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European Technical Assessment

ETA 10/0445 of 19/05/2016

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General Part

Technical Assessment Body issuing the ETA designated according to Art. 29 of Regulation (EU) 305/2011:

Instituto de Ciencias de la Construcción Eduardo Torroja (IETcc)

Trade name of the construction product

PANFRI, PANPLA, SANFRI, SANPLA

Product family to which the construction product belongs

Self-supporting composite lightweight panels for use in roofs.

Manufacturer

López Panel S.L.

Polígono Industrial de Barros. Parcela 29-7
39408 Los Corrales de Buelna (Cantabria) – Spain
www.lopezpanel.com

Manufacturing plant

López Panel S.L.

Polígono Industrial de Barros. Parcela 29-7
39408 Los Corrales de Buelna (Cantabria) - Spain

This European Technical Assessment contains

14 pages including 3 annexes which form an integral part of this assessment. Annex D contains confidential information and is not included in the European Technical Assessment when that assessment is publicly available.

This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of

Guideline for European Technical Approval of “Self-supporting composite lightweight panels” ETAG 016, edition November 2003, Part 1: “General” and Part 2: “Specific aspects relating to self-supporting composite lightweight panels for use in roofs” used as European Assessment Document (EAD)

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SPECIFIC PART

1. Technical description of the product

1.1.Panels

The following self-supporting composite lightweight panels “PAN-FRI”, “PAN-PLA”, “SAN-FRI”, “SAN-PLA” present different thicknesses, and consists of basis, rafters, an insulation injected polyurethane foam core, and a covering layer as described below.:

- Panels PANFRI and PANPLA: They are made of an inner skin or basis as described below, two lateral faces of pine-wood rafters, an injected polyurethane core and an outer skin of a paper kraft barrier (for the polyurethane protection against degradation by the UVA during the installation process).
- Panels type SANFRI and SANPLA: Sandwich panels composed by an inner skin or basis as described below, two lateral faces of pine-wood rafters, an injected polyurethane core and an outer skin of water repellent particle board. The union between the core and the external faces is carried out by the polyurethane injection.

The covering layers used can be:

- For PANFRI and PANPLA panels: External skin: Paper kraft. Internal skins: Solid wood (fir) or gypsum plasterboard
- For SANFRI and SANPLA panels: External skin: Water repellent particle boards. Internal skins: Solid wood (fir) or gypsum plasterboard

Their characteristics are listed on Annex 1. The trade name, i.e. **PANFRI XX**, indicates:

- **PAN- or SAN-**: Identification letters for the panel layers configuration: (PAN- , for panels with an inner face, two lateral wood rafters and a paper barrier; SAN-, for sandwich panels with an inner and an outer faces, and two lateral wood rafters).
- **-FRI or -PLA**: Identification letters of internal board: (-FRI for solid wood (fir); -PLA for gypsum plasterboard)
- **-XX** dimension in mm. This dimension is, depending on the panel type: For PAN- types, the rafter height (80, 100, 125). For SAN- types, the rafter height (48)

The panels are fixed with mechanical fixings (L-shape nails and screws) and joints are sealed from outside. Both auxiliary components are not part of the assessment of this ETA.

1.2 Generic auxiliary products

1.2.1 Fixing elements

The characteristics of the fixing elements are included in Table 1.

Fixing elements description:	Wood support		Metallic support
	L-shape nails	Metal self-threading screws with countersunk head	Metal self-drilling screws with countersunk head
Screw head diameter (mm)/head length (L-shape nails) (mm)	9	11,97-12,40	11,05-11,16
Head height (mm)	-	3,70-4,20	4,26-4,34
Body diameter (mm)	2,8	5,45-5,55	6,03-6,32
Fixing element length longer than panel thickness (mm)	≥60	≥40	≥30
Panel types	PANFRI, PANPLA	SANFRI, SANPLA	PANFRI, PANPLA, SANFRI, SANPLA
Number of fixings per support (minimum)	2 fixings per support	3 fixings per support	2 fixings per support (PAN) 3 fixings per support (SAN)

1.2.2 Sealing products

The following products are suitable to be used with panels for joints:

- Aluminium adhesive strips
- PUR mastics
- Other similar

2. Specification of the intended use in accordance with the applicable EAD.

2.1 Intended use

Panels PANFRI, PANPLA, SANFRI and SANPLA are used as insulating self-supporting roof panels, adequate to be used indoor in normal humidity conditions. They do not have structural functions nor have significant influence on the raking resistance of the works. PANFRI, PANPLA, SANFRI and SANPLA panels always require external finishing layer/s to provide waterproofing and may require an extra insulation layer to fulfil performances.

2.2 Relevant general conditions for the use of the product

The provisions made in this European Technical Assessment are based on an assumed working life of 25 years, as long as conditions lay down for installation, packaging and storage as well as appropriate use, maintenance and repair, are fulfilled. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

2.3 Design of the product

The ETA holder is responsible for guaranteeing the information about design and installation of these panels are easily accessible to the concerned people. This information can be supplied by means of reproduction of this ETA.

The designer using the system object of this ETA shall in any case comply all the National Regulations and in particular those referring to behaviour in the face of fire and wind resistance. Only the panels described in section 1.1 of this ETA may be used in this system.

The support on which the system will be executed must be rigid and stable. Its rigidity must be appropriate to ensure the system will not be exposed to deformations which might damage it.

Execution tasks must be planned (including details such as confluences with walls, chimneys, ridgepoles, ceilings, walls, breaks, etc.) to prevent water penetrating the system. The laying of the panels shall follow the same national regulations, which proceed as set forth in section 2.4 of this ETA and manufacturer's instructions.

2.4 Installation

Layout and preparation of support likewise the generalities of the system execution shall be pursuant to chapter 7 of the ETAG 016, likewise the corresponding national dispositions.

Panels shall be placed so that their greater sides are perpendicular to the supports, the panel lesser sides resting on them. Each panel shall rest on 3 supports minimum except for the roof gables, where they may be 2 depending on panel layout. The maximum span will depend on the panel composition. The joint among panels will be through a tongue-and-groove joint at the core level, for the whole panel perimeter.

Panels will be secured with screws, at least 3 per support, and following the manufacturer's instructions. The choice and density of the fixings shall be determined considering:

- The design wind loads according to the national regulations.
- The characteristic resistance of the fixing devices into the considered substructure.
- Safety in use of the panels

Joints between the panels will be sealed to prevent water infiltration due to roof problems.

The panels must be finished with external layer(s) for waterproofing and protection purposes. All traditional roofing materials can be laid over these panels following the common guidelines thereof regarding slopes, overlapping, fixings, etc.

2.5 Use, maintenance and repair

To preserve performances of the panel, roof waterproofing will be efficiently maintained and regularly checked for possible water filtration at specific points, likewise presence of the same due to condensation.

Maintenance will include repair of damaged areas to be done as soon as possible.

The manufacturer will provide customers with this information.

3. Performance of the product and references to the methods used for its assessment

The identification tests and the assessment for the intended use of these panels according to the basic work requirements (BWR) were carried out in compliance with the Guideline for European Technical Approval 016 for Self-supporting composite lightweight panels Part 1: General (edition November 2003) and Part 2, used as EAD. The characteristics of the components shall correspond to the respective values laid down in the technical documentation of this ETA, checked by IETcc.

3.1 Mechanical resistance and stability (BWR 1)

PANFRI, PANPLA, SANFRI and SANPLA panels are non-load bearing parts of the works because it does not contribute to the structural resistance of the roof structure, nor it does claim any stiffening or ranking function. The self-supporting mechanical resistance is considered under BWR 4 Safety in use (see 2.1.4).

3.2 Safety in case of fire (BWR 2)

3.2.1. Reaction to fire

3.2.1.1 Reaction to fire: No Performance Determined (NPD).

3.2.1.2 Reaction to fire on backside of panels: No Performance Determined (NPD).

3.2.2 Resistance to fire

No performance determined (NPD).

3.2.3 External fire performance

No performance determined (NPD).

3.3 Hygiene, health and the environment (BWR 3)

This requirement is not relevant for the anchors.

3.3.1 Water permeability

Non performance determined (NPD).

3.3.2 Vapour permeability

The μ values of the materials that constitute the SANFRI, SANPLA, PANFRI, PANPLA panels are declared in Table 2.

Table 2

Material	Water vapour diffusion resistance factor (μ)	
	Dry	Wet
Water-repellent particleboard	50	16
Gypsum plasterboard	10	4
PUR	79	79
Solid fir wood	50	20
Polyurethane glue	180	180

3.3.3 Release of dangerous substances

According to the manufacturer's declaration the boards that composed the panel are classified as formaldehyde class E1 to EN 13986. The manufacturer declares that the wood-base boards that composed panels covered by this ETA are non-treated wood-based boards. They do contain neither wood preservatives nor fire protection agents nor other dangerous substances. In addition to the specific clauses relating to dangerous substances contained in this ETA, there may be other requirements applicable to the product falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions).

3.3.4. Dimensional variations

Non performance determined (NPD).

3.4 Safety in use (BWR 4)

Requirements with respect to the safety in use are not included in this Essential Requirement but are treated under the Essential Requirement Mechanical Resistance and Stability (see section 3.1).

3.4.1 Mechanical resistance

3.4.1.1 Mechanical resistance of panels subject to positive charges

Tests performed in Laboratorio de Estructuras de Madera INIA-AITIM on two supported panels, according to Guide 016 EOTA and manufacturer specifications, has done the results appearing in Table 3.

Table 3

PANEL TYPE	SPAN (mm)	NUMBER OF SPANS	ULTIMATE LOAD (kN/m ²)	LOAD FOR L/200 (kN/m ²)
PANFRI 80	1950	X2	18,26	5,76
PANFRI 100	2100	X2	20,08	6,70
PANFRI 125	2100	X2	38,96	12,28
PANPLA 80	1500	X2	25,11	7,98
PANPLA100	1500	X2	35,74	11,25
PANPLA 125	1500	X2	37,86	13,94
SANFRI 48	1650	X2	18,18	8,82
SANPLA 48	1500	X2	15,33	7,32

Tests performed in Laboratorio de Estructuras de Madera INIA-AITIM on three supported panels, according to Guide 016 EOTA and manufacturer specifications, have given the results appearing in Table 4.

Table 4

PANEL TYPE	SPAN (mm)	ULTIMATE LOAD (kN/m ²)	LOAD FOR L/200 (kN/m ²)
PANFRI 125	2400	26,12	6,53
PANFRI 125	3000	16,72	5,14
PANFRI 125	3600	9,32	3,05
PANPLA 80	1500	32,61	11,03
PANPLA 80	2000	15,51	4,82
PANPLA 80	2500	7,20	1,71
PANPLA100	1500	38,06	11,71
PANPLA 100	2500	11,67	4,93
PANPLA 100	3000	6,30	3,12
PANPLA 125	1500	48,30	16,83
PANPLA 125	2500	16,63	5,58
PANPLA 125	3000	9,41	4,47
SANPLA 48	800	82,08	29,54
SANPLA 48	1200	28,29	11,29
SANPLA 48	1700	12,61	3,51

The values, declared in this ETA, are characteristic values (5% fractile with a probability of 75% for unknown standard deviation, according with the EUROCODE).

The minimum width for wooden supports is 60 mm, and 50 mm for metallic supports.

3.4.1.2 Mechanical resistance of panels subjected to negative loads

Tests performed in Laboratorio de Estructuras de Madera INIA-AITIM on two and three supported PANFRI, PANPLA, SANFRI and SANPLA panels, according to Guide 016 EOTA and manufacturer specifications, always resulted in punch breakage of top panel layer by screw heads or L-shaped nails.

Tests have been conducted on the worst case for each kind of fixing solution:

- For L-shaped nails (PANFRI and PANPLA panels), two fixing points per support, three wooden supports, the average value per fixing point is 1,90 kN/m².
- For self-threading screws (SANFRI and SANPLA panels), three fixing points per support, three wooden supports, the average value per fixing point is 1,83 kN/m².
- For self-drilling screws (PANFRI, PANPLA, SANFRI and SANPLA panels), three fixing points per support, three metallic supports, the average value per fixing point is 2,13 kN/m².

3.4.1.3 Thermal effect

Non performance determined (NPD).

3.4.2 Impact resistance

Hard and soft body impact resistance and walkability test results enable panels' classification in the use category appearing in Table 5.

Table 5

Type	Use categories according with ETAG 016
Sanpla 48	A1
Sanfri 48	A4
Panpla 125	A1*
Panfri 125	A1*

*These elements require another more finishing layer, not only to comply waterproofing requirements, but increasing this use category.

A1: level of accessibility equivalent to not accessible roofs, not even for installation, (in accordance with ETAG 016, Part 2, table 2).

A4: level of accessibility equivalent to accessible without protective measures (in accordance with ETAG 016, Part 2, table 2).

3.4.3 Resistance to fixings

3.4.3.1 Resistance of the panel at fixing devices and joints

The behaviour of the panel has been assessed in 2.1.4.1.2. The failure mode has been always type b: Pull through (in accordance with point 5.4.3.1 of the ETAG 016 Part 1: General).

3.4.3.2 Resistance to eccentric load resistance due to objects fixed to panel

Panel resistance as support to suspend lightweight decoration or lighting elements (100 N) is satisfactory in view of test results.

3.4.4. Walkability

Tests performed on SANFRI and SANPLA panels, under the most unfavourable configurations produced no damage. For PANFRI and PANPLA panels, the test was performed with additional finishing layer/s to obtain satisfactory results. Use categories classification of panels are included in Table 4.

3.5. Protection against noise (BWR 5)

3.5.1 Direct airborne sound insulation

The sound reduction index R_w has been determined by testing in Instituto de Acústica del CETEF Leonardo Torres Quevedo according to EN-ISO 140-3 on different panel types (most unfavourable) assembled according to manufacturer's instructions with joints sealed with putty.

Results, according to UNE-EN ISO 717, appear in Table 6.

Panel type	R _A (dBA)	R _w Weighted sound reduction index (dB)
Sanpla 48	28,1	R _w (C; C _{tr}) = 30(-2; -4)
Sanfri 48	28,2	R _w (C; C _{tr}) = 30(-2; -4)
Panpla 125	27,5	R _w (C; C _{tr}) = 28(0; -2)
Panfri 125	24,6	R _w (C; C _{tr}) = 25(0; -1)

3.5.2 Sound absorption

Non performance determined (NPD).

3.6 Energy economy and heat retention (BWR 6)

3.6.1. Thermal insulation properties

Declared thermal transmittance (U) for different panels, calculated in accordance with EN ISO 6946, appears in Annex 1. On the cases where supporting structure is metallic, thermal bridges should be taken into account.

3.6.2 Air permeability

The system requires all the joins between the panels to be sealed. The air permeability has been tested according to EN 12114:2000 and the positive and negative pressure conditions for applied pressure from 0 to 500 Pa. In all the cases the air flux obtained has been 0 m³ / h.

3.7 Sustainable use of natural resources (BWR 7)

No Performance Determined.

3.8 Aspects of durability serviceability and identification of the products

3.8.1 Durability

3.8.1.1 Creep

Test was performed on a three supports for panel type SANPLA 48 (the most onerous composition) following ETAG 16 Part 2. The results are included in Table 7.

Table 7

Type	Creep Factor ϕ
Load time (h)	Span 1
0	0
500	7
1000	7
2000	7

3.8.1.2 Thermal agents

3.8.1.2.1 Climate cycles

Panels require placement of a finishing covering systems that provides waterproofing on the outer face, so the panels will not be in contact with water. For this reason climatic testing cycles are considered as not relevant.

3.8.1.2.2 Thermal shock

The most unfavourable type of panels has been submitted to 15 cycles of thermal shock following ETAG 16 Part 2. The test was carried out with panels finished with an external covering layer in accordance with the defined intended use described in 1.3. The mechanical bending strength of the panels was not affected by thermal shocks.

Following this the estimated working life of the panels is 25 years.

3.8.1.3 Biological agents

Durability from the biological viewpoint depends on the wooden boards comprising the same and susceptible to said attack. This is included in the specifications for the EC marking of said boards included in EN 13986. Should the designer consider there is a possibility of biological attack (due to geographical location, high risk of insects, proximity or contact with wood which has suffered xylophages attacks, etc.), it might be necessary to apply exclusive treatment against these risks to panel components. The panels described in this ETA are exempt from protection against these attacks.

3.8.2 Serviceability

3.8.2.1 Resistance to impact from hard body

PANFRI and PANPLA panels: test was performed with additional finishing layer/s to obtain satisfactory results. SANFRI and SANPLA panels: test was performed on different panels with 40 mm core and 10 mm outer face water repellent particleboard with satisfactory results.

3.8.2.2 Resistance to impact from soft body

PANFRI and PANPLA panels: test was performed with additional finishing layer/s to carry out the test and to obtain different results. SANFRI and SANPLA panels: Tests performed on different panel types have done varying results depending on panel composition. Basically those whose composition is not involved types PI or V tolerate the shock without being crossed by the soft body that is, passing the test. Use categories are included in Table 5.

4. System of assessment and verification of constancy of performance

According to the decision 97/354 Rev. 1, Annex 3 of the European Commission (amended by decision 2000/447/EC) I the system of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) given in the following table applies:

Table 8

PANFRI 80	System 1
PANFRI 100	
PANFRI 125	
PANPLA 80	
PANPLA100	
PANPLA 125	
SANFRI 48	
SANPLA 48	

5. Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the quality plan deposited at Instituto de Ciencias de la Construcción Eduardo Torroja.



Instituto de Ciencias de la Construcción Eduardo Torroja
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On behalf of the Instituto de Ciencias de la Construcción Eduardo Torroja

Madrid, 19/05/2016

A handwritten signature in blue ink, appearing to read 'Marta Castellote Armero', written over a faint background stamp.

Marta Castellote Armero
Director

ANNEX A Table of panel types. Dimensions, weights and heat transmittance.

Type	Inner face (mm)	Core (mm)	Rafter section (mm)	Outer face (mm)	Length	Width mm	Weight kg/m ²	U W/m ² .K
PANFRI 80	Solid fir 15	PUR 50	80 x 25	Paper kraft 0,1	2,40 a 5,40 m ≤ 3 m -0/+10 mm > 3 m -0/+ 20 mm	600 ± 3	13,61	0,37
PANFRI 100	Solid fir 15	PUR 70	100 x 25	Paper kraft 0,1	2,40 a 5,40 m ≤ 3 m -0/+10 mm > 3 m -0/+ 20 mm	600 ± 3	15,79	0,26
PANFRI 125	Solid fir 15	PUR 95	125 x 25	Paper kraft 0,1	2,40 a 5,40 m ≤ 3 m -0/+10 mm > 3 m -0/+ 20 mm	600 ± 3	17,78	0,20
PANPLA 80	Gypsum plasterboard 13	PUR 50	80 x 25	Paper kraft 0,1	2,50m -0/+10 mm	600 ± 3	14,63	0,37
PANPLA 100	Gypsum plasterboard 13	PUR 70	100 x 25	Paper kraft 0,1	2,50m -0/+10 mm	600 ± 3	16,83	0,27
PANPLA 125	Gypsum plasterboard 13	PUR 95	125 x 25	Paper kraft 0,1	2,50m -0/+10 mm	600 ± 3	18,95	0,20
SANFRI 48	Solid fir 15	PUR 48	48 x 25	Water repellent particle boards 10	2,50m -0/+10 mm	600 ± 3	19,57	0,36
SANPLA 48	Gypsum plasterboard 13	PUR 48	48 x 25	Water repellent particle boards 10	2,50m -0/+10 mm	600 ± 3	21,72	0,37

ANNEX B: Characteristics of the components

WATER-REPELLENT PARTICLE BOARD

PROPERTIES	UNITS	VALUE			TOLERANCES	REGULATIONS
		10 mm Thickness	18-20 mm Thickness	22 mm Thickness		
Density	kg/m ³	720	670	630	+/- 10 %	EN 323
Bending strenght	MPa	18	0,45	0,4	Minimum Value	EN 319
Tensile Stress	MPa	0,45	16	14	Minimum Value	EN 310
Modulus of	MPa	2550	1400	2150	Minimum Value	EN 310
Swelling (24 h)	% vol.	11	10	10	Minimum Value	EN 317
Constant swelling	% vol.	11	11	10	Minimum Value	EN 321
Moisture content	% vol.	8	8	8	+/- 3	EN 322
Vapour resistivity	MN s/g m	20	20	20	Reference Value	EN 12086

SOLID FIR WOOD

PROPERTIES	UNITS	VALUE
Bending strenght	MPa	65-77
Modulus of Elasticity	MPa	10000-12000
Compressive Stress	MPa	30-50
Density (12% Moisture content)	Kg/m ³	450-470

PUR

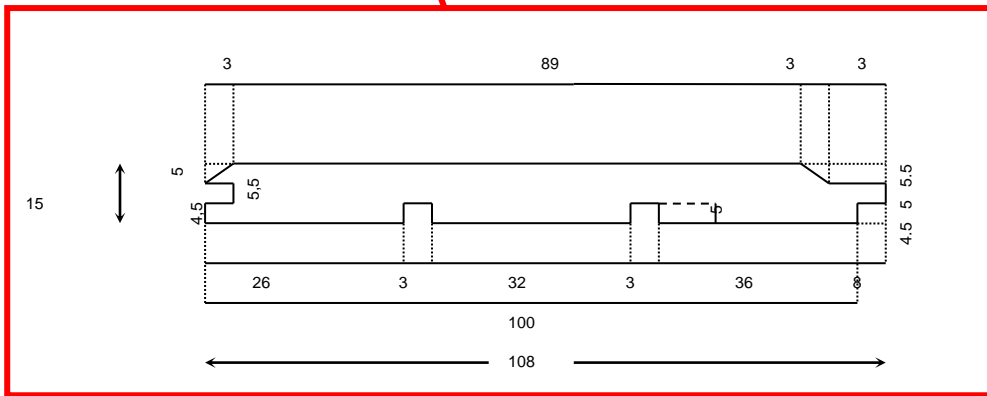
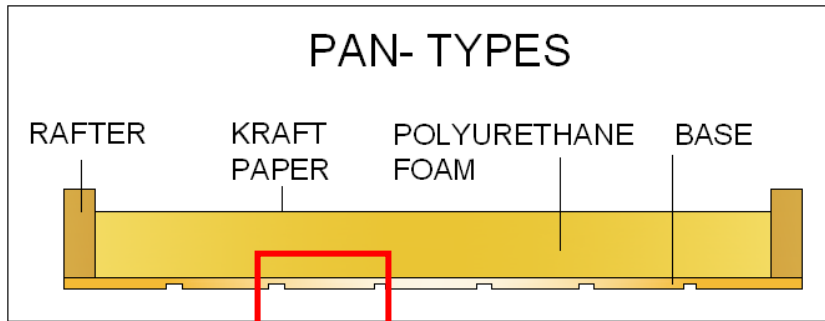
PROPERTIES	UNITS	VALUE	REGULATIONS
Density	kg/m ³	41	UNE EN 1602
Closed cells contain	%	>90	ASTM 2956
Termal conductivity	W/m °K	0,019	EN 13164
Compresive stress	MPa	0,12	EN 826
Dimensional stability:			
24 hours at -20° C	% lineal variation	1	-
24 hours at 80° C	% lineal variation	1	-

GYPSUM PLASTERBOARD

PROPERTIES	UNITS	VALUE
Density	Kg/m ³	1150±50
Bending strenght	MPa	≥ 5,8
Tensile Stress	MPa	≥ 0,3
Modulus of Elasticity. Bending (perpendicular)	MPa	3000
Modulus of Elasticity. Bending (paralell)	MPa	3000
Tensile modulus	MPa	3000
Compression modulus	MPa	1900
Thermal conductivity	w/m °K	0,316
Weight variation for water inmersion after 24 hours	%	< 2

ANNEX C: Details.

PAN type panels. Panel section mm



SAN type panels. Panel section mm

