), the whole panel must be protected.

Plywood panels are made with different wood species, whose durability against lignicolous fungi can vary significantly. However, if work conditions allow it, and in the absence of suitable chemical treatment, the use of high-resistance species is recommended.

The application of a finishing that protects the panel against humidity reduces the risk of organic alterations, but cannot replace the preservation treatment.



PANEL CLASSIFICATION

In compliance with UNI EN 636, plywood is classified based on:

- wood species used to make the panel
- surface appearance of the faces,
- type of composition (homogeneous or mixed)
- type of adhesive
- natural wood durability (i.e. resistance to biodegradation)
- use (structural or non-structural).



QUALITY GRADES

The quality of a plywood panel is established through visual inspection of the panel's outer faces, in compliance with UNI EN 635-1 and 635-2 (refer to these standards for the characteristics of the various grades and tolerances).

Grades (I, II, III and IV) indicate an increasing presence of defects. Both panel surfaces are graded separately (first the front and then the back). That's why different compositions are possible (e.g. I/II, II/III, III/IV).

QUALITY GRADE	DESCRIPTION	EXAMPLE
CLASS I	<p>"Natural" or "discoloured" face. Only a few pin knots or sound tight ones without cracks are allowed. Slight discolouration, tiny patches, or well-made repairs where colour remains consistent with the rest of the surface are also allowed. The face can be visible. Ideal for all types of finish (plating, clear varnish, satin finish etc.).</p>	
CLASS II	<p>"Natural" face with colour variations and sound knots. May contain sound, tight knots no larger than 35 mm in diameter; small knot holes or hairline cracks, only if well-patched. Low contrast discolouration, minor imperfections, glue marks, repairs and well-filled patches are also allowed. Suitable for finishing with laminate covering, paint or varnish.</p>	
CLASS III	<p>"Open" face. Sound, tight knots up to 50 mm in diameter are allowed, as are loose knots, cracks and bark inclusions. Discolouration, as long as they do not affect soundness, glue marks, repairs and patches are allowed. Suitable for uses where the face is not visible or coatings with highly covering material.</p>	
CLASS IV	<p>Plywood face intended for packaging or similar purposes. Natural wood features and various processing defects are allowed as long as they do not compromise panel functionality (for example, fungus growth and iron/mineral inclusions are not allowed).</p>	

USE CLASSES AND BIOLOGICAL DURABILITY

The level of humidity in the place where the panels will be installed and the presence of biological degradation agents determine whether a panel is suitable for a specific environment (UNI EN 335). Standard UNI EN 335 outlines the use classes, which consist in the various situations to which wood and wood-based products might be exposed. This standard also indicates the biological agents for each situation.

Panguaneta products are available in the following use classes:

Use class 1 (*dry indoor environment*)

refers to situations in which the panel is in a sheltered area, fully protected from weather agents and installed in settings with air humidity lower than 20% and, thus, with no risk of fungi development (e.g. interior furnishings).

Use class 1 is available for all Panguaneta products.

Use class 2 (*humid indoor environment or sheltered outdoor setting*)

This class covers situations in which the panel is protected from the direct action of weather agents. Humidity is higher than 20% and can result in occasional yet not continuous moisture. The panel is therefore exposed to a moderate risk of fungi development (e.g. bathroom furnishings, humid rooms or under external coverings).

Use class 2 is available for all Panguaneta products, considering the use of a high-resistance bonding agent.

Use class 3.1 (*outdoor environment*)

This class refers to situations in which the panel is not protected from weather agents and is not in contact with the ground or standing water (e.g. outdoor applications).

Use class 3.1 is available for all Tutto-Okoume and Forte product ranges.

Use class 3.2 (*humid outdoor environment*)

This class refers to even more harsh conditions that result in a high risk of biodegradation, as the panel is in contact with soil or water (fresh or saltwater) and is permanently exposed to moisture.

Use class 3.2 is available for all Tutto-Okoume and Forte product ranges.

BONDING

Use classification depends, in particular, on bonding characteristics. The quality of the bonding depends on the resistance to humidity and is regulated by standard UNI EN 314. Bonding classification indicates the resistance of the bonding line to the hydrolysing action of moisture:

Class 1: urea bonding that meets class 1 requirements for the use of the panel in a dry environment (UNI EN 636-1);

Class 2: melamine bonding that meets class 2 requirements for the use of the panel in a humid environment (UNI EN 636-2);

Class 3: melamine bonding that meets class 3 requirements for the use of the panel in an outdoor environment (UNI EN 636-3);

FORMALDEHYDE

Panels are classified based on their formaldehyde emission in compliance with specific technical regulations (see annex B of the UNI EN 13986 standard). Formaldehyde (formic aldehyde, volatile organic compound) is widely used for manufacturing materials used in the construction and furniture industries. It is also a by-product of combustion and some natural phenomena. That's why we can find it in both indoor and outdoor environments.

Class E1

Class E1 panels have low emissions and can be used without causing an equilibrium concentration in the air of the test chamber (defined in the UNI EN 717-1 standard) greater than 0.1 ppm. This limit is recommended by the World Health Organization for living environments. All Panguaneta products fall in class E1.

Class E05

This class was developed to meet the requirements of the German market and the UNI EN 16516 standard. Since January 2020, it has been the new reference method for wood-based products.

The limit of 0.1 ppm (as in the E1 emission class) remains; however, considering the higher testing load and the lower air-exchange rates compared to UNI EN 717-1, the analysis of the new formaldehyde measurement method for wood-based products implies significantly lower emissions.

For many years, Panguaneta has been at the forefront in developing panels that meet the most demanding market requirements and promoting the use of adhesives with minimal or even zero formaldehyde emissions.

CARB P2 - TSCA Title VI

Bonding developed to meet formaldehyde-emissions requirements for wood-based panels and finished products made with them, introduced first in the Californian market and then across the United States.

Carb Phase 2 -P2, implemented from 2010 to 2012, reduces the previous emissions values to 0.05 ppm, thus halving the E1 class values (0.01 ppm).

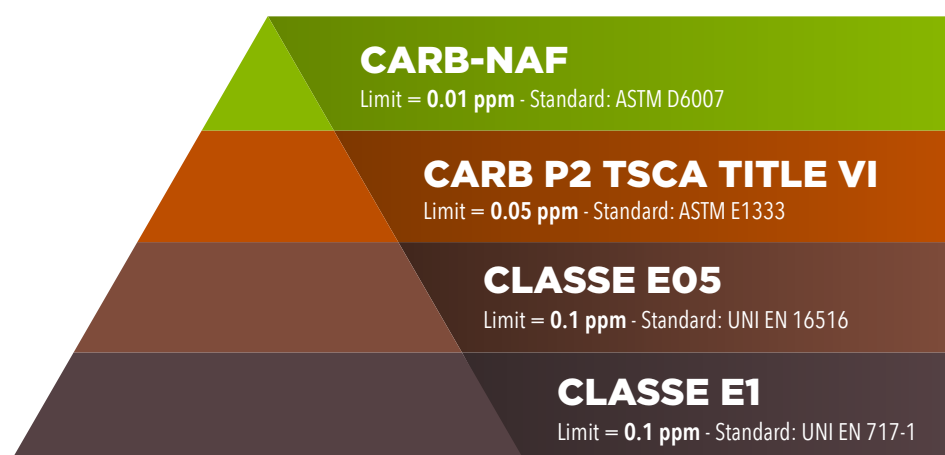
Certified products: **Tutto-Pioppo, Ilomba-Twin, Ceiba-Twin, Okoume-Twin, Birch-Superior, Maple-Superior.**

CARB - NAF

Panguaneta is the first European company to obtain this certification for no-added formaldehyde products. NAF (No Added Formaldehyde) certificates: Panguaneta panels meet the world's most stringent regulations (the United States - Carb Phase 2; Japan F****; Australia - AS/NZS).

CARB-NAF certified products are included in the PUREGLUE range. They are developed with Solenis LLC, a world-leading company specialised in the development of biomaterials for industrial applications using the Soyad™ adhesive technology, a soya flour-based resin.

FORMALDEHYDE EMISSIONS



All Panguaneta certificates can be downloaded from our download area
www.panguaneta.com



05 CERTIFICATIONS

ENVIRONMENTAL SUSTAINABILITY CERTIFICATIONS



ENVIRONMENTAL PRODUCT DECLARATION



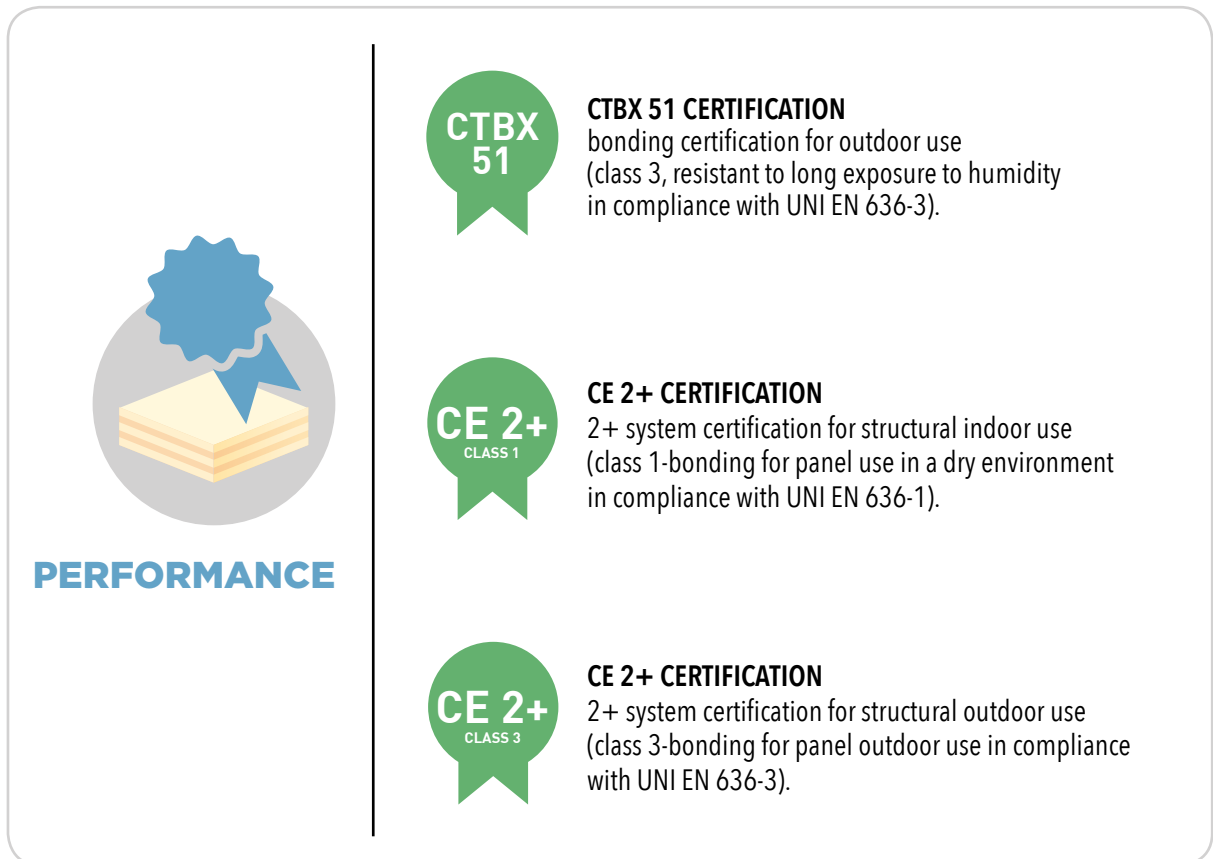
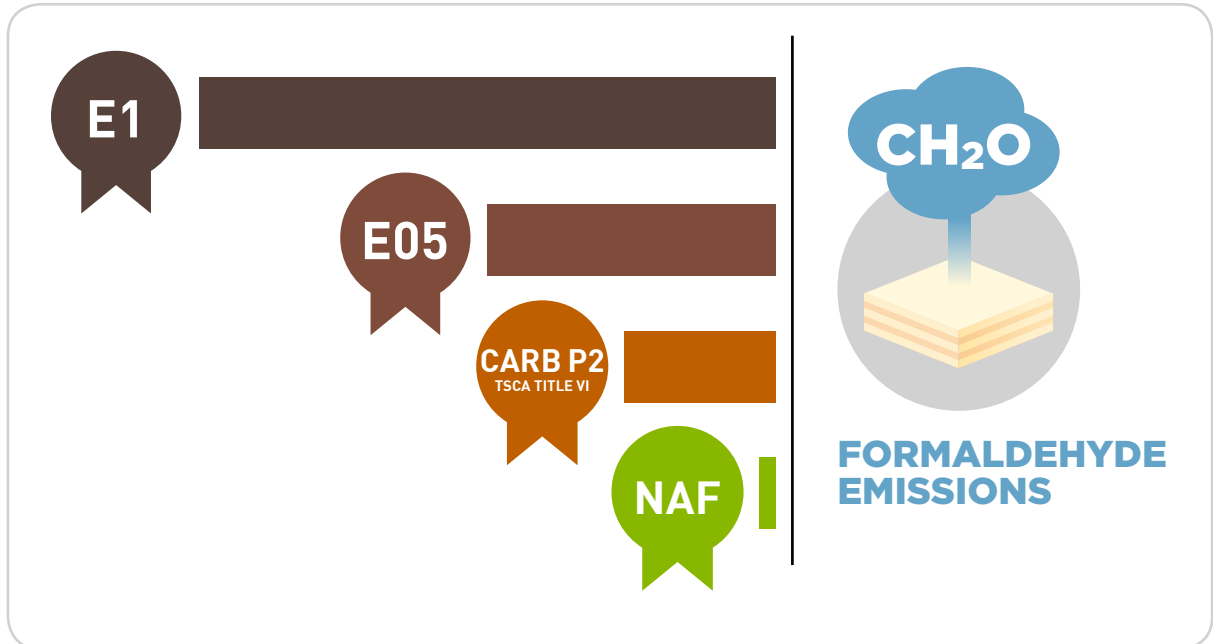
Panguaneta was the first company to obtain the EPD® certification for the Italian plywood industry and the first in Europe for the poplar plywood industry, thus consolidating its commitment to responsible and certified production.

The Environmental Product Declaration (EPD®) provides environmental data about the life cycle and environmental impact of products in compliance with the international ISO 14025 standard. An important information and communication tool about environmental performance that helps architects and designers choose the best products and meet the most stringent environmental standards.

The EPD is a voluntary declaration that involves the entire life cycle of a product (raw material, cutting, bonding, transport, emission values, waste management). It also confirms our sense of responsibility towards the entire production process.

Panguaneta's EPD® certificate is an added value for the finished product that reaches the end-user and a competitive advantage for those who buy our products, as they can integrate their offering and develop highly sustainable projects.

TECHNICAL PRODUCT CERTIFICATIONS





06 PACKAGING

THICKNESS (mm)	3	4	5	6	8	10	12	15	18	20	25	30	40
PANELS PER PACK	200	150	120	100	75	60	50	40	33	30	23	20	15
PACKAGING HEIGHT (INDICATIVE)	60 cm												
DIMENSIONS	PACKAGING VOLUME (INDICATIVE)		PACKAGING WEIGHT										
250 x 122 cm	± 2.0 m ³		700 to 750 kg										
252 x 187 cm	± 3.0 m ³		1000 to 1200 kg										
310 x 153 cm	± 3.0 m ³		1000 to 1200 kg										
310 x 183 cm	± 3.5 m ³		1300 to 1500 kg										

07 INSTALLATION

GENERAL RULES

Plywood panels meet the most demanding requirements and are suitable for multiple uses. Plywood panels are wood-based products of organic origin with recognised environmental qualities and technical performance.

Before use, remember that wood (and therefore plywood panels) keeps interacting with the environment during its life cycle. Just think about its hygrothermal properties, which are often the reason why we choose wood over an inert material.

Therefore, it's important to consider the dimensional variation of plywood panels resulting from weather changes or exposure to water (or variations of hygrothermal conditions).

Preparing plywood panels for thermal and hygrothermal conditions as close as possible to those of their intended use is essential.

More in general, it is essential to check and, if necessary, solve the material's exposure or risk of exposure to water during construction and prevent these risks during its life cycle.

The following checklist helps reduce risks considerably:

- Choose the plywood panel based on intended use (bonding class);
- Store and install plywood panels in water-protected environments;
- Remove surface condensation resulting from no or low thermal resistance of the outer walls;
- Ventilate the walls to maintain the inside climate as close as possible to the state of equilibrium of the surrounding environment;
- Add an expansion joint between each panel and assemble the panels so as not to obstruct expansions;
- Heat the rooms gradually;
- Maintain a constant air humidity rate, especially in rooms with air conditioning.

TRANSPORT, STORAGE AND MAINTENANCE

TRANSPORT

Plywood panels must be transported in strapped and protected compact packages on a sheeted vehicle. They must be placed on flat and clean pallets and loaded and unloaded in closed settings intended for this purpose.

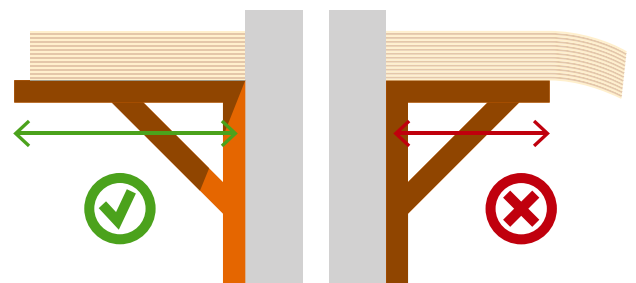
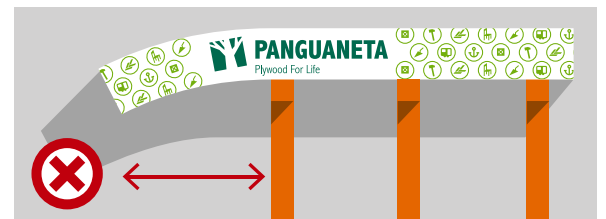
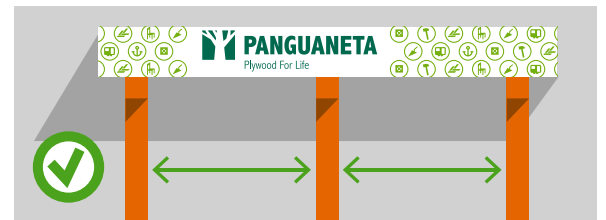
STORAGE

Panels must be stored flat in clean and dry settings (avoid cold and humid environments or those with wet walls). The panels must be stored in a dedicated, closed, air-conditioned room at controlled room temperature. Poor storage conditions (see figure) can cause aesthetic defects (spots, stains, etc.) or deformations.

Analyse the level of flexibility based on the dimensions and thickness of the panels to ensure proper storage and handling. The larger the panels and the smaller the thickness, the greater the bending.

The cantilever system ensures the correct positioning of the panels. Always take into consideration the damage that handling operations may cause on the material. The panel can bend permanently, or marks can appear on the material, compromising quality.

To reduce bending effects, it is essential to reduce the distance between the supports (both during lifting and storage).



For this purpose, you can adopt the following strategies:

- Use a larger number of forks.
- Increase the number of supports.
- Handle the panels on a platform.

In periods when air humidity rates change considerably, stored plywood panels may show irregular humidity variations (depending on whether they are on the sides or centre of the packaging). This condition can irregularly deform the panels.

MAINTENANCE

Prevent impacts (especially while handling) and avoid dragging the panels to prevent damage and absorption of other materials. Pay special attention to previously processed panels (laminated, painted panels, etc.).



FINISHING

FINISHING PRODUCTS

All finishing products used on solid wood (paints, varnishes, etc.) can also be used on plywood panels. These products can be divided into four categories:

- organic solvent paint: alkyd (or glycerophaltic)
- water-soluble paints: alkyd, acrylic, urea-formaldehyde,
- vinyl acrylic copolymers, two-component paints: polyurethane, epoxy resin,
- UV light-curing paints: acrylic, epoxy or polyester that can be polymerised under ultraviolet radiation.

PREPARING THE SURFACE

The surfaces to be reprocessed (plated, laminated, etc.) must be free from dust or sanding traces. They must be clean and without any stains, resins or salt. Plywood panels always come sanded. However, depending on the intended use, further sanding using a thin sandpaper grit (e.g. 180-220 grit) is recommended.

Before any application, check the porosity of the panels' surfaces and edges to make sure that the finish bonds to the surface and test its coating power. The edges absorb more than the faces. In this case, we recommend applying a sealant.



PANGUANETA

Plywood For Life

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