

1. Purpose of the manual:

The information contained in this publication is aimed to inform customers about proper handling and storage of panels in order to obtain better final results or even a longer product-durability.

2. Storage:

The importance of proper care and storage of plywood cannot be over-emphasized; thus, all panels should be stored in a cool, dry place away from the direct sunlight. Drastic changes in temperature and humidity levels, as well as a lengthy exposure to direct sunlight, might produce internal wood tensions leading to cracking.

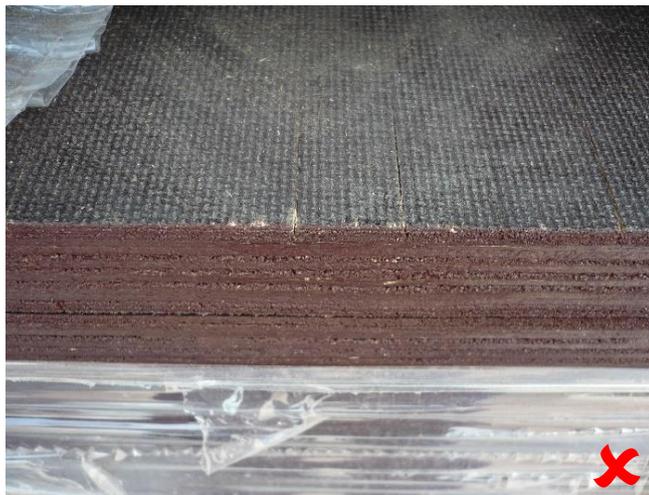


Image 1. Cracks in a Laudio Wire type panel, after a six months exposure to outdoors conditions.

When outdoors-storage comes unavoidable, panels should be well covered with a waterproof packaging permeable to water steam, keeping them all on lifted stands so as to avoid contact with floor, vegetation or water.

It is recommended not to remove the packaging of the boards, and keep it on as long as possible before the panels are conditioned for use.

2.1. Stack:

When panels had to be raised, moved or stack, this should be done properly in order to avoid warping or any other possible deformation.



Image 2. Wood battens should be aligned

It is recommended to pile panels horizontally on a flat surface and level. Stack one on top of another should be done on wood battens, placed vertically over the beams below. Battens halfway between are not meant to exceed a distance of 600 mm. among them.

2.2. Handling:

Panels must not be dragged by using rollers with sharp edges neither overchains, to prevent any damage or scratches on finished surfaces.



Image 3. Marks on the panel surface due to improper handling.



Image 4. Panel damaged by Forklift hit.

Care should be taken when working with forklifts (it would be convenient to protect the forks) to prevent panels from being marked or damaged at the base of the package.

2.3. Preventive measures:

Una vez retirado el embalaje, el paquete no debe moverse puesto que los tableros son altamente deslizantes.

3. Civil & building construction formwork:

Protect panels from a direct and long outdoors exposure.



Image 5. Panels protected from a direct outdoors exposure

3.1. Mechanizing and drilling:

On mechanizing of the panels it is highly important the use of conveniently sharp tools on a good support, avoiding vibrations.

Saw circular discs have to be placed as low as possible to prevent chipping, denting and damage to panel edges.

Use appropriate bits, suitable for use on wood.



Image 6. Incorrect machining due to lack of support.

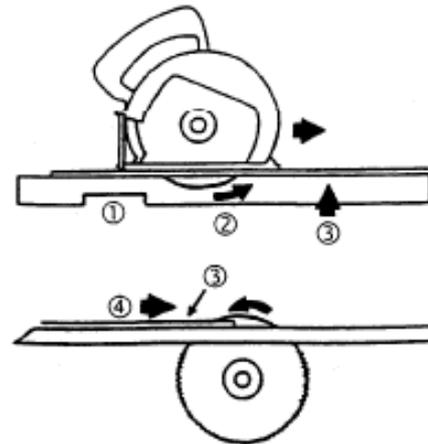


Image 7. Trimmed panel.

1-Support. 2-Spindle saw direction. 3-Upside face position.
4. Cut direction.

On cutting the panel, this is to be leant on a right position and strongly pressed down against the cutting table and guide-rails to avoid vibrations.

Once the boards are cut, two coatings of water resistant paint for external exposure, should be applied on the edges as soon as possible.

3.2. Care and handling of plywood for shuttering:

The Formwork finish quality and the number of reuses of a panel may vary depending on some factors linked to a proper care on the job site.

3.2.1. Treatment before first use:

Before using, it is of great importance a deep treatment/cleaning of panels with a formwork release agent, no matter what kind of coating they have. We advise to apply two coatings before the first use and one after each later application.

3.2.2. Release agents:

The choice of a suitable release agent, according to the specific type of concrete and finishing required, will guarantee a cleaner result after stripping and a longer lasting panel. Quality of release agent may affect the finish aspect of concrete. Plywood panels have to be treated with a quality release agent before each using.

3.2.3. Conditioning of the panels and formwork process:

Holes for anchorages should be drilled through both sides and not just one of them. Also, do never drill the panels without placing a base underneath the panel to avoid chipping.

Holes and edges should be sealed with at least two coatings of waterproof paint.

An appropriate silicone or putty would be recommended on boards junctions to minimize whitewash loss.

On building up the concrete reinforcement, follow the instructions given at point 4 of this guide. The use of wood treated for external use is recommended. The support of panels should be placed perpendicular to the long side of the panels. (grain orientation).



Image 8. Reinforcement, built using untreated wood and failing to keep sufficient gap between panels.

If the vibrator touches the panel, this it could lead to one part of panel getting attached to concrete. To avoid this, it is convenient to protect the vibrator at any time with a rubber-stopper or design the wire-mesh in a way that the vibrator does not touch panel at all.

It is of great importance to release the panels as soon as possible to prevent breakages or these getting attached to concrete. Ask concrete manufacturer for advice.

3.2.4. Formwork finish:

Panels are stocked at production site and transported to the working place, under relatively dry conditions, (below 15%). After exposure to open air weather conditions, and first uses at the work site, a light swelling on the panel surface may arise, a so called “rippling” effect. This is a natural process due to increase on the moisture content of the panels, which it is bound to be reduced on further uses, once the hygrometric, moisture, balance of the panels wood is recovered.



Images. 9 and 10. Typical swelling on the veneers surface due to moisture content variations. “Rippling” effect.

3.2.5. Formwork panels storage at worksite:

Plywood panels should be cleaned and treated immediately with a proper release agent after stripping. Those form panels left without cleaning after use, are highly probable to be damaged when taken away from the shuttering. Boards should be storage with their film face protected from sun; by example by leaning them on a wall. If sun exposure becomes unavoidable, a quick loss of moisture of the face veneers would probably damage the phenolic film.

4. Load bearing boards in floors installation:

4.1. Storage:

As plywood is manufactured with low moisture content, lower than those at work site conditions, it is a good practice to storage it for a period of at least 24 hours, under conditions that approximate those it will experience in service.

4.2. Mechanizing:

Edges may be manufactured straight or mechanized.

Panels with straight edges need some space among them and all sides to be placed on wood battens.

Long side Tooth and groove panels do not need to be placed on an additional beam under the long side.

4.3. Enlargement spaces:

Bearing in mind moisture increase, it is highly recommended to leave a gap between panels according to panel length as it is pointed it out in the following chart.

Panels suffer changes in moisture content that affect its dimensions. Panels are manufactured with a content of $9 \pm 2\%$. In the following table, a dimensional variation in length and thickness can be observed in connection with moisture.

	NOMINAL	INCREASE	MEASURE	INCREASE	MEASURE	INCREASE	MEASURE
MOISTURE	10%	15%		20%		25%	
Length	10	0,01	10,01	0,02	10,02	0,02	10,02
	500	0,38	500,38	0,75	500,75	1,13	501,13
	1.000	0,75	1.000,75	1,50	1.001,50	2,25	1.002,25
	1.500	1,13	1.501,13	2,25	1.502,25	3,38	1.503,38
	2.000	1,50	2.001,50	3,00	2.003,00	4,50	2.004,50
	2.500	1,88	2.501,88	3,75	2.503,75	5,63	2.505,63
	3.000	2,25	3.002,25	4,50	3.004,50	6,75	3.006,75
Thickness	9	0,14	9,14	0,27	9,27	0,41	9,41
	12	0,18	12,18	0,36	12,36	0,54	12,54
	15	0,23	15,23	0,45	15,45	0,68	15,68
	18	0,27	18,27	0,54	18,54	0,81	18,81
	24	0,36	24,36	0,72	24,72	1,08	25,08
	30	0,45	30,45	0,90	30,90	1,35	31,35

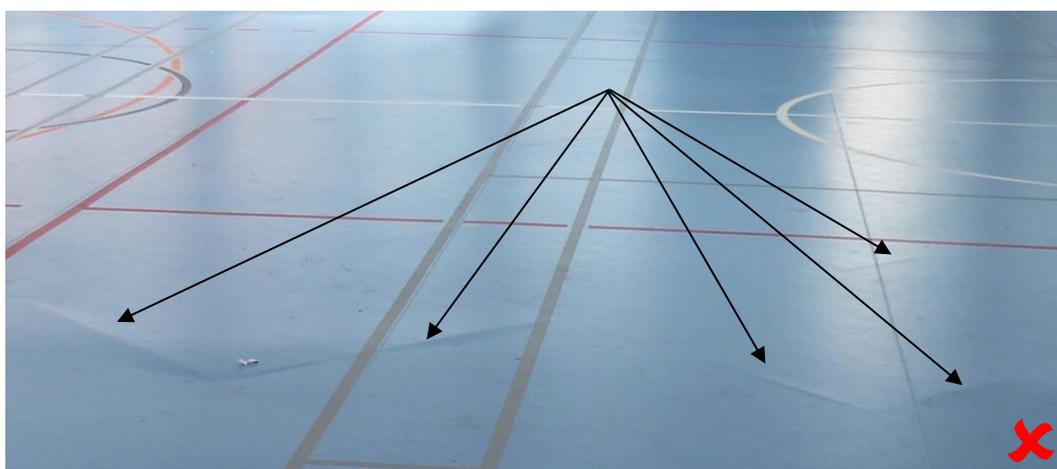


Image 11. Panels assembled with no gap between them

4.4. Assembly of panels:

Panels with straight edges are recommended to be always leaned on their four sides, placing their short sides on small beams and the longer ones on crossbeams. (See 13rd figure).

All panel edges are meant to lean on beams or crossbeams.

It is recommended the panels to keep a minimum support base of 18 mm on beams or crossbeams.

Side joints on short sides should be placed alternate whatever the sort of edge.

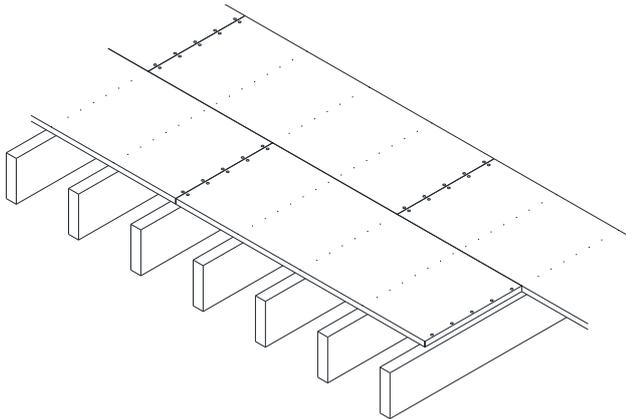


Image 12. T & G panels assembly (Laudio Tech) : Short side edges should lean on beams. (ENV 12872).

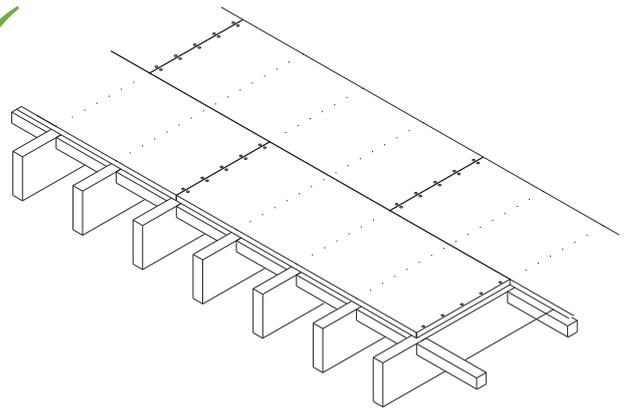


Image 13. Trimmed panels assembly: Short sides to lean on beams and long sides on crossbeams. (ENV 12872).

4.5. Panel installation:

Minimum length of nails or screws should be twice the panel thickness and their diameter at least 0.16 times panel thickness.

It is recommended to inlay nails or screws 2 or 3 mm. under the panel surface.

In case of panels being used as floor coating, it is preferable not to seal inlay-holes.

Values below show minimum and maximum distances among settings in relation to edges.

Maximum distance settings (mm)		Minimum distance in relation to panel edge (mm)
Distances among settings along edges sides	Distances among settings upon beams, twin or upright intermediate support for panels	
150	300	8

5. Scope and other considerations to be taken into account:

On a structural use of the panels, the type of panel construction should be taken into account and in particular, the wood grain direction. For example: 2500x1250, the first figure corresponds to the grain direction and the second is transversal to grain direction. If support points are parallel to the short dimension, the mechanical values are those as shown at technical sheet for the long side. See technical sheet of the panels.

A declaration of performance of all our products is available at our web page:

www.maderasdelldio.com

Check also the standard Norm UNE-ENV 12872, "wood panels-Guide for structural use of panels in formwork, walls and roof-covers"

For any further enquiries, please do not hesitate to contact:

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Nº de Revisión	Fecha de modificación	Modificación realizada
Rev .01	14/06/2013	Nuevo índice. Nueva referencia a la construcción de forjados. Recomendaciones según UNE ENV 12872:2000
Rev .02	17/01/2014	Nueva imagen corporativa.
Rev .03	02/06/2017	Actualización y revisión
Rev .04	01/07/2019	Nueva imagen corporativa