



**INSTITUTO DE CIENCIAS  
DE LA CONSTRUCCIÓN  
EDUARDO TORROJA**

*C/ Serrano Galvache n. 4 28033 Madrid (Spain)  
Tel.: (34) 91 302 04 40 Fax: (34) 91 302 07 00  
[direccion.ietcc@csic.es](mailto:direccion.ietcc@csic.es) [www.ietcc.csic.es](http://www.ietcc.csic.es)*



## European Technical Assessment

**ETA 11/0087  
of 13/12/2016**

English translation prepared by IETcc. Original version in Spanish language

### General Part

**Technical Assessment Body issuing the  
ETA and designated according to Article  
29 of the Regulation (EU) Nº305/2011:**

Instituto de Ciencias de la Construcción  
Eduardo Torroja (IETcc)

**Trade name of the construction product**

ENCOSANPLA, ENCOSANFRI

**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  
<http://lopezpanel.com>

**Manufacturing plant(s)**

LÓPEZ PANEL S. L.  
Polígono Industrial de Barros. Parcela 29/7  
39408 LOS CORRALES DE BUELNA  
(Cantabria) – Spain

**This European Technical Assessment  
contains**

12 pages including 4 Annexes which form an  
integral part of this assessment. Annex 4  
contains confidential information and is not  
included in the ETA when 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  
Assessment (ETAG) nº 016 ed. November  
2003, part 1 and 2 used as European  
Assessment Document (EAD)

**Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.**

**Communication of this European Technical Assessment, including transmission by electronic means, shall be in full, excepted Annex(es) referred to as confidential(s). However, partial reproduction may be made, with the written consent of the issuing Technical Assessment Body. Any partial reproduction has to be identified as such.**



- PUR putty
- Other similar

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

### **2.1 Intended use**

The ENCOSANFRI and ENCOSANPLA panels are used as insulating self-supporting roof sheeting in roofs. The system does not have structural functions nor does it have significant influence on the racking resistance of the works.

ENCOSANFRI and ENCOSANPLA panels are adequate to use indoor in normal humidity conditions<sup>2</sup> and always require external finishing layers to provide waterproofing and protection performances.

### **2.2 Relevant general conditions for the use of the product**

The provisions made in this European Technical Assessment according to the ETAG 016, Parts 1 and 2, used as EAD, 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 should 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, Part 1, 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 half-wood joint at the core level, in the greater sides of the panel.

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 substrate.
- Safety in use of the panels

---

<sup>2</sup> For example, it may be considered the conditions required in Eurocode 5 (EN 1995-1-1:2015) for service class 1 which is characterised by a moisture content in the materials corresponding to a temperature of 20°C and the relative humidity of the surrounding air only exceeding 85% for a few weeks for year.

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. In addition, joints between the panels will be sealed or will be installed a waterproofing system to prevent water infiltration due to roof problems.

The ENCOSANFRI and ENCOSANPLA panels should not be exposed to temperatures above 75°C, which may damage the XPS core. Thus panels must be protected from high temperature focus on the roof, e.g. chimneys, lamps, etc.

## **2.5 Use, maintenance and repair**

To preserve the system performances, 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 assessment of the fitness of ENCOSANFRI and ENCOSANPLA panels for the intended use according to the Basic Requirements was carried out in compliance with the ETAG 016 used as an EAD. Values of features (both components and the system) not specified in this document or its annexes must correspond with those recorded in the technical documentation verified by the IETcc.

### **3.1 Mechanical resistance and stability (BWR 1)**

ENCOSANFRI and ENCOSANPLA panels are non-loadbearing part of the works because they do not contribute to the structural resistance of the roof structure, nor it does claim rigidity or stability function. The self-supporting mechanical resistance is considered under BWR4 Safety in use (see section 3.4).

### **3.2 Safety in case of fire (BWR 2)**

#### **3.2.1 Reaction to fire**

Declared performances, obtained from tests of reaction to fire, are included below.

The reaction to fire tests, carried out by the AFITI-LICOF Centro de Ensayos e Investigación del Fuego, according to UNE-EN 13823:2002, UNE-EN ISO 11925-2:2002 and the test reports, according to CEN/TS 15117:2005 y UNE-EN 13501-1:2002 has done this classification:

Types ENCOSANPLA 40, 50, 60, 80 and 100: **B – s1, d0**.

The reaction to fire for the ENCOSANFRI 40, 50, 60, 80 and 100 panels have not been determined (NPD).

#### **3.2.2 Resistance to fire**

No performance assessed.

#### **3.2.3 External fire performance**

No performance assessed. ENCOSANFRI and ENCOSANPLA panels are never used as external finishing layer.

### **3.3 Hygiene, health and the environment (BWR 3)**

#### **3.3.1 Water permeability**

No performance assessed.

### 3.3.2 Vapour permeability

The  $\mu$  values of the materials that constitute the ENCOSANFRI and ENCOSANPLA panels are declared in table 2.

MATERIAL	FACTOR ( $\mu$ )	
	Dry	Wet
Water-repellent particleboard	50	16
Gypsum plasterboard	10	4
Solid fir wood	50	20
Extruded polystyrene (XPS)	150	150
Poliurethane 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 ENCOSANFRI and ENCOSANPLA panels covered by this ETA are non-treated wood-based boards. They do not contain either wood preservatives or fire protection agents or 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). In order to meet the provisions of the EU Construction Products Directive 89/106/CEE, these requirements need also to be complied with, when and where they apply.

### 3.3.4 Dimensional variations

No performance assessed.

## 3.4 Safety in use (BWR 4)

### 3.4.1 Mechanical resistance

#### 3.4.1.1 Mechanical resistance of panels subject to positive loads

Tests performed in Wooden Structures Laboratory INIA-AITIM on three supported ENCOSANFRI and ENCOSANPLA panels, according to Guide 016 EOTA and manufacturer specifications, has done the results appearing in table 3.

PANEL TYPE	SPAN (mm)	NUMBER OF SPANS	ULTIMATE LOAD (kN/m <sup>2</sup> )	LOAD FOR L/200 (kN/m <sup>2</sup> )
ENCOSANFRI 40	1200	X2	24,72	4,25
ENCOSANFRI 60	1200	X2	25,43	7,12
ENCOSANFRI 100	1200	X2	46,34	16,71
ENCOSANPLA 40	1200	X2	18,41	4,61
ENCOSANPLA 60	1200	X2	24,72	9,38
ENCOSANPLA 100	1200	X2	36,80	18,28

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 Wooden Structures Laboratory INIA-AITIM on three supported ENCOSANFRI and ENCOSANPLA panels, according to Guide 016 EOTA and manufacturer specifications, always resulted in punch breakage of top panel layer by screw heads.

Tests have been conducted on the worst case fixing solution: weakest 3 layers panels on 3 wood supports, with 3 fixing points per support. The fixing elements comprised  $\varnothing$  6mm metal screws with countersunk head. This fastening system failed on the central support of the panel at an average value of 1,093 kN/fixing support.

### 3.4.1.3 Thermal effect

No performance assessed.

### 3.4.2 Impact resistance

Hard and soft body impact resistance and walkability test results enable ENCOSANFRI and ENCOSANPLA panel classification in the use category appearing in table 4, according to ETAG 016, part 2.

TYPE OF PANEL	USE CATEGORY <sup>3</sup>
ENCOSANPLA 100	A1
ENCOSANFRI 100	A1

### 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 3.4.1.2. The failure mode has been always Type B: Pull through (should not cause moisture ingress).

#### 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 panels, under the most unfavourable configurations produced no damage. Use categories classification of ENCOSANFRI and ENCOSANPLA panels is 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 the acoustic institute CETEF Leonardo Torres Quevedo according to EN-ISO 140-3: 1995 on ENCOSANFRI and ENCOSANPLA panel types (most unfavourable) assembled according to manufacturer's instructions with joints sealed with putty.

Results, according to EN ISO 717: 2013, appear in table 5.

TYPE OF PANEL	$R_A$ (dBA)	$R_w$ Weighted sound reduction (dB)
ENCOSANPLA 100	26,6	$R_w (C; C_{tr}) = 28 (-1; -2)$
ENCOSANFRI 100	27,0	$R_w (C; C_{tr}) = 28 (-1; -2)$

### 3.5.2 Sound absorption

No performance assessed.

<sup>3</sup> ETAG 016, part 2, 6.4.6 Impact resistance, table 2.

CATEGORÍA DE USO	NIVEL DE ACCESIBILIDAD
A1	Not accessible roofs, not even for installation
A2	Roofs, accessible for installation and maintenance only, always with protective measures
A3	Accessible roofs with protective measures
A4	Accessible roofs without protective measures

### 3.6 Energy economy and heat retention (BWR 6)

#### 3.6.1 Thermal insulation properties

Declared thermal transmittance (U) for ENCOSANFRI and ENCOSANPLA 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

ENCOSANFRI and ENCOSANPLA panels require all the joints between the panels to be sealed.

The air permeability of these panels 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 m<sup>3</sup>/h.

### 3.7 Aspects of durability serviceability and identification of the products

#### 3.7.1 Durability

##### 3.7.1.1 Creep

Test was performed on a three supports for ENCOSANFRI 100 panel (the most onerous composition) following ETAG 16 Part 2. The results are included in table 6.

TABLE 6: CREEP FACTOR $\varphi$ (ENCOSANFRI 100)		
LOAD TIME (H)	CREEP FACTOR $\varphi$	
	SPAN 1	SPAN 2
0	0	0
500	0,3981	0,5439
1000	0,4331	0,9665
2000	0,5446	1,0921

##### 3.7.1.2 Thermal agents

###### 3.7.1.2.1 Climate cycles

No performance assessed.

ENCOSANFRI and ENCOSANPLA 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.

###### 3.7.1.2.2 Thermal shock

The most unfavourable types of ENCOSANFRI and ENCOSANPLA panels have been subjected to 15 cycles of thermal shock following ETAG 16 Part 2. The tests were carried out with panels finished with an external covering layer in accordance with the defined intended use described in 2.1.

The mechanical bending strength of the panels was not affected by thermal shocks.

With this evidence together with the experience of IETcc on the assessment of this product in several national Technical Assessments, the declared working life of the panels is 25 years.

###### 3.7.1.3 Biological agents

ENCOSANFRI and ENCOSANPLA panels' 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.

### 3.7.2 Serviceability

#### 3.7.2.1 Resistance to impact from hard body

Test was performed on ENCOSANFRI and ENCOSANPLA panels with 40 mm core and 10 mm outer face water repellent particleboard with satisfactory results.

#### 3.7.2.2 Resistance to impact from soft body

Tests performed on ENCOSANFRI and ENCOSANPLA panels.  
ENCOSANFRI panels resisted soft body impacts (1 impact at 700 Nm), ENCOSANPLA not.  
Use categories are included in table 4.

### 3.7.3 Identification of products

The identification of ENCOSANFRI and ENCOSANPLA panels is included in 1.1.

## 4. Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base

### 4.1 System of attestation of conformity

According to the decision 2003/640/EC of the European Commission<sup>4</sup> the system of assessment and verification of constancy of performance (see Annex V to Regulation (EU) N° 305/2011) for ENCOSANFRI and ENCOSANPLA panels is:

System 1

## 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  
**CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS**  
C/ Serrano Galvache nº 4. 28033 Madrid (Spain)  
director.ietcc@csic.es      www.ietcc.csic.es



On behalf of the Eduardo Torroja Construction Science Unit  
Madrid, 13<sup>th</sup> December 2016

A handwritten signature in blue ink, appearing to read 'Marta Mª Castellote Armero', with a horizontal line extending from the end of the signature.

Marta Mª Castellote Armero  
Director

<sup>4</sup> Official Journal of the European Communities L226/21 of 10.09.2003.

**ANNEX 1: Table of panel types. Dimensions, weights and heat transmittance.**

TYPE	INNER FACE (mm)	CORE (mm)	OUTER FACE (mm)	LENGTH (mm)	WIDTH (mm)	WEIGHT (kg/m <sup>2</sup> )	TRANSMITANCIA TÉRMICA U (W/m <sup>2</sup> .°C)
ENCOSANFRI 40	Solid fir 9 (15)	40	Water repellent particle boards 10/16/19	2,39m -0/+10 mm	600	13-15	0,71
ENCOSANFRI 50	Solid fir 9 and 15	50	Water repellent particle boards 10/16/19	2,39m -0/+10 mm	600	13-15	0,59
ENCOSANFRI 60	Solid fir 9 and 15	60	Water repellent particle boards 10/16/19	2,39m -0/+10 mm	600	13-15	0,50
ENCOSANFRI 80	Solid fir 9 and 15	80	Water repellent particle boards 10/16/19	2,39m -0/+10 mm	600	13-15	0,38
ENCOSANFRI 100	Solid fir 9 and 15	100	Water repellent particle boards 10/16/19	2,39m -0/+10 mm	600	13-15	0,31
ENCOSANPLA 40	Gypsum plasterboard 10 and 13	40	Water repellent particle boards 10/16/19	2,39m -0/+10 mm	600	17-19	0,72
ENCOSANPLA 50	Gypsum plasterboard 10 and 13	50	Water repellent particle boards 10/16/19	2,39m -0/+10 mm	600	17-19	0,59
ENCOSANPLA 60	Gypsum plasterboard 10 and 13	60	Water repellent particle boards 10/16/19	2,39m -0/+10 mm	600	17-19	0,50
ENCOSANPLA 80	Gypsum plasterboard 10 and 13	80	Water repellent particle boards 10/16/19	2,39m -0/+10 mm	600	17-19	0,38
ENCOSANPLA 100	Gypsum plasterboard 10 and 13	100	Water repellent particle boards 10/16/19	2,39m -0/+10 mm	600	17-19	0,31

**ANNEX 2: Characteristics of the components**
**XPS**

PROPERTIES	UNITS	VALUE	TOLERANCES	REGULATIONS
Density	kg/cm <sup>3</sup>	30	Minimum value	UNE EN 1602
Thermal conductivity	W/m <sup>2</sup> ·K	0,033	Minimum value	EN 13164
Compressive stress	MPa	0,30	Minimum value	EN 826
Tensile stress	MPa	0,50	Minimum value	UNE EN 1607
Shear stress	MPa	0,25	Minimum value	UNE EN 12090
Modulus of elasticity	MPa	12-20	Minimum value	UNE EN 1607
Shear modulus	MPa	4,5	Minimum value	UNE EN 12090
Constant swelling	% vol.	1,5	Minimum value	EN 12087
Vapour resistivity	MN s/g m	80-150	Reference value	EN 12086

**WATER-REPELLENT PARTICLE BOARD**

PROPERTIES	UNITS	VALUE			TOLERANCES	REGULATIONS
		8-13 mm Thickness	13-19 mm Thickness	19-30 mm Thickness		
Density	kg/m <sup>3</sup>	720/680	675/650	640/625	+/- 10 %	EN 323
Bending strength	MPa	18	16	14	Minimum value	EN 319
Tensile Stress	MPa	0,45	0,45	0,40	Minimum value	EN 310
Modulus of Elasticity	MPa	2550	2400	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±3	8±3	8±3	+/- 3	EN 322
Vapour resistivity	MN s/g m	20	20	20	Reference Value	EN 12086

## SOLID FIR WOOD

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

## GYPSUM PLASTERBOARD

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

**ANNEX 3: Details of ENCO-type panels.**

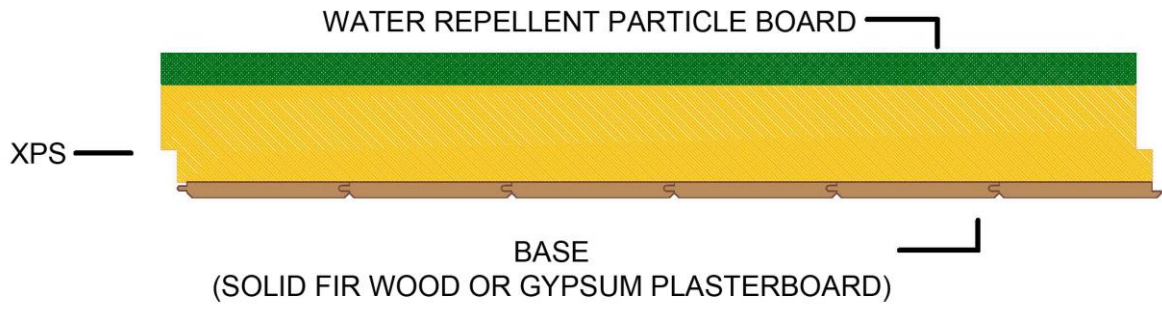


Figure 1: Panel composition

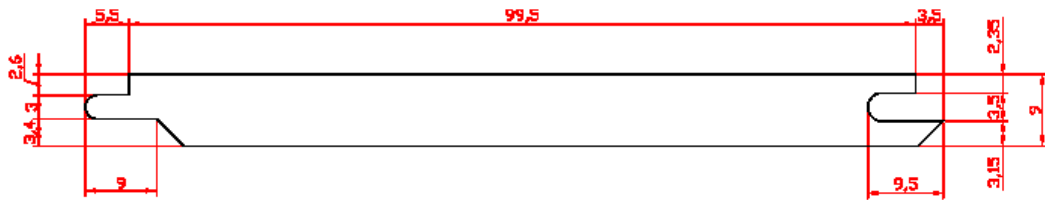


Figure 2: Detail tongue and groove joints for solid fir base