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European Technical Assessment **ETA 10/0447 of 25/07/2016**

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

Tezno T.1, Tezno T.2, Tezno T.3 y Tezno T.5

Product family to which the construction product belongs

Self-supporting composite lightweight panels for use in roofs

Manufacturer

Tezno Cuber Composites S.L.
Majuelo, 2. Polígono Cantabria 1-C.
26006 Logroño (La Rioja) – Spain
<http://www.grupotezno.com>

Manufacturing plant(s)

Tezno Cuber Composites S.L.
Majuelo, 2. Polígono Cantabria 1-C.
26006 Logroño (La Rioja) – Spain.

This European Technical Assessment contains

15 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)

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SPECIFIC PART

1. Technical description of the product

This ETA covers self-supporting composite lightweight panels Teznocuber[®] types T.1, T.2, T.3 and T.5 for use as sheathing system in roofs.

This product is assessed according to the ETAG 016 *Self-supporting Composite Lightweight Panels – Part 1: General and Part 2: Specific aspects relating to Self-supporting Composite Lightweight Panels for use in roofs*, edition November 2003 used as European Assessment Document (EAD).

The use categories (A1 – A4 as defined in ETAG 016 part 2) depend on the different Teznocuber[®] board types described in 1.1.

1.1 Definition of the product components

The panel is made of non-metallic covering layers and extruded polystyrene thermal insulating core XPS of different thicknesses bonded by means of polyurethane glue.

The covering layers used on manufacturing of Teznocuber[®] types T.1, T.2, T.3 y T.5 panels¹ are detailed in table 1 and their configuration in table 2.

TYPE	COATING	THICKNESS
T. 1	Solid fir, iroko, oak and chestnut	≥ 10mm
T. 2	Water repellent particle boards for use in damp environments ²	≥ 10mm
	Natural wood or phenolic plywood boards	≥ 10mm
	Decorated OSB (oriented strand board)	≥ 10mm
T. 3	Cement bonded particleboard	≥ 8mm
	Gypsum plasterboards	≥ 10mm
	Plaster fibreboard	≥ 10mm
	Herakustik – Acoustic board of wood chips with magnesite	≥ 15mm
	Micro heraklith travertine – Acoustic board of wood chips with magnesite (micropores)	≥ 25mm
T. 5	Pirineo solid fir	≥ 14mm

NAME OF PANEL	Nº OF LAYERS	CONFIGURATION		
		INNER LAYER	CORE	EXTERNAL LAYER
T. 1 TEZNO	3	Solid fir	XPS	Water repellent particle boards
T. 2 TEZNO	3	Wood agglomerate		
T. 3 TEZNO	3	Mineral conglomerate		
T. 3 TEZNO (four layers)	4	Solid fir + Mineral conglomerate		
T. 5 TEZNO Pirineo	3	Solid fir		

The trade name, for example TEZNO FRISO ABETO XX-YY-ZZ, indicates:

TEZNO: trade name

FRISO ABETO: Internal board layer

XX- Thickness of internal layer (mm).

YY- Thickness of XPS core (mm).

ZZ- Thickness of external layer (mm).

Teznocuber[®] types T.1, T.2, T.3 y T. 5 panels present tongue-and-groove joints at the core level on the longitudinal sides.

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

¹ Physical features and heat transmittance of the panel in annex 1 and physical and mechanical properties in annex 2.

² Melamin or natural wood coating

1.2 Auxiliary elements

1.2.1 Fixing elements

Wood support: Metal self-threading screws, stainless steel or coated steel (galvanized, zinc plated, bichromate etc.), diameter $\varnothing \geq 6$ mm.

Metal support: Metal self-drilling screws, stainless steel or coated steel (galvanized, zinc plated, bichromate etc.), diameter $\varnothing \geq 5,8 - 6,3$ mm.

Concrete support: Carbon steel self-threading screws with anti-corrosion treatment or screws with expandable plug specific for concrete.

The characteristics of the fixing elements are included in Table 3.

TABLE 3: CHARACTERISTICS OF FIXING ELEMENTS ³			
	WOODEN SUPPORT	METAL SUPPORT	CONCRET SUPPORT
Fixing elements description:	Metal self-threading screws	metal self-drilling screws	Metal self-threading screws or Screws with expandable plug
Head fixing diameter (mm)	≥ 10	≥ 10	≥ 10
Fixing diameter (mm)	≥ 6	5,8-6,3	≥ 6
Length of the fixing element beyond the panel thickness (mm)	≥ 40	≥ 30	≥ 40

Teznocuber[®] types T.1, T.2, T.3 and T.5 panels always rest in, at least, three supports except for the roof gables, where they may be two depending on panel layout.

1.2.2 Sealing products

The following products are suitable to be used with Teznocuber[®] types T.1, T.2, T.3 and T.5 panels for joints:

- Auto-adhesive strips
- bituminous strips
- PUR putty
- Other similar

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

2.1 Intended use

The Teznocuber[®] types T.1, T.2, T.3 and T.5 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 raking resistance of the works.

Teznocuber[®] types T.1, T.2, T.3 and T.5 panels are adequate to use indoor or in normal humidity conditions⁴ and always require external finishing layers to provide waterproofing and protection performances.

For type T.2 and T.3, the internal layer, HERAKUSTIK, OSB/3 and OSB/4⁵, can be used in high humidity conditions such as swimming pool etc.

2.2 Relevant general conditions for the use of the product

The provisions made in this European Technical Assessment according to the ETAG 016, used as EAD, are based on an assumed working life of 25 years, as long as conditions lay down for installation, packaging

3 The fixings used must be resistant or protected against corrosion. See Eurocode 5 (EN 1995-1-1: 2015), Table 4.1: Example of minimum specifications for material protection against corrosion for fasteners (related to ISO 2081).

4 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.

5 Classification according-EN 300:2006 Oriented Strand Boards (OSB) – Definitions, classification and specifications.

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, 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

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.

Teznocuber® 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 Teznocuber® 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 Teznocuber® panels, types T.1, T.2, T.3 and T. 5, 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 (BR 1)

Teznocuber® types T.1, T.2, T.3 and T.5 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 ER4 Safety in use (see section 3.4).

3.2 Safety in case of fire (BR 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 *Gaiker ik-4 Research Alliance y Ensatec* laboratory, according to standards EN 13823:2002, EN ISO 11925-2:2002 and the test reports, under the CEN/TS 15117:2005 and EN 13501-1:2002, have given the following classification:

T.3 TEZNO HERAKUSTIK **B-s1 d0**

T.3 TEZNO (four layers) Solid fir fireproof and varnishing + Gypsum plasterboards: **B-s1, d0**

T.3 TEZNO (four layers) Solid fir + Gypsum plasterboards: **C-s2, d0**

The reaction to fire for the remaining panels have not been determined (NPD).

3.2.2 Resistance to fire

Non-performance determined (NPD).

3.2.3 External fire performance

Non-performance determined (NPD), Teznocuber® types T.1, T.2, T.3 and T.5 panels are never used as external finishing layer.

3.3 Hygiene, health and the environment (BR 3)

3.3.1 Water permeability

Non-performance determined (NPD).

3.3.2 Vapour permeability

The μ values of the materials that constitute the different types of Teznocuber® types T.1, T.2, T.3 and T.5 panels are declared in table 4.

MATERIAL	FACTOR(μ)	
	Dry	Wet
Water-repellent particle board	50	16
Cement-bonded particleboard	50	30
Gypsum plasterboard	10	10
Plywood board	202	72
Solid fir	50	20
Extruded polystyrene (XPS)	100	100
Poliurethane glue	180	180
Herakustik	5	5
Plaster fibreboard	11	11

3.3.3 Release of dangerous substances

According to the manufacturer declaration the boards that configure the panel are classified as formaldehyde class E1 to EN 13986.

The manufacturer declares that the wood-base boards that composed Teznocuber® types T.1, T.2, T.3 and T.5 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

Non-performance determined (NPD).

3.4 Safety in use (BR 4)

3.4.1 Mechanical resistance

3.4.1.1 Mechanical resistance of panels subject to positive charges

The tests carried out in the Wooden Structures Laboratory INIA-AITIM on two supports Teznocuber® types T.1, T.2, T.3 and T.5 panels, according to ETAG 016 and manufacturer specifications, has done the results shown in table 5.

TABLE 5: MECHANICAL RESISTANCE OF PANELS ON TWO SUPPORTS SUBJECT TO POSITIVE CHARGES			
TYPE OF PANEL	SPAN (mm)	ULTIMATE LOAD (kN/m ²)	LOAD TO L/200 (kN/m ²)
TEZNO T1-30 ABETO	1040	70,833	11,53
TEZNO T1-30 ABETO	1680	30,357	3,26
TEZNO T1-30 ABETO	2320	10,632	1,91
TEZNO T1-50 ABETO	1040	74,84	16,19
TEZNO T1-50 ABETO	1280	57,161	12,33
TEZNO T1-50 ABETO	1680	38,343	6,09
TEZNO T1-50 ABETO	2080	26,803	4,59
TEZNO T1-50 ABETO	2320	21,695	2,84
TEZNO T1-50 ABETO	2800	14,286	2,09
TEZNO T1-100 ABETO	1040	78,606	32,53
TEZNO T1-100 ABETO	1280	61,328	27,82
TEZNO T1-100 ABETO	1680	44,147	17,33
TEZNO T1-100 ABETO	2080	33,173	11,80
TEZNO T1-100 ABETO	2320	28,448	9,32
TEZNO T1-100 ABETO	2800	21,518	5,50
TEZNO T1-30 CONTRACHAPADO	1040	57,372	12,17
TEZNO T1-30 CONTRACHAPADO	1680	24,802	4,25
TEZNO T1-30 CONTRACHAPADO	2320	9,9138	1,76
TEZNO T1-50 CONTRACHAPADO	1040	68,51	17,00
TEZNO T1-50 CONTRACHAPADO	1680	32,242	6,79
TEZNO T1-50 CONTRACHAPADO	2320	17,457	2,86
TEZNO T1-100 CONTRACHAPADO	1040	79,167	38,32
TEZNO T1-100 CONTRACHAPADO	1680	39,683	16,51
TEZNO T1-100 CONTRACHAPADO	2320	25,144	9,21
TEZNO T2-30 AGLOMERADO	1040	49,359	11,66
TEZNO T2-30 AGLOMERADO	1680	11,706	3,33
TEZNO T2-30 AGLOMERADO	2320	4,0948	0,56
TEZNO T2-50 AGLOMERADO	1040	65,224	16,52
TEZNO T2-50 AGLOMERADO	1280	41,51	12,53
TEZNO T2-50 AGLOMERADO	1680	17,659	6,81
TEZNO T2-50 AGLOMERADO	2080	13,478	3,31
TEZNO T2-50 AGLOMERADO	2320	9,7414	2,07
TEZNO T2-50 AGLOMERADO	2800	5,7262	1,25
TEZNO T2-100 AGLOMERADO	1040	78,365	33,47
TEZNO T2-100 AGLOMERADO	1280	50,651	22,83
TEZNO T2-100 AGLOMERADO	1680	17,361	8,38
TEZNO T2-100 AGLOMERADO	2080	12,941	4,16
TEZNO T2-100 AGLOMERADO	2320	9,6624	3,09
TEZNO T2-100 AGLOMERADO	2800	5,8333	2,40

The tests carried out in the Wooden Structures Laboratory INIA-AITIM on three supports Teznocuber® types T.1, T.2, T.3 and T.5 panels, according to ETAG 016 and manufacturer specifications, has done the results shown in table 6.

TYPE OF PANEL	SPAN (mm)	NUMBER OF SPANS	ULTIMATE LOAD (kN/m ²)	LOAD TO L/200 (kN/m ²)
TEZNO T1-30 ABETO	1645	x2	14,95	4,69
TEZNO T1-50 ABETO	1645	x2	19,19	7,68
TEZNO T1-100 ABETO	1645	x2	36,02	11,74
TEZNO T2-30 AGLOMERADO	1245	x2	27,48	8,79
TEZNO T2-50 AGLOMERADO	1245	x2	33,91	9,82
TEZNO T2-100 AGLOMERADO	1245	x2	51,07	17,50
TEZNO T3-30 HERAKUSTIK	1245	x2	15,08	6,20
TEZNO T3-50 HERAKUSTIK	1245	x2	19,08	11,13
TEZNO T3-100 HERAKUSTIK	1245	x2	26,58	19,28
TEZNO T3-30 CARTÓN-YESO	1245	x2	16,86	6,76
TEZNO T3-50 CARTÓN-YESO	1245	x2	20,28	9,25
TEZNO T3-100 CARTÓN-YESO	1245	x2	37,95	16,36
TEZNO T5-40 PIRINEO	1245	x2	33,95	13,71
TEZNO T5-60 PIRINEO	1245	x2	35,00	14,25
TEZNO T5-100 PIRINEO	1245	x2	42,44	21,19

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

The width for all the supports has to be greater than 4 cm, although the supports where rest two panels in a row have to have a minimum width of 8 cm.

3.4.1.2 Mechanical resistance of panels subjected to negative loads

Tests performed in INIA-AITIM laboratory on two and three supported Teznocuber® types T.1, T.2, T.3 and T.5 panels, according to ETAG 016 and manufacturer specifications, always resulted in punch breakage of the top panel layer by the screw head. The fixing elements comprised \varnothing 6mm metal screws, with wooden and metallic support. The fastening system failed at an average value of 1,77 kN/ fixing support.

The manufacturer advises the convenience of using at least 3 fixings per support (two fixings for central support when the panel rest on three supports).

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 Teznocuber® types T.1, T.2, T.3 and T.5 panel classification in the use category appearing in table 7 according to ETAG 016, part 2.

TYPE OF PANEL	USE CATEGORY ⁶
TEZNO T.1-30 FRISO ABETO	A2
TEZNO T.2-30 AGLOMERADO HIDRÓFUGO	A1
TEZNO T.3-30 CARTÓN-YESO	A1
TEZNO T.5-40 TARIMA PIRINEO	A4

⁶ 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

3.4.3 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 Teznocuber® types T.1, T.2, T.3 and T.5 panels is included in table 7.

3.5 Protection against noise (BR 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 on different Teznocuber® types T.1, T.2, T.3 and T.5 panels types (most unfavourable) assembled according to manufacturer's instructions with joins sealed with putty.

Results, according to UNE-EN ISO 717, are shown in table 8.

TYPE OF PANEL	RA (dBA)	R_w (dBA)
TEZNO T.1 y T.5 - FRISO MADERA – 10-80-19	32,7	$R_w(C; C_{tr}) = 33(-1; -3)$
TEZNO T.2- AGLOMERADO HIDRÓFUGO – 10-80-19	33,4	$R_w(C; C_{tr}) = 34(-2; -4)$
TEZNO T.3 –CARTÓN YESO – 10-80-19	33,5	$R_w(C; C_{tr}) = 34(-1; -3)$

3.5.2 Sound absorption

The acoustic absorption factor declared on TEZNO T.3–15 HERAKUSTIK (the only relevant type to these effects) according to EN-ISO 354: 2003, expressed according to EN-ISO 11654, as included in table 9.

TYPE OF PANEL	FREQUENCY Hz	100	125	250	500	1000	2000	4000	5000
TEZNO T3-15 HERAKUSTIK	α_w	0,04	0,05	0,08	0,14	0,28	0,73	0,60	0,54

For the remaining types the performance has not been determined (NPD).

3.6 Energy economy and heat retention (BR 6)

3.6.1 Thermal insulation properties

Declared thermal transmittance (U) for different Teznocuber® types T.1, T.2, T.3 and T.5 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

Teznocuber® types T.1, T.2, T.3 and T.5 panels require all the joints between the panels to be sealed.

The air permeability of Teznocuber types T.1, T.2, T.3 and T.5 panels have 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 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 TEZNO T.5-100 TARIMA PIRINEO (the most onerous composition) following ETAG 16 Part 2. The results are included in table 10.

LOAD TIME (h)	CREEP FACTOR ϕ	
	SPAN 1	SPAN 2
0	0	0
500	0,6296	0,5862
1000	0,7037	0,7586
2000	0,8148	0,8621

3.7.1.2 Thermal agents

3.7.1.2.1 Climate cycles

Non-performance determined (NPD).

Teznocuber[®] types T.1, T.2, T.3 and T.5 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 Teznocuber[®] T.1, T.2, T.3 and T.5 panels have been submitted 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

Teznocuber[®] types T.1, T.2, T.3 and T.5 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 different panels with the minimum thickness for the core, and for external layer, depending on the panel type, with satisfactory results.

3.7.2.2 Resistance to impact from soft body

Tests performed on different panel types have done varying results depending on panel's composition. Basically those whose composition is not involving Gypsum plasterboard, Plaster fibreboard, Cement-bonded particleboard and Herakustik tolerate the shock without being crossed by the soft body that is, passing the test. Use categories are included in table 7.

3.7.3 Identification of products

The identification of Teznocuber[®] types T.1, T.2, T.3 and T.5 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 Commission⁷ the system of assessment and verification of constancy of performance (see Annex V to Regulation (EU) N° 305/2011) for Teznocuber[®] panels types T.1, T.2, T.3 y T. 5 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.



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On behalf of the Eduardo Torroja Construction Science Unit
Madrid, 25th July 2016

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

Marta Mª Castellote Armero
Director

⁷ Official Journal of the European Communities L226/21 of 10.09.2003.

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

Dimensional tolerances: Length ± 10 mm Thickness ± 3 mm
 Width ± 5 mm Deviation for squareness $\pm 1, 5$ mm

TYPE	INNER FACE	INNER FACE (mm)	CORE (mm)	OUTER FACE (mm)	DIMENSIONES (mm)			PESO (Kg/m ²)	TRANSMITANCIA TÉRMICA U (W/m ² .°C)		
					ESPOSOR	LONGITUD	ANCHURA				
TEZNO T. 1	Solid fir	10-12	30-40-50 60-80-100 120-140-160 180-200	10-15-16 18-19-22	56-238	2490-2990 3290-3590	600	17,59-22	≤ 0.970		
TEZNO T.2	Plywood	10-12-15			56-238	2490-2990	600	17,59-22	≤ 0.973		
	Particles board	10-15-16-18-19-22			56-238	2490-2990-3600-4190-4990-5390	600	14,99-29,90	≤ 0.929		
	Decorated OSB	10-12-15-18			56-238	2490-2990-4990	600	18,99-23,40	≤ 0.970		
TEZNO T.3	Herakustik	15-25			61-234	2490	600	20,22-29,98	≤ 0.886		
	Micro Heraklit travertine	25-35			71-244	2490	600	26,69-36,90	≤ 0.977		
	Gypsum plasterboards	10-12,5-15			56-238	2490-2990	600	19,59-24	≤ 1.007		
	Cement bonded particle board	8-10-12-16			56-238	2490-2990	600	22,22-36,66	≤ 1.012		
	Plaster fibreboards	10-12,5			56-238	2490-2990	600	23,69-28,10	≤ 1.013		
TEZNO T. 3 4 layers	TEZNO T. 3 + Finishing layer	10-12-18 + 10				66-248	2490-2990-3290-3590-4190-5090-5390	600	(depends on the finishing layer)	≤ 0.984	
TEZNO T. 5	Pirineo solid fir	14-18				18-19-22	73-237	2490-2990-3290-3590-4190-5090-5390	600	22,18-24,16	≤ 0.733

ANNEX 2: Characteristics of the components

XPS

PROPERTIES	UNITS	VALUE	TOLERANCES	REGULATIONS
Density	kg/cm ³	32	Typical value	UNE EN 1602
Thermal conductivity	W/m °K	0,036	Minimum value	EN 13164
Compressive stress	MPa	0,25	Minimum value	EN 826
Tensile stress	MPa	0,45	Minimum value	UNE EN 1607
Shear stress	MPa	0,20	Minimum value	UNE EN 12090
Modulus of elasticity	MPa	10	Minimum value	UNE EN 1607
Shear modulus	MPa	7	Minimum value	UNE EN 12090
Constant swelling	% vol.	1,5	Minimum value	EN 12087

SOLID FIR BOARD

PROPERTIES	UNITS	VALUES	TOLERANCES	REGULATIONS
Density	kg/m ³	420	+/- 10 %	EN 323
Bending strength	MPa	62-90	Minimum value	EN 319
Shear stress	MPa	4.9-7.5	Minimum value	UNE EN 12090
Modulus of Elasticity	MPa	11000	Minimum value	EN 310
Swelling (24 h)	% vol.	12	Minimum value	EN 317

PLYWOOD BOARD

PROPERTIES	UNITS	VALUES	TOLERANCES	REGULATIONS
Density	kg/m ³	520	+/- 10 %	EN 323
Thermal conductivity	W/m °K	0,134	Minimum value	EN 13164

WATER-REPELLENT PARTICLE BOARD

PROPERTIES	UNITS	10 mm Thickness	16-19 mm Thickness	TOLERANCES	REGULATIONS
Density	kg/m ³	700	680	+/- 10 %	EN 323
Bending strength	MPa	15	14	Minimum Value	EN 319
Tensile Stress	MPa	0,45	0,45	Minimum Value	EN 310
Modulus of Elasticity	MPa	2050	1950	Minimum Value	EN 310
Swelling (24 h)	% vol.	14	14	Maximum Value	EN 317
Moisture content	% vol.	5-13	5-13	Range of values	EN 322

HERAKUSTIK BOARD (Acoustic wooden board bonded with magnesite)

PROPERTIES	UNITS	VALUE	TOLERANCES	REGULATIONS
Density	kg/cm ³	(457-533)x10 ⁻⁶	Range of values	UNE EN 1602
Thermal conductivity	W/m °K	0,085	Minimum value	EN 13164
Compressive stress	MPa	0,20	Minimum value	EN 826

CEMENT BONDED PARTICLEBOARD

PROPERTIES	UNITS	VALUE	TOLERANCES	REGULATIONS
Density	kg/cm ³	10x10 ⁸	Minimum value	UNE EN 1602
Thermal conductivity	W/m °K	0,23	Minimum value	EN 13164
Compressive stress	MPa	9	Minimum value	EN 826
Tensile stress	MPa	0,30	Minimum value	UNE EN 1607
Modulus of elasticity	MPa	4500	Minimum value	UNE EN 1607
Constant swelling	% vol.	1,5	Minimum value	EN 12087

OSB

PROPERTIES	UNITS	VALUE	TOLERANCES	REGULATIONS
Density	kg/cm ³	5,8x10 ⁻⁴	Typical value	UNE EN 323
Bending stress	MPa	10-24	Minimum values	EN 310
Tensile stress	MPa	0,40	Minimum value	EN 319
Swelling (24 h)	% vol.	12	Maximum Value	EN 317
Moisture content	% vol.	5-13	Range of values	EN 322

WOOD-CEMENT BOARD

PROPERTIES	UNITS	VALUE	TOLERANCES	REGULATIONS
Density	kg/m ³	1250	Minimum value	UNE EN 1602
Thermal conductivity	W/m °K	0,35	Minimum value	EN 13164
Bending stress	MPa	1,8	Minimum value	EN 826
Tensile stress	MPa	0,80	Minimum value	UNE EN 1607
Modulus of elasticity	MPa	4500	Minimum value	UNE EN 1607
Swelling (24 h)	% vol.	1,5	Maximum Value	EN 317
Constant swelling	% vol.	2	Minimum value	EN 12087
Moisture content	% vol.	9	+/- 3 %	EN 322

GYPSUM PLASTERBOARD

PROPERTIES	UNITS	VALUE	TOLERANCES	REGULATIONS
Density	kg/m ³	800	Reference value	EN 323
Thermal conductivity	W/m °K	0,25	Minimum value	EN 13164
Bending strength	MPa	1,53x10 ⁻⁴	Minimum Value	EN 310
Water absorption	gr/m ²	180	Minimum Value	EN 382-1
Water absorption 24 h	% weight	5	Maximum Value	EN 317

FIBER –GYPSUM BOARD

PROPERTIES	UNITS	VALUE	TOLERANCES	REGULATIONS
Density	kg/m ³	1150	Minimum value	EN 323
Thermal conductivity	W/m °K	0,29	Minimum value	EN 13164
Bending strength	MPa	5,5	Minimum Value	EN 310
Modulus of Elasticity	MPa	3200	Minimum Value	EN 310

ANNEX 3: Details.

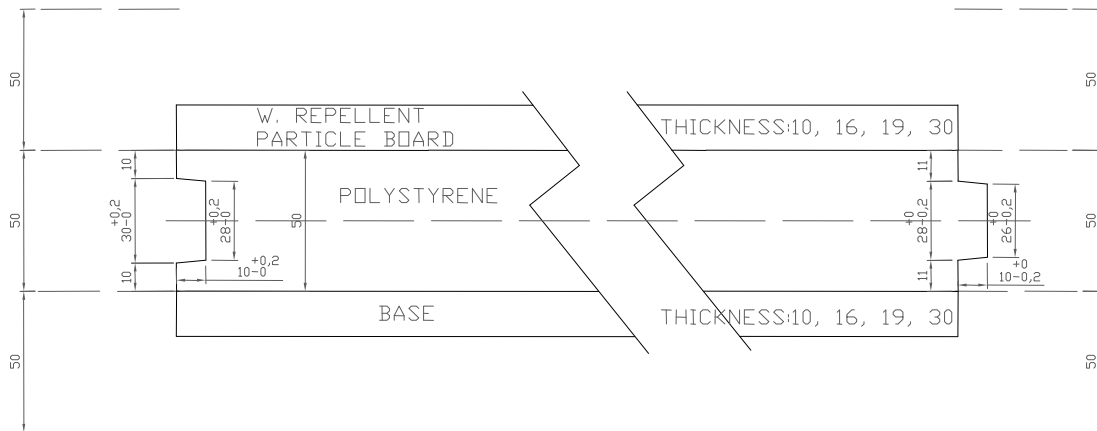


Figure 1: Panel composition

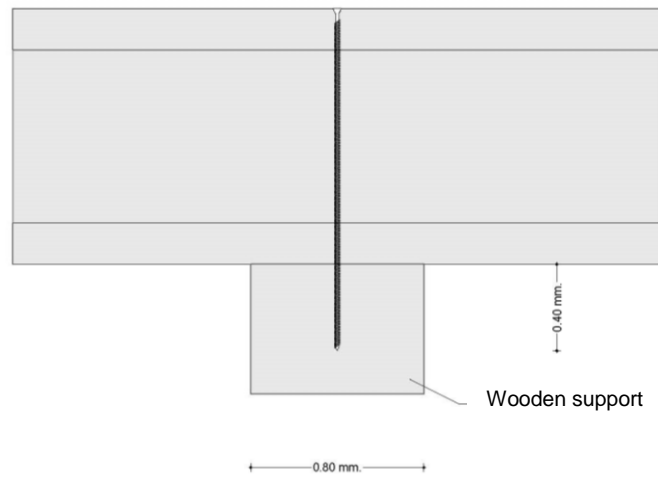


Figure 2: Metallic screw disposition for wooden supports

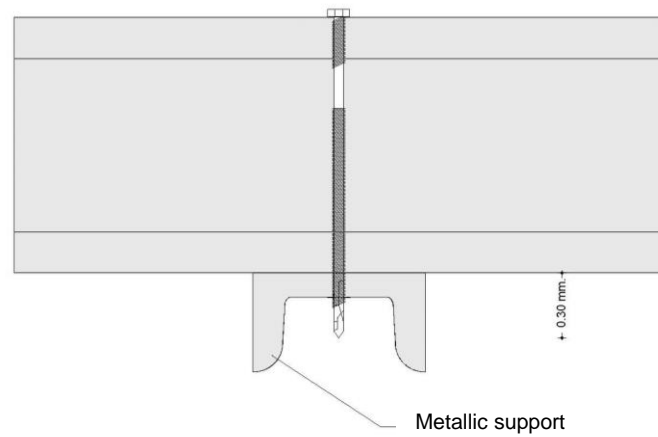


Figure 3: Metallic screw disposition for metallic supports