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European Technical Assessment ETA 09/0154 of 29/07/2016

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	CALIPLAC®
Product family to which the construction product belongs	Self-supporting composite lightweight panels for use in roofs
Manufacturer	Cubiertas Aligeradas Termoacústicas S.L. C/ Río Cúa, 27. Polígono de El Bierzo. 24560 Toral de los Vados (León) – Spain: http://www.caliplac.es
Manufacturing plant(s)	Cubiertas Aligeradas Termoacústicas S.L. C/ Río Cúa, 27. Polígono de El Bierzo. 24560 Toral de los Vados (León) – Spain
This European Technical Assessment contains	14 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 Caliplac[®] 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 Caliplac[®] 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 Caliplac[®] panels¹ are detailed in table 1 and their configuration in table 2.

TYPE	COATING	USE
H	Water repellent particle boards	External and internal board
A	Solid fir	Only internal board
F	Phenolic plywood boards	
V	Cement bonded particleboard	
PL	Gypsum plasterboards	

The trade name, for example CAXB/WW-YY-ZZ, indicates:

C: trade name - Caliplac

A – Internal board layer

X – XPS core

B – External board layer

XX- Thickness of internal layer A (mm).

YY- Thickness of XPS core (mm).

ZZ- Thickness of external layer B (mm).

Caliplac[®] panels present:

- longitudinal joints all along the panel where splines of medium density fibre (MDF) are inserted
- 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.

1.2 Auxiliary elements

1.2.1 Fixing elements

Wood support: Metal self-threading screws with countersunk head, stainless steel or coated steel.

Metal support: Metal self-drilling screws with countersunk head, stainless steel or coated steel.

The characteristics of the fixing elements are included in Table 2.

CHARACTERISTIC	WOODEN SUPPORT	METAL SUPPORT
Fixing elements description:	Metal self-threading screws	Metal self-drilling screws
Head fixing diameter (mm)	12,1-12,5	12,1-12,5
Head height (mm)	4,80-5,30	4,80-5,30
Fixing diameter (mm)	6,03-6,25	6,03-6,25
Length of the fixing element beyond the panel thickness (mm)	≥ 50	≥ 20

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

² 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).

Caliplac[®] panels always rest in, at least, three supports.

1.2.2 Sealing products

The following products are suitable to be used with Caliplac[®] panels for joints:

- bituminous strips
- PUR putty
- Other similar

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

2.1 Intended use

The Caliplac[®] 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.

Caliplac[®] panels are adequate to use indoor or in normal humidity conditions³ 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, 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 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.

³ 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 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.

2.5 Use, maintenance and repair

To preserve Caliplac[®] 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 Caliplac[®], 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)

Caliplac[®] 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 *AFITI-LICOF* 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:

Type CPLXH:	B-s1, d0
Type CVXH:	B-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), Caliplac[®] 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 Caliplac[®] panels are declared in table 3.

MATERIAL	FACTOR(μ)	
	Dry	Wet
Water-repellent particle board (H)	50	16
Cement-bonded particleboard (V)	50	30
Gypsum plasterboard (PL)	10	4
Plywood board (F)	200	70
Solid fir (A)	50	20
Extruded polystyrene (XPS)	150	150
Poliurethane glue	180	180

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 Caliplac[®] 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 three supports Caliplac[®] panels, according to ETAG 016 and manufacturer specifications, has done the results shown in table 4.

TYPE OF PANEL	SPAN (mm)	NUMBER OF SPANS	ULTIMATE LOAD (kN/m ²)	LOAD TO L/200 (kN/m ²)
CAXH/10-40-16	1160	X2	26,01	5,90
CAXH/10-50-16	1160	X2	30,5	9,46
CAXH/10-60-16	1160	X2	31,24	11,49
CAXH/10-80-16	1160	X2	34,98	14,49
CFXH/10-40-16	1170	X2	25,92	11,82
CFXH/10-60-16	1170	X2	26,79	15,42
CFXH/10-80-16	1170	X2	28,35	17,41
CVXH/10-40-16	1150	X2	33,55	12,65
CVXH/10-60-16	1150	X2	36,43	15,36
CVXH/10-80-16	1150	X2	38,22	17,39
CPLXH/10-40-16	1170	X2	25,68	4,63
CPLXH/10-60-16	1170	X2	31,25	5,76
CPLXH/10-80-16	1170	X2	40,39	10,47
CHXH/10-40-16	1170	X2	28,54	12,39
CHXH/10-60-16	1170	X2	33,91	19,70
CHXH/10-80-16	1170	X2	36,32	22,18

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 10 cm.

3.4.1.2 Mechanical resistance of panels subjected to negative loads

Tests performed in INIA-AITIM laboratory on two and three supported Caliplac[®] panels, according to ETAG 016 and manufacturer specifications, always resulted in punch breakage of the top panel layer by the screw head.

Tests have been conducted on the worst case fixing solution:

- Weakest 3 layers panels on 3 wood supports, with 3 fixings per support;
- 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 1,04 kN/ fixing support.

The manufacturer advises the convenience of using at least 3 fixings per support.

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 Caliplac[®] panel classification in the use category appearing in table 5 according to ETAG 016, part 2.

TABLE 5: USE CATEGORY OF PANELS	
TYPE OF PANEL	USE CATEGORY ⁴
CHXH all types	A1
CFXH 10-40-16 up to 10-60-16	A1
CFXH 10-80-16	A2
CAXH all types	A1
CVXH all types	A1
CPLXH all types	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 Caliplac[®] panels is included in table 5.

⁴ 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

3.5 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 Caliplac® 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 6.

TYPE OF PANEL	RA (dBA)	R_w (dBA)
CHXH/10-40-16	30,5	R_w (C; Ctr) = 31(0; -1)
CFXH/10-40-16	29,7	R_w (C; Ctr) = 31(-1; -2)
CPLXH/13-40-16	30,6	R_w (C; Ctr) = 32(-1; -2)
CVXH/10-40-16	30,8	R_w (C; Ctr) = 32(-1; -2)
CAXH/10-40-16	29,8	R_w (C; Ctr) = 31(-1; -2)

3.5.2 Sound absorption

The sound absorption coefficient tests have been carried out by the acoustic institute CETEF Leonardo Torres Quevedo on Caliplac® panels according to EN 20354. Results expressed according to EN-ISO 11654, as included in table 7.

TYPE OF PANEL	NRC	α_w
CHXH	0,09	0,15
CFXH	0,08	0,10
CPLXH	0,07	0,10
CVXH	0,07	0,10
CAXH	0,09	0,15

3.6 Energy economy and heat retention (BR 6)

3.6.1 Thermal insulation properties

Declared thermal transmittance (U) for different Caliplac® 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

Caliplac® panels require all the joins between the panels to be sealed.

The air permeability of Caliplac® 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 Caliplac® panel, rests on three supports, type CHXH, (the most onerous composition) following ETAG 16 Part 2. The results are included in table 8.

LOAD TIME (h)	CREEP FACTOR ϕ	
	SPAN 1	SPAN 2
0	0	0
500	0,1369	0,1736
1000	0,4124	0,5753
2000	0,5303	0,7155

3.7.1.2 Thermal agents

3.7.1.2.1 Climate cycles

Non-performance determined (NPD).

Caliplac[®] 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 Caliplac[®] 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

Caliplac[®] 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 40 mm core and 10 mm outer layer (water repellent particleboard) 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 involved 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.

3.7.3 Identification of products

The identification of Caliplac[®] 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 Commission⁵ the system of assessment and verification of constancy of performance (see Annex V to Regulation (EU) N^o 305/2011) for Caliplac[®] panels is:

System 1

⁵ Official Journal of the European Communities L226/21 of 10.09.2003.

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, 29th July 2016

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

Marta M^a Castellote Armero
Director

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 (mm)	CORE (mm)	OUTER FACE (mm)	DIMENSIONS (mm)			WEIGHT (Kg/m ²)	HEAT TRANSMITTANCE U (W/m ² .°C)
				THICKNESS	LENGTH	WIDTH		
CPLXH	13	40	16	69	2440	600	21,60	0,52
		50		79			21,90	0,44
		60		89			22,30	0,38
		80		109			23,00	0,29
CAXH	10	40	16	66	2440*	550	16,70	0,52
		50		76			17,00	0,44
		60		86			17,40	0,38
		80		106			18,10	0,29
CFXH	10	40	16	66	2440	600	17,30	0,52
		50		76			17,60	0,44
		60		86			18,00	0,38
		80		106			18,70	0,29
CVXH	10	40	16	66	2400	550	26,10	0,52
		50		76			26,40	0,44
		60		86			26,80	0,38
		80		106			27,50	0,29
CHXH	16	40	16	72	2400	600	22,20	0,52
		50		82			22,55	0,44
		60		92			22,90	0,38
		80		112			23,60	0,29

*Optionally 3000mm

ANNEX 2: Characteristics of the components

XPS

PROPIEDADES	UNIDADES	VALOR	TOLERANCIAS	NORMATIVA
Density	kg/cm ³	30	Minimum value	EN 1602
Thermal conductivity	W/m ² °K	0,033	Minimum value	EN 13164
Compressive stress	MPa	0,30	Minimum value	EN 826
Tensile stress	MPa	0,50	Minimum value	EN 1607
Shear stress	MPa	0,25	Minimum value	EN 12090
Modulus of elasticity	MPa	12-20	Minimum value	EN 1607
Shear modulus	Mpa	4,5	Minimum value	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 (H)

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

SOLID FIR BOARD (A)

PROPERTIES	UNITS	VALUES
Bending strength	MPa	65-77
Modulus of Elasticity	MPa	10000-12000
Compressive stress	MPa	430-50
Density (12% moisture content)	Kg/m ³	450-470

CEMENT BONDED PARTICLEBOARD (V)

PROPERTIES		UNITS	VALUE
Weight		Kg/m ³	1350
Moisture content		%	6 – 12
Modulus of Elasticity		MPa	5500
Bending strenght		MPa	11
Tensile Stress		MPa	0,5
Compressive Stress		MPa	15
Dimensional stability	Weight increasing	%	1 after 2 hours 1,5 after 24 hours
	Variation (length and width)	%	- 0,18 for relative moisture 65 to 80% at 25°C + 0,12 for relative moisture 65 to 80%
Vapour permeability		g/m.h.mm Kg	0,00197
Termal insulation		w/m °C	0,22
Acoustic insulation		dB	12 mm: 31 dB, 37 mm: 37 dB

GYPSUM PLASTERBOARD (PI)

PROPERTIES	UNITS	VALUE
Density	Kg/m ³	1130
Bending strenght	MPa	5,3
Tensile Stress	MPa	0,3
Shear Stress	MPa	5,0
Compression Stress	MPa	2,0
Modulus of Elasticity. Bending	MPa	2900
Modulus of Elasticity. Shearing	MP	2900
Modulus of Elasticity. Tensile	MPa	2900
Modulus of Elasticity. Compression	MPa	1900
Thermal conductivity	w/m °K	0,18
Water absorption 24 h	%	2

PLYWOOD BOARD (F)

PROPERTIES	UNITS	VALUE (Thickness 10 mm)	TOLERANCES	REGULATIONS
Density	kg/m ³	550	± 10%	EN 323
Bending strenght	MPa	63	Minimum Value	EN 310
Tensile Stress	MPa	0,65	Minimum Value	EN 319
Tensile Stress ión surface	MPa	27	Minimum Value	EN 311
Modulus of Elasticity	MPa	6650	Minimum Value	EN 310
Water absorption	% vol	17	Minimum Value	EN 382-1
Water absorption 24 h	% vol	3,8	Minimum Value	EN 317
Moisture content	% vol	8	± 3	EN 322

ANNEX 3: Details.

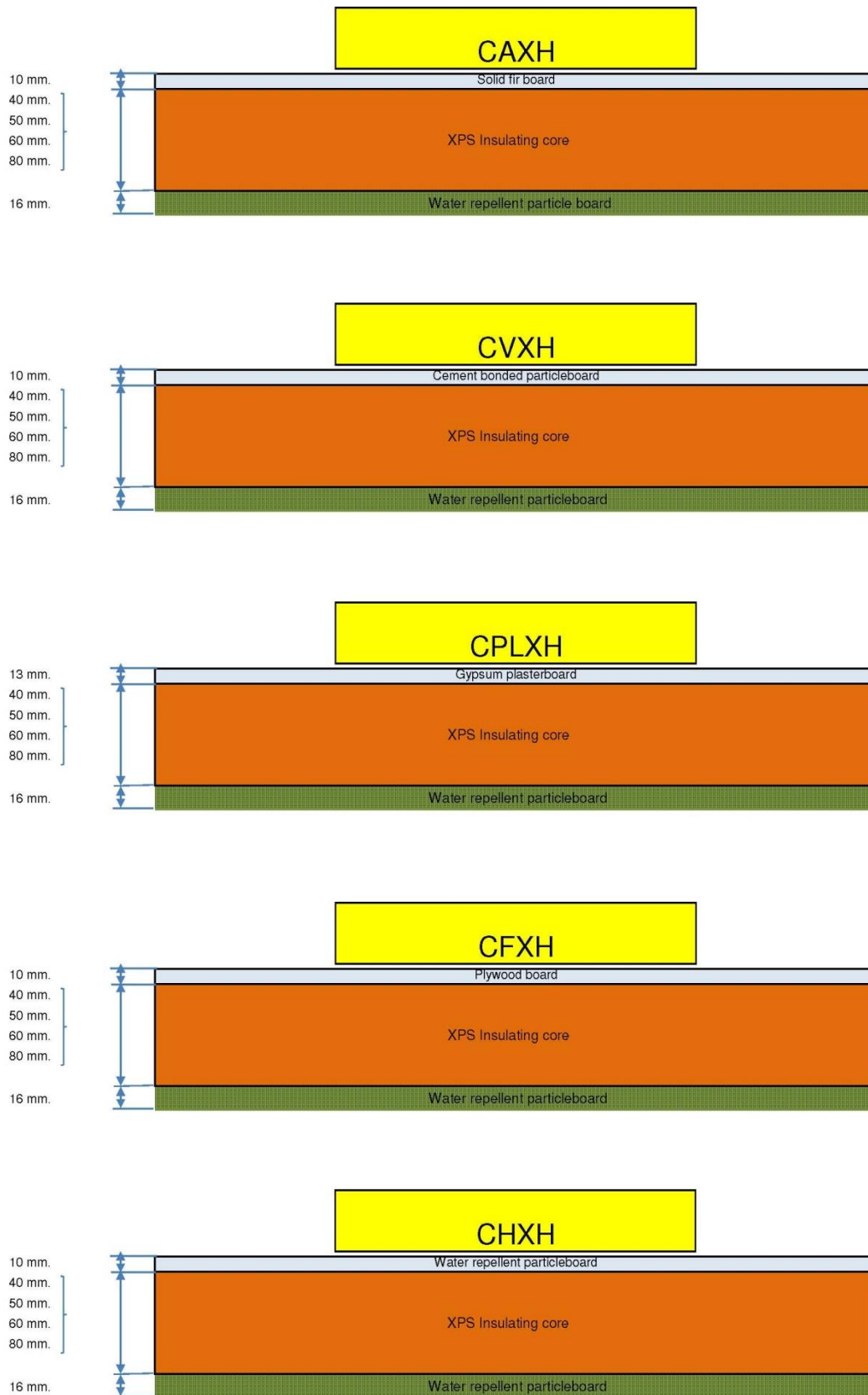


Figure 1: Panels composition

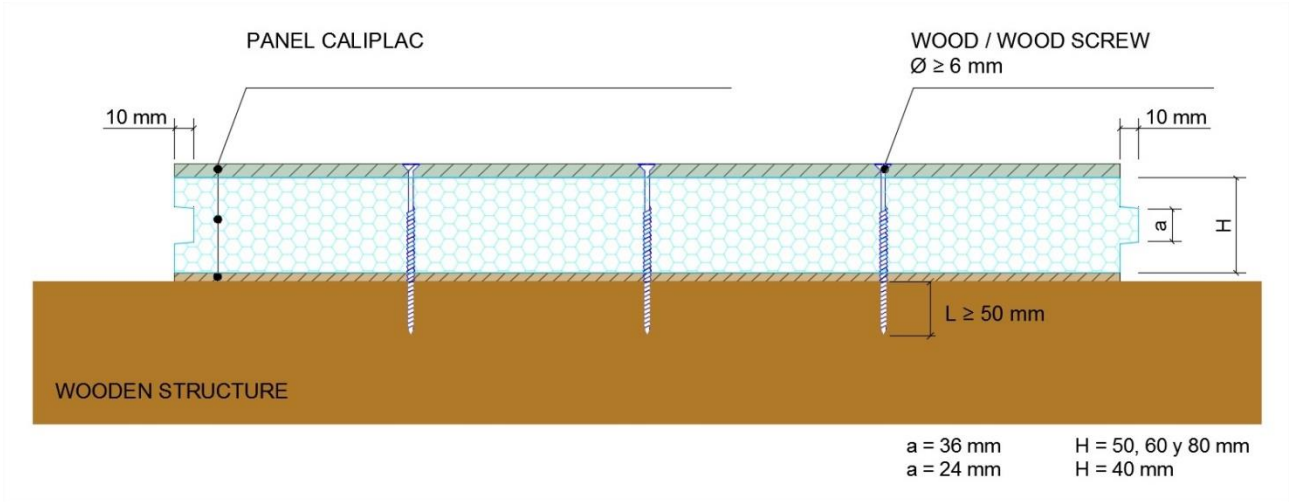


Figure 2: Metallic screw disposition for wooden supports and detail of tongue-and-groove joint

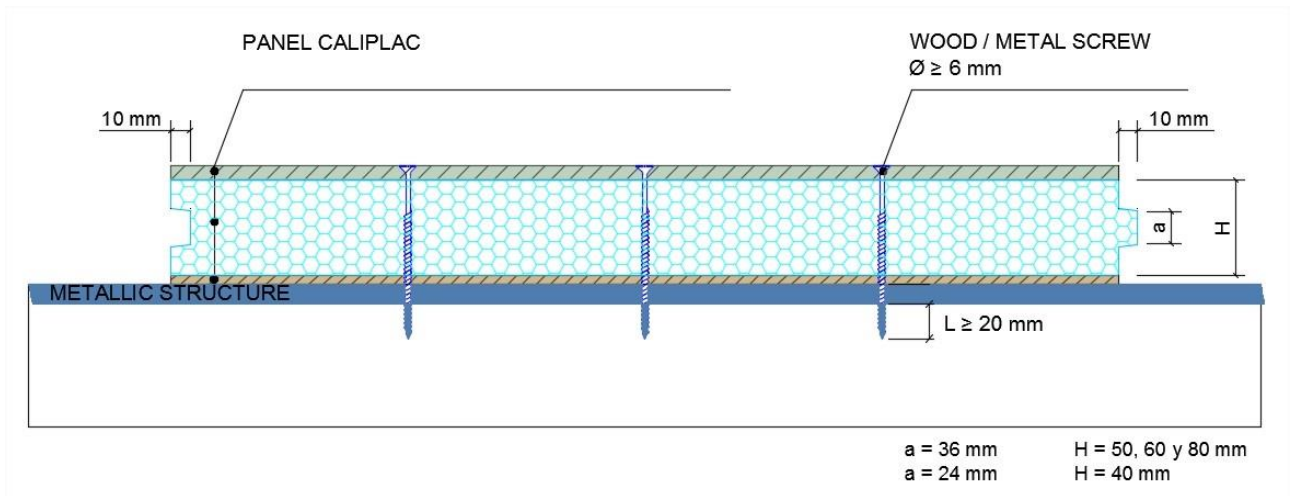


Figure 3: Metallic screw disposition for metallic supports and detail of tongue-and-groove joint