

EUROPEAN TECHNICAL ASSESSMENT

ETA 10/0019
Version 01
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Technical Assessment Body issuing the European Technical Assessment: UBAtc.
UBAtc has been designated according to Article 29 of Regulation (EU) No 305/2011
and is member of EOTA (European Organisation for Technical Assessment)

Trade name of the construction product:

UNILIN SW-EPS, SW-XPS, SW-PUR, SW-PUR-ML, SW-WOOL-ML, SW-ALT-ML, SW-FLAX-ML, OPEN PUR, OPEN WOOL, OPEN ALT, OPEN FLAX, SW PLUS PUR

Product family to which the construction product belongs:

22 - Roof coverings, roof lights, roof windows, and ancillary products. Roof kits

Manufacturer

Unilin division insulation bvba
Waregemstraat 112
8792 Desselgem
Belgium

Manufacturing plants:

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Website:

www.unilin.com

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

Guideline for European technical approval (ETAG), used as European Assessment Document (EAD): 019

This version replaces:

European Technical Approval 10/0019, issued on 27 June 2013

This European Technical Assessment contains:

22 pages, including 3 annexes, which form an integral part of the document.



**European Organisation
for Technical Assessment**

Legal bases and general conditions

- 1 This European Technical Assessment is issued by UBAtc (Union belge pour l'Agrément technique de la construction, i.e. Belgian Union for technical Approval in construction), in accordance with:
 - Regulation (EU) No 305/2011¹ of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC, as amended
 - Commission Implementing Regulation (EU) No 1062/2013² of 30 October 2013 on the format of the European Technical Assessment for construction products
 - Guideline for European technical approval (ETAG), used as European Assessment Document (EAD): ETAG 016
- 2 Under the provisions of Regulation (EU) No 305/2011, UBAtc is not authorized to check whether the provisions of this European Technical Assessment are met once the ETA has been issued.
- 3 The responsibility for the conformity of the performances of the products with this European Technical Assessment and the suitability of the products for the intended use remains with the holder of the European Technical Assessment.
- 4 Depending on the applicable Assessment and verification of constancy of performance (AVCP) system, (a) notified body(ies) may carry out third-party tasks in the process of assessment and verification of constancy of performance under this Regulation once the European Technical Assessment has been issued.
- 5 This European Technical Assessment allows the manufacturer of the construction product covered by this ETA to draw up a declaration of performance for the construction product.
- 6 CE marking should be affixed to all construction products for which the manufacturer has drawn up a declaration of performance.
- 7 This European Technical Assessment is not to be transferred to other manufacturers, agents of manufacturers, or manufacturing plants other than those indicated on page 1 of this European Technical Assessment.
- 8 The European Technical Assessment holder confirms to guarantee that the product(-s) to which this assessment relates, is/are produced and marketed in accordance with and comply with all applicable legal and regulatory provisions, including, without limitation, national and European legislation on the safety of products and services. The ETA-holder shall notify the UBAtc immediately in writing of any circumstance affecting the aforementioned guarantee. This assessment is issued under the condition that the aforementioned guarantee by the ETA-holder will be continuously observed.
- 9 According to Article 11(6) of Regulation (EU) No 305/2011, when making a construction product available on the market, the manufacturer shall ensure that the product is accompanied by instructions and safety information in a language determined by the Member State concerned which can be easily understood by users. These instructions and safety information should fully correspond with the technical information about the product and its intended use which the manufacturer has submitted to the responsible Technical Assessment Body for the issuing of the European Technical Assessment.
- 10 Pursuant to Article 11(3) of Regulation (EU) No 305/2011, manufacturers shall adequately take into account changes in the product-type and in the applicable harmonised technical specifications. Therefore, when the contents of the issued European Technical Assessment do not any longer correspond to the product-type, the manufacturer should refrain from using this European Technical Assessment as the basis for their declaration of performance.
- 11 All rights of exploitation in any form and by any means of this European Technical Assessment are reserved for UBAtc and the ETA-holder, subject to the provisions of the applicable UBAtc regulations.
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- 13 Subject to the application introduced, this European Technical Assessment is issued in English and may be issued by the UBAtc in its official languages. The translations correspond fully to the English reference version circulated in EOTA.
- 14 A European Technical Approval was first issued for this product on 30 April 2010. On 27 June 2013 that document was replaced by a revised European Technical Approval. Compared with the previous version, the Sandwich plus element (SW PLUS PUR) and the use of planking were added and the reaction to fire classes were specified for the materials referred to. This European Technical Assessment was first issued on 25 June 2018 and does not comprise any technical changes compared with the latest version of the European Technical Approval.

¹ OJEU, L 88 of 2011/04/04

² OJEU, L 289 of 2013/10/31

Technical Provisions

1 Technical description of the product

Roof elements type SW-EPS, SW-XPS, SW-PUR, SW-PUR-ML, SW-WOOL-ML, SW-ALT-ML, SW-FLAX-ML, SW plus-PUR, OPEN PUR, OPEN WOOL OPEN ALT and OPEN FLAX are prefabricated wood based load bearing stressed skin- panels as defined in the ETAG 019 and are intended to be used as load bearing elements.

The SW-type element is a pure sandwich type element with upper and lower skin. The element has no wooden ribs. The core consists of a rigid insulation material

The SW-ML-type element is a closed box type element with upper and lower skin and with intermediate wooden ribs. The core exists of a rigid or a flexible insulation material.

The OPEN-type element is an open box type element consisting of wooden ribs and a lower skin. The open type element is filled with a rigid or with a flexible insulation material.

The sandwich plus-type element is a combination between a sandwich-type element and an open-type element. The lower skin is glued to the wooden ribs. The upper skin is only glued to the rigid insulation material.

Skins, ribs and core are bonded by means of an adhesive, which can be the foamed PUR itself.

The composition of the different types of elements is given in Annex II.

The provisions made in this European Technical Assessment are based on an intended working life of 50 years³, provided that the assembled product is subject to appropriate use and maintenance, in accordance with paragraph 2 of this ETA.

2 Specification of the intended use(s) in accordance with the applicable EAD

The main application is load-bearing elements for inclined roofs. However, this is no restriction and the elements may alternatively be used as wall or floor elements.

The elements shall be subjected to static and quasi-static actions only and are intended to be used in classes 1 and 2 according to EN 1995-1-1/A1.

The roof elements are fixed on site on the roof substructure consisting of purlins, ridge purlins and wall plates or directly on trusses. In case of inclined roof elements may be covered with discontinuously laid roof coverings, such as tiles, slates and corrugated plates.

2.1 Assumptions under which the fitness of the product(s) for the intended use was favourably assessed

2.1.1 Manufacturing

The elements are manufactured in accordance with the provisions of the European Technical Assessment using the manufacturing process as identified in the inspection of the manufacturing plant by the assessment body.

2.1.2 Design

The European Technical Assessment only applies to the manufacture and use of the elements. Verification of stability of the works, including application of loads on the products, is not subject to the European Technical Assessment.

The performances specified in this ETA apply under the following conditions:

- Design of the elements shall be carried under the responsibility of an engineer experienced in such products;
- Design of the work shall account for the protection of the elements;
- In service, elements shall not be exposed to detrimental moisture. The definitions of service classes 1 and 2 according to EN 1995-1-1 apply;
- The elements shall be installed correctly.

Design of the products can be according to EN 1995-1- 1 and EOTA technical report 019, taking into account of ER 1 of the European Technical Assessment. Standards and regulations in force in the place of use shall be considered.

2.1.3 Installation

The manufacturer shall prepare installation instructions in which the product-specific characteristics and the most important measures to be taken into consideration for installation are described.

Installation according an installation plan shall be carried out by appropriately qualified personnel under the supervision of the person responsibility for technical matters on site.

Installation shall be done in a reasonable time frame in order to reduce the storage time on site and is followed by cladding. If the latter is not possible to be foreseen within a reasonable time frame, the products shall be protected against weather conditions providing the necessary ventilation. The water tight vapour open barrier is not to be considered as proper protection and shall not be exposed to UV radiation from direct sunlight.

Damaged products or products with swollen boards shall not be installed.

The roof elements shall be installed perpendicularly on the direction of the support and in case of a purlin roof from the ridge to the wallboard.

The panels shall be connected alongside with a spring and sealed at the upper groove with PUR.

³ The indications given as to the working life of the products cannot be interpreted as a guarantee given by the ETA-holder or the Technical assessment body. It should only be regarded as a means for specifiers to choose the appropriate criteria for corrugated bitumen tiles in relation to the expected, economically reasonable working life of the works.

Corbels in the length of the panel until 300 mm as well as corbels across until 150 mm do not require any additional provisions. Contact the manufacturer about larger corbels.

Holes are allowed if they do not exceed 1/4 of the width provided that no ribs are damaged. Contact the manufacturer for larger holes.

After assembling the roof elements, the roof shall be fitted, as soon as possible, with a roof covering. In any case, measures shall be taken to protect the element against rainfall by sealing the upper grooves as soon as possible. Sealing of the side seams is carried out in accordance with the panel type, by means of a spring and by filling the upper core with PUR. Cross seams shall be avoided for as far as possible. If there are cross seams, then these shall be located as close as possible to the ridge. Sealing of the cross seam shall be done with PUR foam and water tight sealing tape.

After assembling the roof elements, the space situated under the roof elements shall be ventilated sufficiently during the rest of the construction process. Especially if construction activities take place during the building process (e.g. installing flooring, etc.) that may cause an indoor climate that is more humid than is usual for the occupied state.

The space between the upper side of the roof element and the cladding shall be well ventilated.

2.2 Recommendations on packaging, transport and storage

For elements longer than 3 m, the element shall be transported in such a way that damage is avoided, in particular by supporting the elements sufficiently to avoid breakage. The assembly on the work shall take place in dry conditions

The elements shall be protected against harmful wetting during transport and storage and stored only temporarily on the building site.

Elements shall be stored on a plane underlay using a sufficient number of supports according to manufacturer's instructions so that the elements do not have contact with water on the ground.

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

3.1 Resistance to static and dynamic loads

The load bearing capacities of all element types may be obtained by calculation.

The sandwich-type elements may be designed according to the EOTA Technical Report No 019 "Calculation models for prefabricated wood-based load bearing stressed skin panels for use in roofs". All types of boards are considered to be load bearing.

The closed-box-type elements (SW-ML) may be designed as a glued thin-flanged I-beam according to EN 1995-1-1. For this type of element, the following skins shall be considered not to be load bearing:

- particleboard type 3;
- MDF.RWH – panel;
- gypsum plasterboard;
- gypsum fibreboard;
- calcium silicate board;

When one of the skins is not load bearing, the element shall be designed as a glued thin-flanged U-beam according to EN 1995-1-1. The ribs may be solid wood, glued laminated timber or I-joists

The open-type elements shall be designed as a glued thin-flanged U-beam according to EN 1995-1-1.

The sandwich plus-type shall be considered to be a combination of a sandwich-type element and an open-type element. All skins used in this element shall be considered to be load bearing.

When boards are considered to be load bearing, the following characteristic strength, mean stiffness and modification factors shall be used:

Board	Strength and stiffness values	k_{mod} , k_{def} , γ_m
Particle board	EN 12369-1	EN 1995-1-1/A1
OSB	EN 12369-1	EN 1995-1-1/A1
Plywood	See following table	EN 1995-1-1/A1
Gypsum fibreboard	According to ETA	According to ETA
Gypsum plaster board	EN 520	
MDF-HLS	EN 12369-1	EN 1995-1-1/A

For plywood, the following minimal strength and stiffness characteristics shall be used:

Characteristic (N/mm ²)	Conifer	Combi
$E_{t,c,mean }$	6000	6000
$E_{t,c,mean\perp}$	5000	6000
$f_{m,k, }$	20,0	40,0
$f_{m,k,\perp}$	11,4	22,0
$f_{t,k, }$	10,0	30,0
$f_{t,k,\perp}$	7,0	16,0
$f_{e,k, }$	14,0	21
$f_{c,k,\perp}$	12,6	21
$f_{v,k}$	3,5	7
$f_{r,k}$	0,6	1,7

For gypsum plasterboard (only service class 1), the following strength and stiffness characteristics shall be used:

$E_{t,c,mean}$ (N/mm ²)	2800
$f_{m,k}$ (N/mm ²)	5,4
$f_{t,k}$ (N/mm ²)	1,4
$f_{c,k}$ (N/mm ²)	3,5
$f_{v,k}$ (N/mm ²)	1,0
$f_{r,k}$ (N/mm ²)	0,9

The following modification and safety factors shall be used

k_{mod}	1,1	Very short
k_{mod}	0,8	short
k_{mod}	0,6	medium
k_{mod}	0,4	Long
k_{mod}	0,2	Permanent
k_{def}	3	
γ_m	1,3	

The wood based boards and the gypsum fibre board are scarf jointed. At the junction between the gypsum plasterboard in the SW panels, two battens are glued on the board. In order to take the joint into account, the strength values shall be reduced with 0,5 for plywood and with 0,7 for the other board materials.

For the ribs, the following characteristic strength, mean stiffness and modification factors shall be used:

Ribs	Strength and stiffness values	k_{mod} , k_{def} , γ_m
Solid wood	EN 338	EN 1995-1-1/A1
Glued laminated timber	EN 14080	EN 1995-1-1/A1
I-joists	According to ETA	According to ETA

The solid wooden ribs may be finger jointed.

For the core, the following characteristic strength, mean stiffness and modification factors shall be used:

Core	E_{mean} (N/mm ²)	G_{mean} (N/mm ²)	$f_{v,k}$ (N/mm ²)	k_{mod} , k_{def}	γ_m
PUR	4	2,5	0,05	Eota Technical Report TR019	
EPS	4	1,8	0,05		
XPS	4	1,8	0,05		

3.2 Dimensional stability

The dimensional stability has been assessed under the conditions of the intended use. In these conditions, no harmful deformations due to moisture are to be expected.

3.3 Reaction to fire

The classification into Euroclasses according to EN 13501-1+A1 of the components of the elements has been specified in this ETA, Annex III.

The materials, which are deemed to satisfy all of the requirements for the performance characteristic without the need of testing according to the relevant Commission Decision, have been specified in this ETA, Annex IV.

3.4 Resistance to fire

No performance assessed.

3.5 External fire performance

The roof covering and claddings products are not part of the stressed skin panel.

No performance assessed.

3.6 Vapour permeability and moisture resistance

Vapour permeability, moisture resistance and critical surface humidity of the element may be assessed on basis of calculations according to EN ISO 13788, using thermal conductivities and vapour resistance factors indicated in this ETA, Annex IV.

The element shall be separately assessed, if it is to be used in a building intended to be refrigerated.

3.7 Watertightness

The water tightness of the external envelope has been assessed to fulfil the common requirements against driving rain when the elements are covered with tiles, slates or corrugated plates. Water tightness of the internal surface has not been assessed.

3.8 Release of dangerous substances

According to the declaration of the manufacturer the elements comply with all relevant European and national provisions⁴ applicable for the uses for which they are brought to the market.

The elements do not contain harmful or dangerous substances as defined in the EU database, with the exception of formaldehyde. The wood based materials are classified E1 in accordance with EN 13986. When a glue containing formaldehyde is used, the amount of emission is negligible.

The product used as wood preservative satisfies the requirements of Regulation (EU) N° 528/2012 of the European Parliament and of the Council of 22 May 2012, as amended, concerning the making available on the market and use of biocidal products.

In addition to this ETA clause relating to dangerous substances, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of Regulation (EU) N° 305/2011, these requirements need also to be complied with, when and where they apply.

3.9 Slipperiness of floors

No performance assessed.

3.10 Impact resistance

No performance assessed.

3.11 Airborne sound insulation

No performance assessed.

⁴ Known at the date of issuing

3.12 Impact sound insulation

No performance assessed.

3.13 Sound absorption

No performance assessed.

3.14 Thermal resistance

The thermal resistance may be determined in accordance with EN ISO 6946, using the thermal conductivities indicated in this ETA, Annex IV.

3.15 Air permeability

The elements including the joints provide adequate air tightness in relation to the intended use.

3.16 Thermal inertia

The elements including the joints provide adequate air tightness in relation to the intended use.

3.17 Durability

The elements may be used in service class 1 or 2 as defined in EN 1995-1-1. During the erection of the building, the elements resist temporary exposure to water without decay, provided that it is allowed to dry afterwards.

Durability may be reduced by attack from insects.

When necessary and required by the local authorities at the building site, elements may be treated against biological attack according to the rules valid on the place. Any adverse effects of the treatment on other properties shall be taken into account. This ETA does not cover these kinds of treatments.

3.18 Identification

The elements are delivered in packages for minimal protection during transportation and storage. Proper protection against different weather conditions shall be foreseen. Each delivery package is labelled with an ID number of the element.

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

In accordance with Regulation (EU) N° 305/2011, Article 65, Directive 89/106/EEC is repealed, but references to the repealed Directive shall be construed as references to the Regulation.

The systems of assessment and verification of constancy of performance, specified in the Decision of the Commission 2000/447/EC⁵, as amended and Commission Delegated Regulation (EU) 2016/364⁶, are specified in the following Table.

Table 2 – Systems of assessment and verification of constancy of performance

Product(s)	Intended use(s)	Level(s) or class(es)	Assessment and verification of constancy of performance system(s) ^a
	For uses contributing to the load-bearing capacity of the structure	-	1
	For uses subject to resistance to fire regulations (e.g. fire compartmentation)	-	3
		A1 ^b , A2 ^b , B ^b , C ^b	1
	For uses subject to reaction to fire regulations	A1 ^c , A2 ^c , B ^c , C ^c , D, E, F	3
		A1 ^d , A2 ^d , B ^d , C ^d , D ^d , E ^d , F ^d , NPD ^e	4
Stressed skin panels		Products requiring testing	3
	For uses subject to external fire performance regulations	Products deemed to satisfy without testing, to be confirmed in discussions with the Fire Regulators Group	4
	For uses subject to regulations in dangerous substances ^f	-	3
	For uses other than those specified above	-	4

^a See Annex V to Regulation (EU) N° 305/2011

^b Products/materials for which a clearly identifiable stage in the production process results in an improvement of the reaction to fire classification (e.g. an addition of fire retardants or a limiting of organic material)

^c Products/materials not covered by footnote (*)

^d Products/materials that do not require to be tested for reaction to fire (e.g. Products/materials of class A1 according to Commission Decision 96/603/EC, as amended)

^e 'No Performance Declared' in accordance with Regulation (EU) N° 305/2011, Article 6(f)

^f In particular, those dangerous substances defined in Council Directive 76/769/EEC, as amended

⁵ See OJEU L 180 of 19/7/2000

⁶ OJEU L 68/4 of 2016.3.15

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

5.1 Tasks for the ETA-holder

The cornerstones of the actions to be undertaken by the manufacturer of the product in the process of assessment and verification of constancy of performance are laid down in clause 8.2 of the Guideline for European technical approval (ETAG), used as European Assessment Document (EAD): ETAG 019.

The manufacturer is allowed to use similar test or control methods, using different equipment and test samples under different conditions, as long as the manufacturer ensures constant product performances, but the frequency of control shall be respected.

5.2 Tasks of notified bodies

The cornerstones of the actions to be undertaken by the notified body in the procedure of assessment and verification of constancy of performance for corrugated bitumen tiles are laid down in clause 8.2 of the Guideline for European technical approval (ETAG), used as European Assessment Document (EAD): ETAG 019.

Annex I: References

EN 335 Durability of wood and wood-based products - Use classes: definitions, application to solid wood and wood-based products

EN 1995-1-1+A1 Eurocode 5: Design of timber structures - General - Common rules and rules for buildings

EN 13501-1:2007+A1:2009 Fire classification of construction products and building elements part 1: classification using test data from reaction to fire tests.

EN 13986 Wood-based panels for use in construction - Characteristics, evaluation of conformity and marking

EN ISO 6946 Building components and building elements - Thermal resistance and thermal transmittance - Calculation method

EN ISO 13788 Hygrothermal performance of building components and building elements - Internal surface temperature to avoid critical surface humidity and interstitial condensation - Calculation methods.

NOTE: If and where dated, the editions of reference documents given above are those which have been used by the UBAtc when establishing this ETA. When new editions become available, these supersede the editions mentioned only when confirmed by the UBAtc.

Annex II: Description of the product

Sandwich-type elements (SW)

The sandwich-type elements are pure sandwich type elements. The width of the element is 600 mm, 800 mm or 1200 mm. The total height may vary in function of the design (mechanical resistance or thermal resistance).

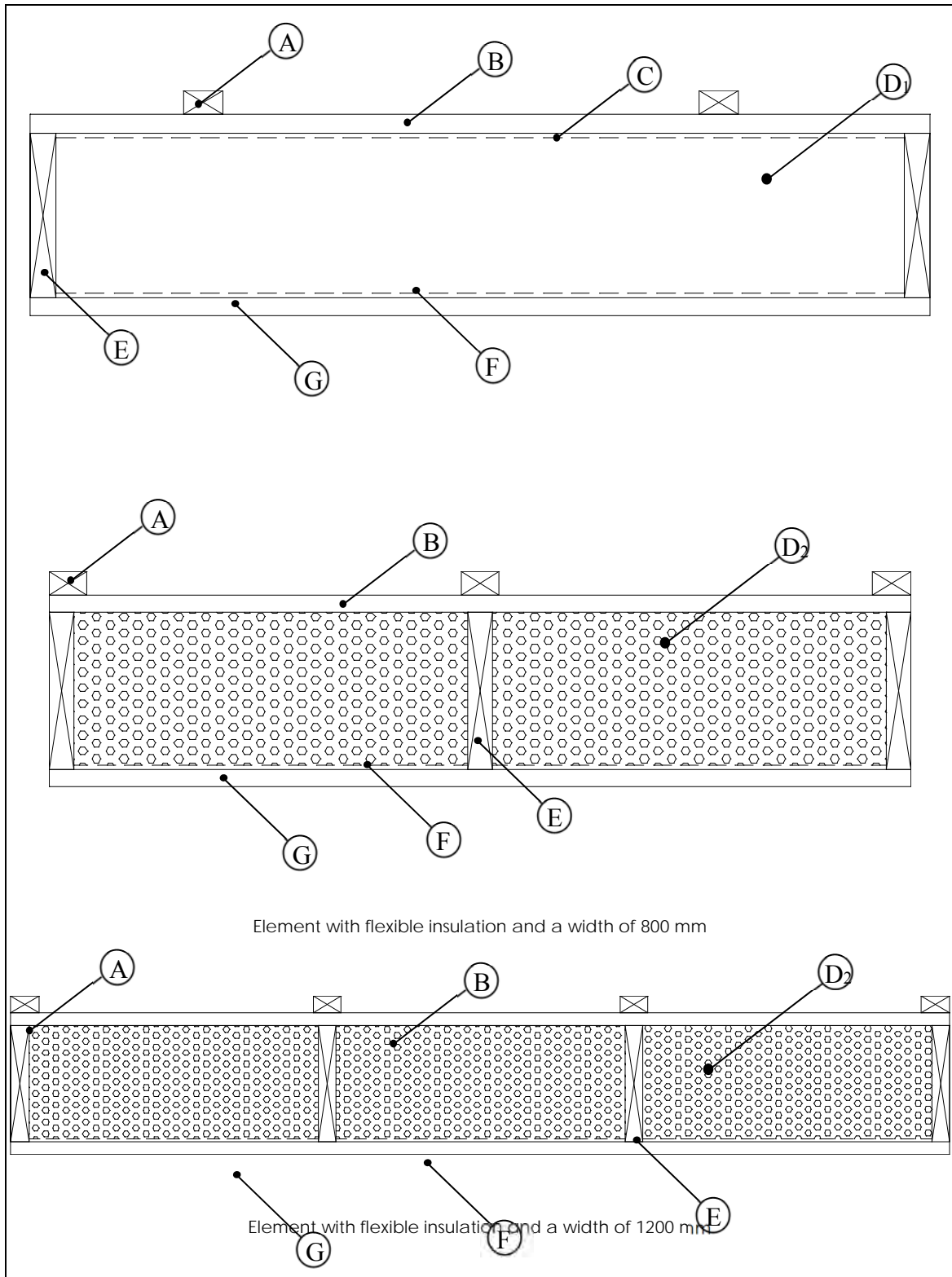
The element is identified by SW, followed by the type of insulation material used as core (EPS / PUR / XPS).

A	Counter battens (optional)
B	Upper skin: <ul style="list-style-type: none"> • Particle board type P5 with a minimal thickness of 3 mm; • or OSB type 3 panel with a minimal thickness of 9 mm; • or plywood with a minimal thickness of 9 mm; • or MDF-HLS panel with a minimal thickness of 3 mm;
C	Vapour barrier (optional)
D	Insulation material <ul style="list-style-type: none"> • Polyurethane (SW- PUR) with a maximal thermal conductivity of $\lambda_D \leq 0,029$ W/mK for a core thickness smaller than 80 mm $\lambda_D \leq 0,028$ W/mK for a core thickness between 80 mm and 120 mm and $\lambda_D \leq 0,027$ W/mK for a core thickness larger than 120 mm. When the insulation material is in between two vapour barriers the thermal conductivity is $\lambda_D \leq 0,023$ W/mK; • or expanded polystyrene (SW-EPS) with a maximal thermal conductivity of $\lambda_D \leq 0,038$ W/mK; • or extruded polystyrene (SW-XPS) with a maximal thermal conductivity of $\lambda_D \leq 0,038$ W/mK.
E	Vapour barrier (optional)
F	Inner skin: <ul style="list-style-type: none"> • Particle board type P5 with a minimal thickness of 3 mm; • or OSB type 3 panel with a minimal thickness of 9 mm; • or plywood with a minimal thickness of 9 mm; • or MDF-HLS panel with a minimal thickness of 3 mm; • or gypsum fibreboard with a minimal thickness of 12,5mm; • or gypsum plasterboard with a minimal thickness of 9,5 mm; • or calcium silicate board with a minimal thickness of 12 mm.

Closed box-type elements (SW-ML)

The closed box-type elements have intermediate wooden ribs. The skins are glued to the ribs and, in case of a rigid insulation material, to the insulation material. The width of the element can be 800 mm, 1200 mm or 1225 mm. The total thickness of the element varies in function of design (mechanical resistance or thermal resistance).

The element is identified by SW - xxx - ML, where xxx identifies the type of insulation material used as core (PUR / WOOL / ALT / FLAX).

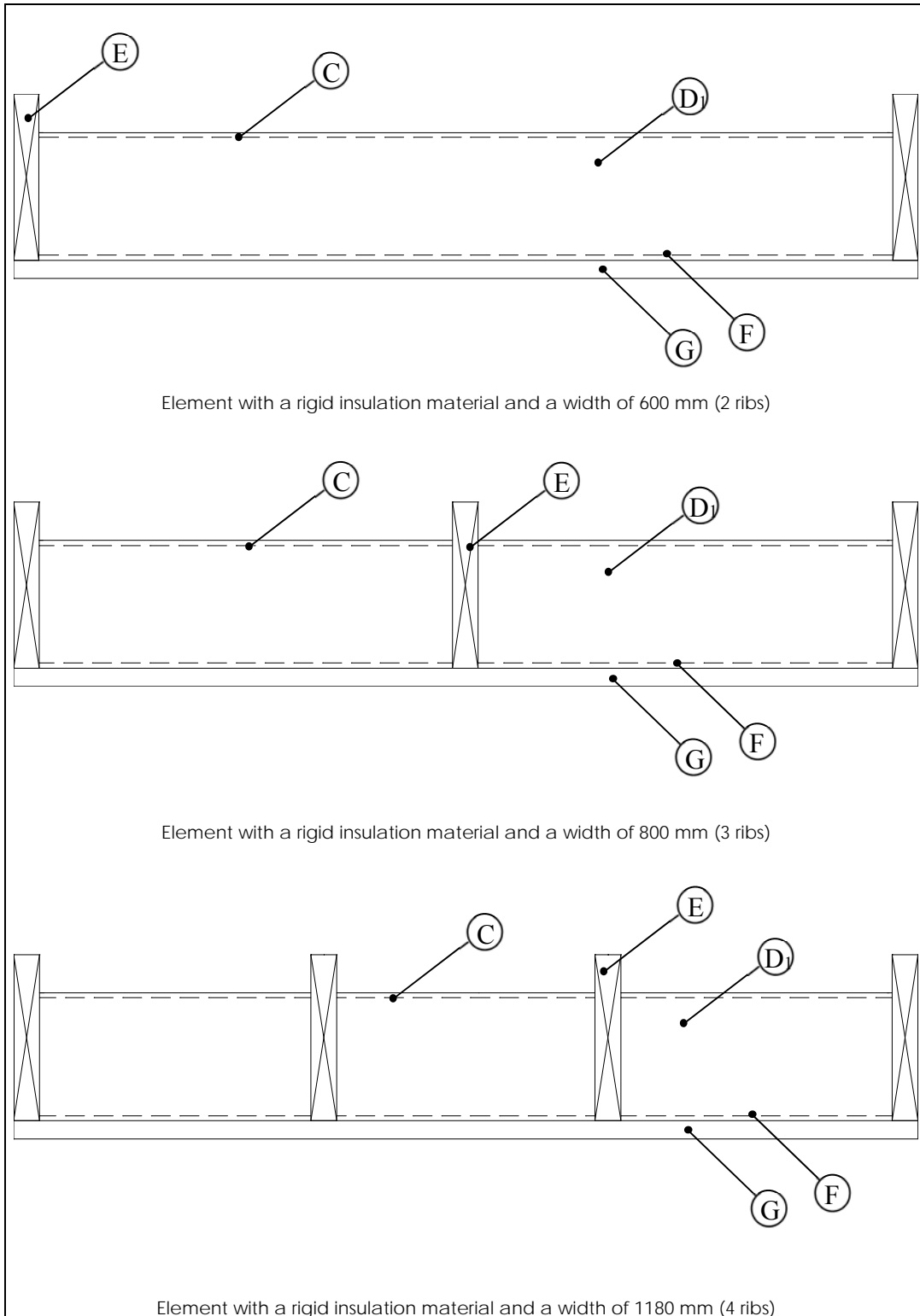


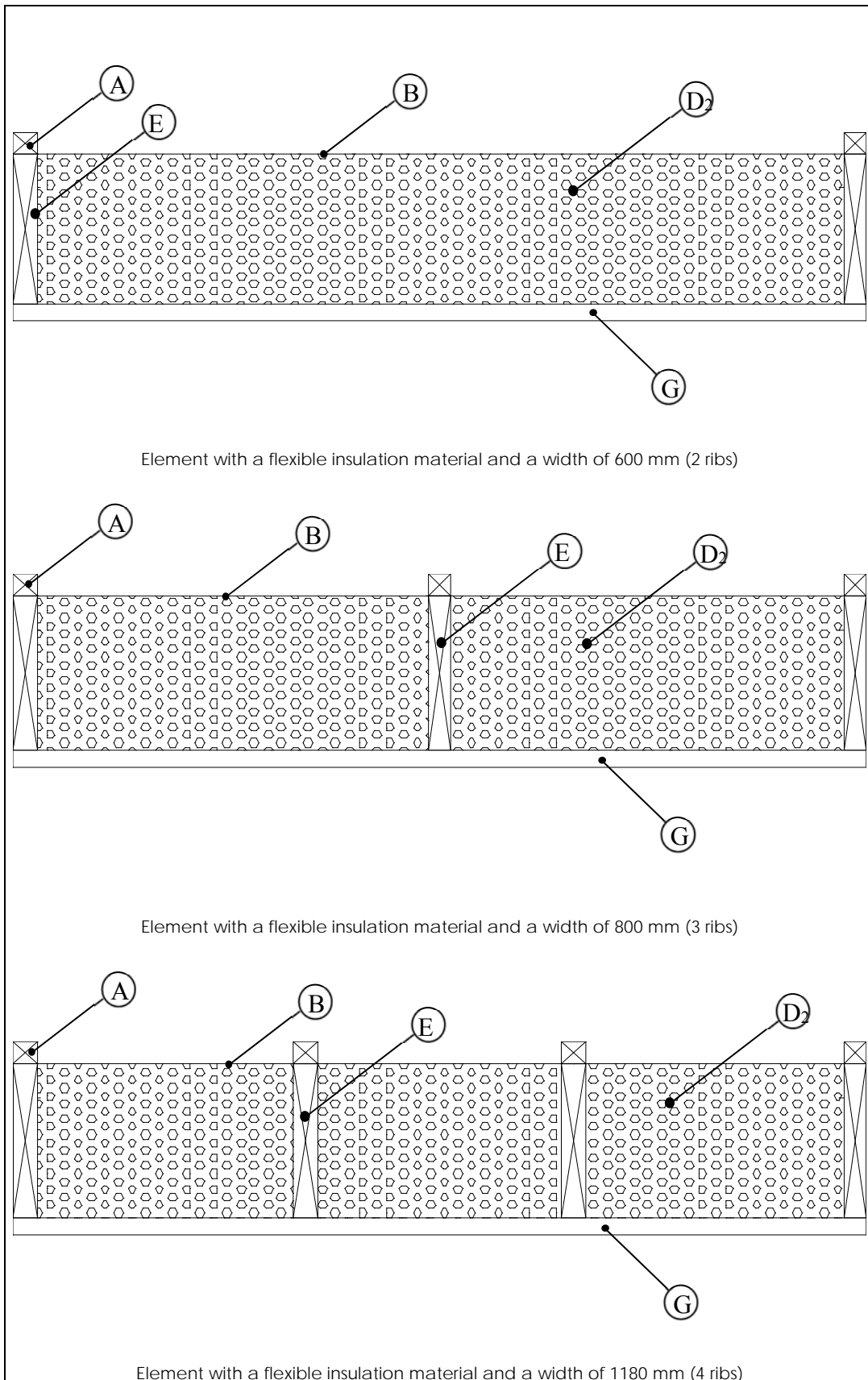
A	Counter battens (optional)
B	Upper skin: <ul style="list-style-type: none"> • Particle board type P5 with a minimal thickness of 3 mm; • or OSB type 3 panel with a minimal thickness of 9 mm; • or plywood with a minimal thickness of 9 mm; • or MDF-HLS panel with a minimal thickness of 3 mm; • or MDF.RWH panel with a minimal thickness of 16 mm
C	Vapour barrier (optional)
D ₁	Rigid insulation material : Polyurethane (SW-PUR-ML) with a maximal thermal conductivity of $\lambda_D \leq 0,029$ W/mK for a core thickness smaller than 80 mm $\lambda_D \leq 0,028$ W/mK for a core thickness between 80 mm and 120 mm and $\lambda_D \leq 0,027$ W/mK for a core thickness larger than 120 mm. When the insulation material is in between two vapour barriers the thermal conductivity is $\lambda_D \leq 0,023$ W/mK;
D ₂	Flexible insulation material: <ul style="list-style-type: none"> • Mineral wool (SW – WOOL – ML);with a maximal thermal conductivity of $\lambda_D \leq 0,037$ W/mK; • or wood fibre insulation (SW-ALT-ML) with a maximal thermal conductivity of $\lambda_D \leq 0,040$ W/mK; • or flax (SW-FLAX-ML) with a maximal thermal conductivity of $\lambda_D \leq 0,040$ W/mK
E	Ribs: <ul style="list-style-type: none"> • solid wood, C18 or better; • or glued laminated timber, GL24h or better; • or I-joists. For elements with a rigid insulation material, there are two ribs per element. For elements with a flexible insulation material, the distance between the ribs is limited to 400 mm.
F	Vapour barrier <ul style="list-style-type: none"> • in combination with flexible insulation material $s_d \geq 50$ m • optional in case of rigid insulation material.
G	Inner skin: <ul style="list-style-type: none"> • Particle board type P5 with a minimal thickness of 3 mm; • or OSB type 3 panel with a minimal thickness of 9 mm; • or plywood with a minimal thickness of 9 mm; • or MDF-HLS panel with a minimal thickness of 3 mm; The following inner skins are also possible, but not in combination with MDF.RWH at position B: <ul style="list-style-type: none"> • or gypsum plasterboard with a minimal thickness of 12,5 mm; • or gypsum fibreboard with a minimal thickness of 12,5 mm; • or calcium silicate board with a minimal thickness of 12 mm

Open-type elements (OPEN)

The open-type elements have a single skin glued to wooden ribs. In case of a rigid insulation material, the skin is also glued to the insulation material. The width of the element is 600 mm, 800 mm or 1180 mm. The total thickness of the element may vary and is dependent on the design (mechanical resistance or thermal resistance).

The element is identified by OPEN, followed by the type of insulation material used as core (PUR / WOOL / ALT / FLAX).



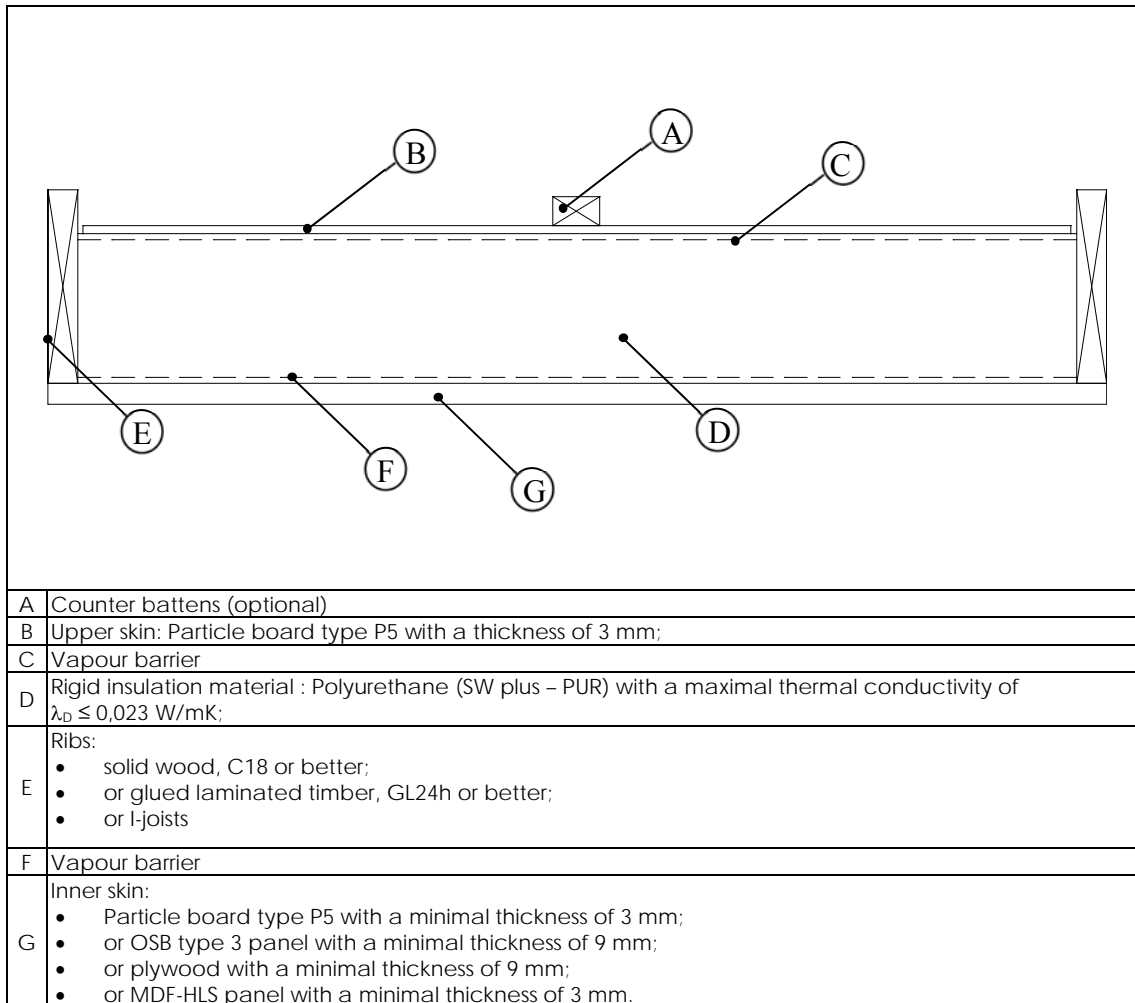


A	Counter battens (optional)
B	Water tight vapour open barrier (only in combination with flexible insulation material)
C	Vapour barrier (optionally - only in combination with a rigid insulation material)
D ₁	Rigid insulation material : Polyurethane (OPEN PUR) with a maximal thermal conductivity of $\lambda_D \leq 0,029$ W/mK for a core thickness smaller than 80 mm $\lambda_D \leq 0,028$ W/mK for a core thickness between 80 mm and 120 mm and $\lambda_D \leq 0,027$ W/mK for a core thickness larger than 120 mm. When the insulation material is in between two vapour barriers the thermal conductivity is $\lambda_D \leq 0,023$ W/mK:
D ₂	Flexible insulation material: <ul style="list-style-type: none"> • Mineral wool (OPEN – WOOL);with a maximal thermal conductivity of $\lambda_D \leq 0,037$ W/mK; • or wood fibre insulation (OPEN - ALT) with a maximal thermal conductivity of $\lambda_D \leq 0,040$ W/mK; • or flax (OPEN - FLAX) with a maximal thermal conductivity of $\lambda_D \leq 0,040$ W/mK
E	Ribs : <ul style="list-style-type: none"> • solid wood, C18 or better; • or glued laminated timber, GL24h or better; • or I-joists <p>The number of ribs is dependent on the width of the element. There are two ribs for a width of 600mm, three ribs for a width of 800 mm and four ribs for a width of 1180 mm.</p>
F	Vapour barrier (optionally – only in combination with rigid insulation material)
G	Inner skin: <ul style="list-style-type: none"> • Particle board type P5 with a minimal thickness of 3 mm; • or OSB type 3 panel with a minimal thickness of 9 mm; • or plywood with a minimal thickness of 9 mm; • or MDF-HLS panel with a minimal thickness of 3 mm;

Sandwich plus-type elements : SW plus - PUR

The sandwich plus-type element is a combined open box / sandwich element. The element has intermediate wooden ribs. The lower skin is glued to the wooden ribs and the insulation material. The upper skin is only glued to the insulation material. The width of the element can be 800 mm. The total thickness of the element may vary and is dependent of the design (mechanical resistance or thermal resistance).

The element is identified by SW plus followed by the type of insulation material.



Dimensions and tolerances

The maximum length of the elements is 8 m. The width and the height of the element may vary. The following tolerances are allowed:

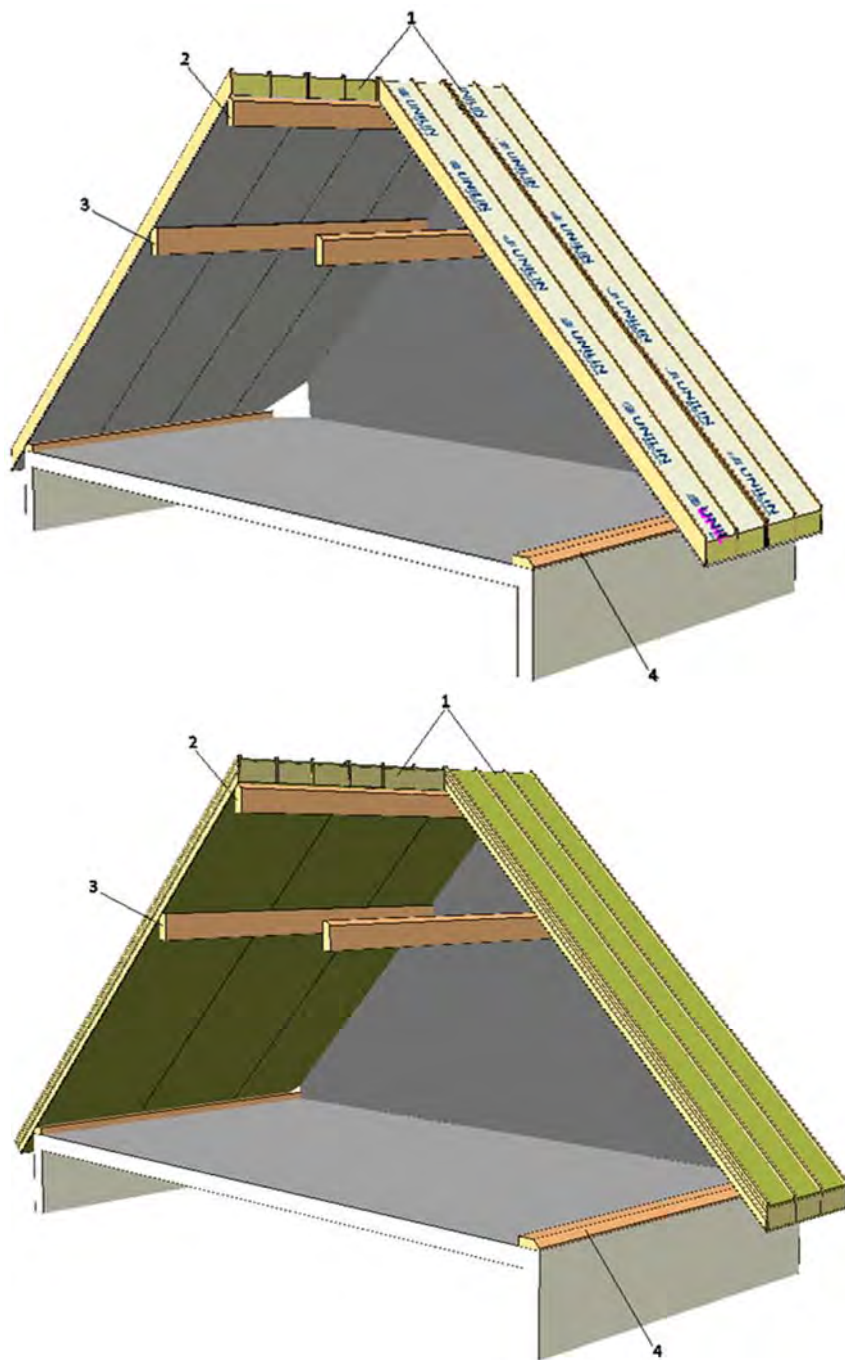
- nominal length ± 15 mm
- width ± 3 mm;
- height: ± 5 mm

The tolerance on the insulation thickness for the open PUR element:

- thickness PUR ≤ 100 mm ± 5 mm
- thickness PUR > 100 mm ± 5 %

Annex III: Construction principles of the roof elements

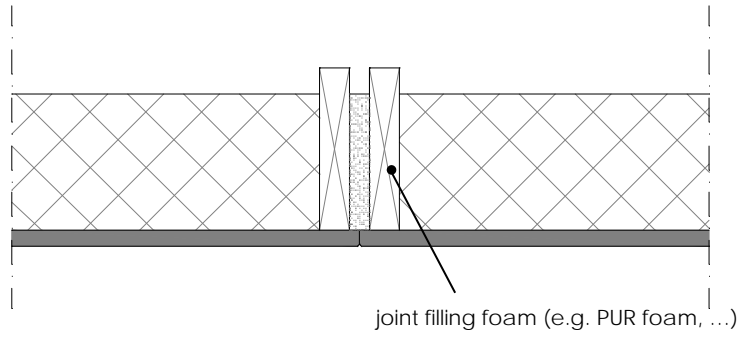
Construction principles of the roof



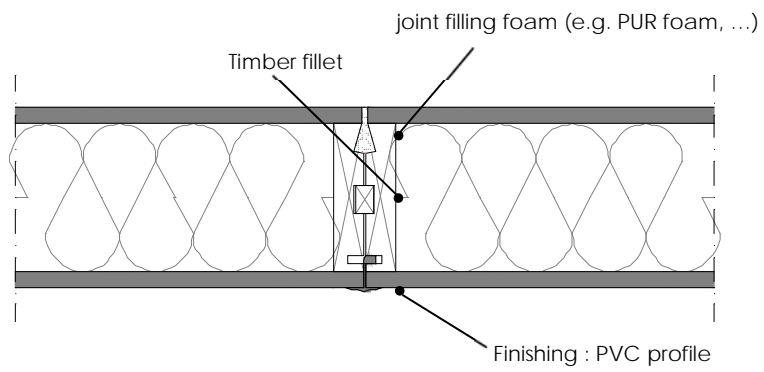
- 1 Roof element
- 2 Ridge purlin
- 3 Purlin
- 4 Wall plate

Joints

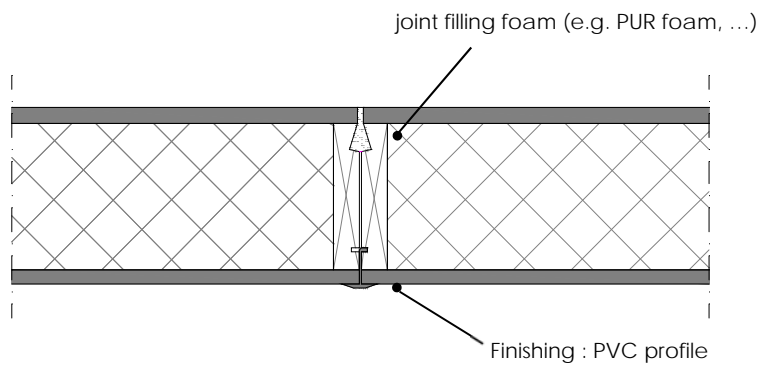
OPEN PUR
 OPEN WOOL
 OPEN ALT
 OPEN FLAX
 SW plus PUR



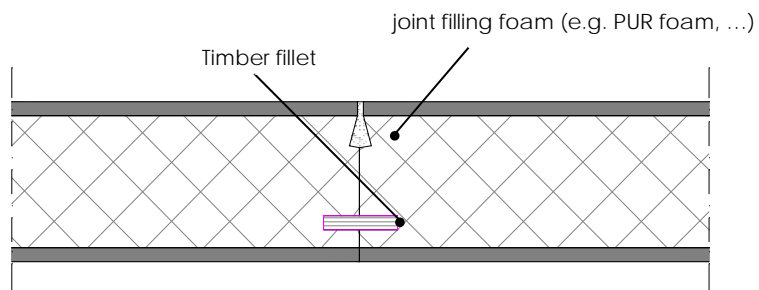
SW-WOOL-ML
 SW - ALT - ML
 SW - FLAX- ML



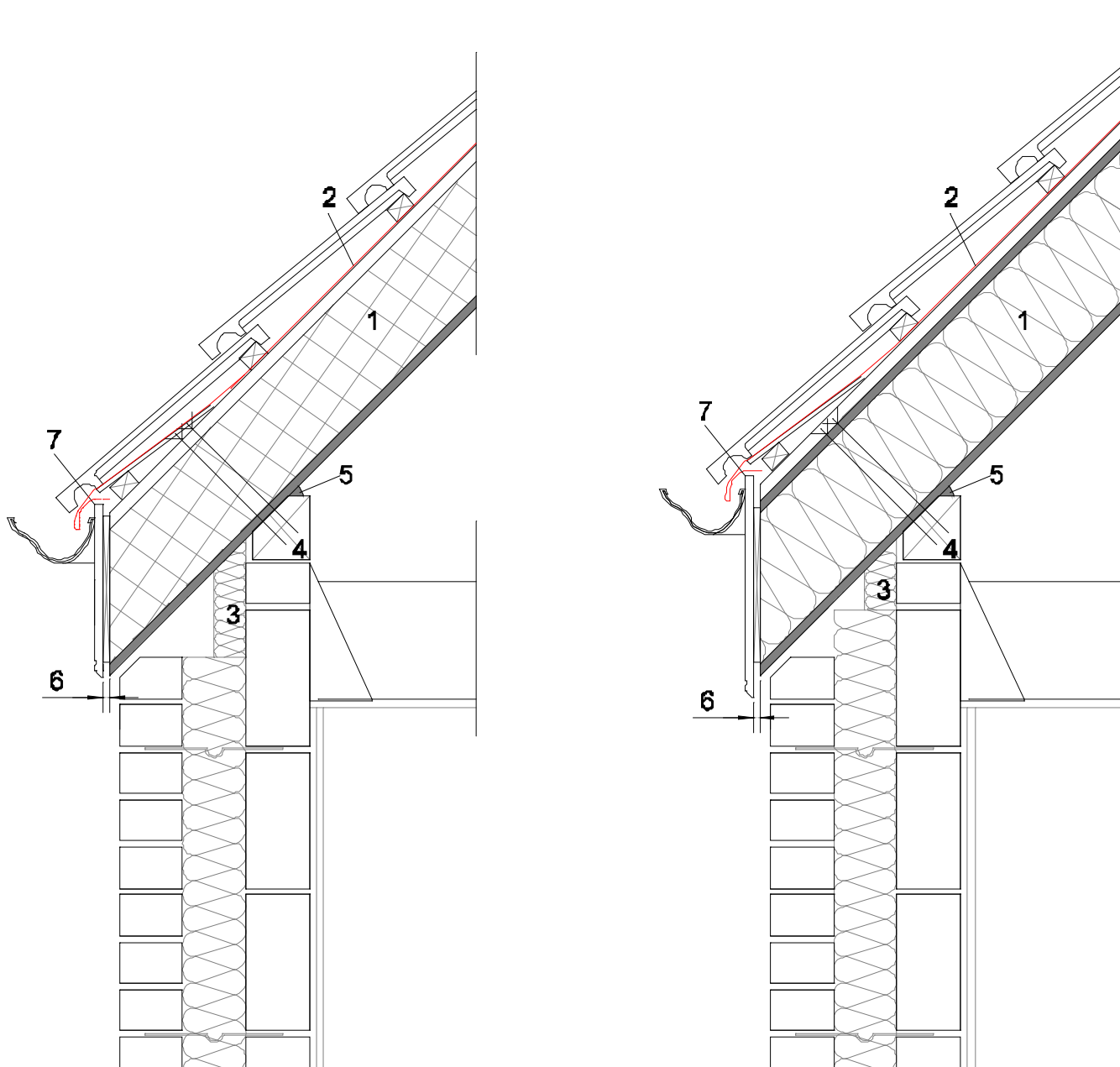
SW - PUR- ML



SW - PUR
 SW - EPS
 SW - XPS

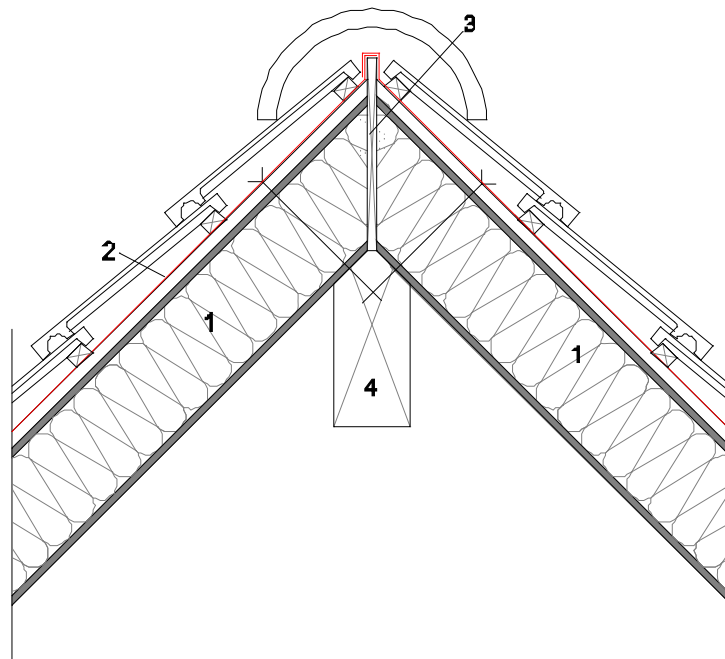
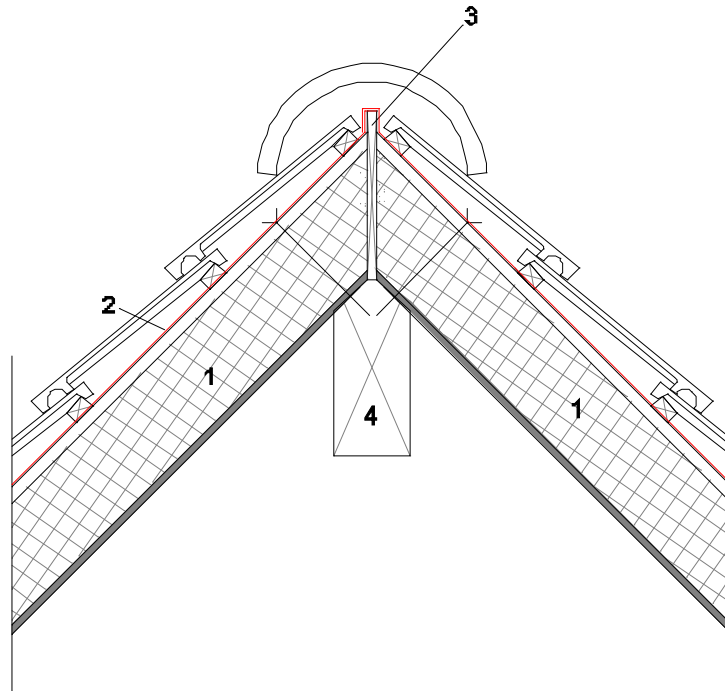


Eaves



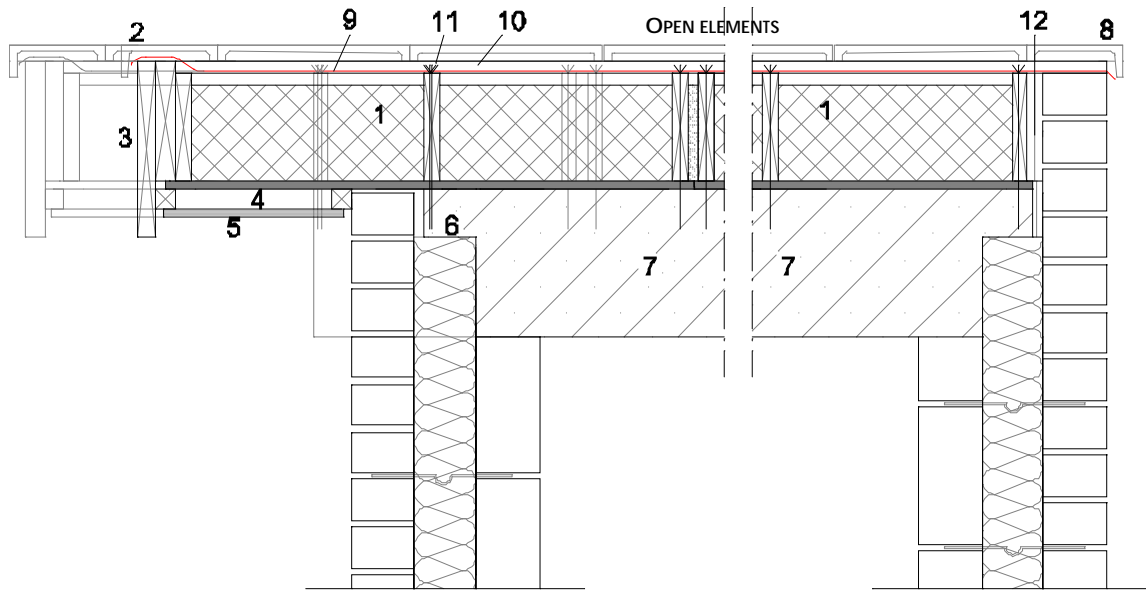
- 1 Roof element
- 2 Optional breathable felt
- 3 Rigid insulation board
- 4 Min. 75 mm chamfered wall plate
- 5 Air tight silicone seal
- 6 Air gap (± 10 mm)
- 7 Optional over fascia vent

Ridge

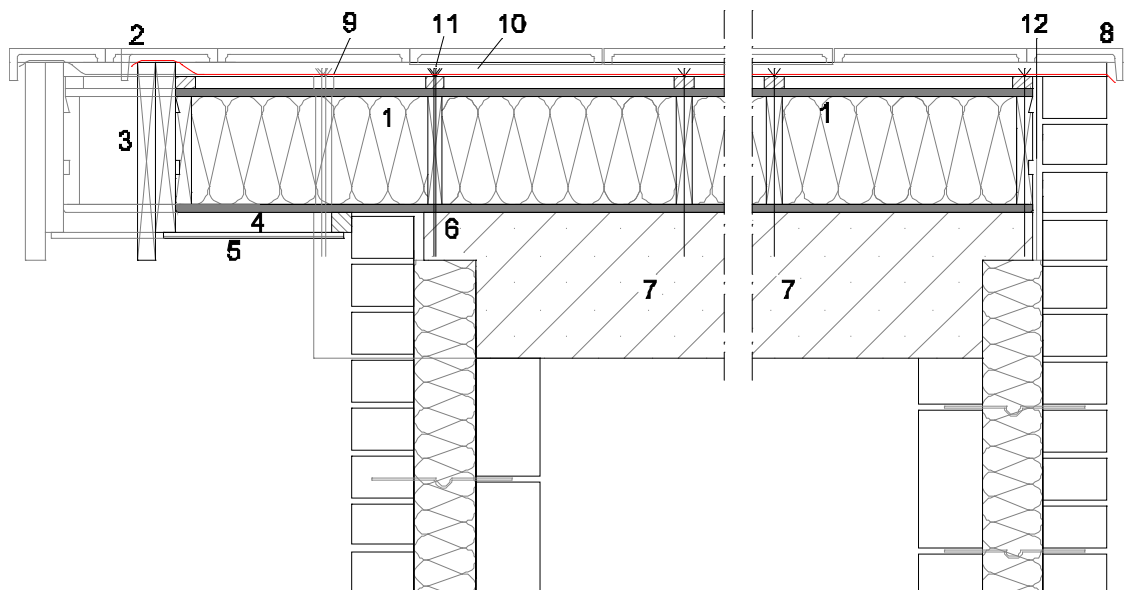


- 1 Roof element
- 2 Optional breathable felt
- 3 Optional ridge board or fill with foam
- 4 Ridge beam

Verge



SW ELEMENTS



- 1 Roof element
- 2 Left verge tile
- 3 Bargeboard to architects design
- 4 Air space
- 5 Soffit to architects design
- 6 Chamfered edge
- 7 Purlin (fixed to internal wall)
- 8 Right verge tile
- 9 Optional breathable felt
- 10 Tiling batten
- 11 Double fixing necessary at verge
- 12 Compressible insulation

Annex IV: Specification of the materials

Material/ component	Reference to European standard or relevant product specification	Type	Dimensions (mm)	λ_d W/m.K	μ (-)	C_p J/kg.K	ρ kg/m ³	Reaction to fire	Remarks
WOODEN RIBS									
Solid wood	EN 14081	C18 or better	Minimal thickness of 21 mm, the height is depending on design	0,13	50	1600	450	D-s2,d0	CE-marked
I-joist	According to ETA		Dependent on design						CE-marked
Glued laminated timber	EN 14080	GL24h or better	Minimal thickness of 21 mm, the height is depending on design	0,13	50	1600		D-s2,d0	CE-marked

Material/ component	Reference to European standard or relevant product specification	Type	Dimensions (mm)	λ_d W/m.K	μ (-)	C_p J/kg.K	ρ kg/m ³	Reaction to fire	Remarks
BOARDS									
Particle board	EN 13986 – EN 312-3 or EN 312-5	Type 3 or type 5	≥ 3	0,14	50	1700	≥ 600	D-s2,d0	CE-marked
OSB	EN 13986 – EN 300	Type 3	≥ 9	0,13	50	1700	≥ 600	D-s2,d0	CE-marked
Plywood	EN 13986 – EN 636-2	Type 2	≥ 9	0,13	200	1600	≥ 500	D-s2,d0	CE-marked
MDF	EN 13986 – EN 622-5	Type HLS	≥ 3	≤ 0,32					CE-marked
MDF.RWH	EN 13986 – EN 622-5	Type RWH	≥ 12	≤ 0,09	11	2100	≥ 540	D-s1,d0	CE-marked
Gypsum fibreboard	According to ETA or EN 15283-2		≥ 12,5	≤ 0,32	20	1000	≥ 900	A2-s1,d0	CE-marked
Gypsum plasterboard	EN 520	H3 or better	≥ 9,5	0,25	10	1000	≥ 900	A2-s1,d0	CE-marked
Calcium silicate board	According to ETA		≥ 15					A2	CE-marked
Planking			≥ 12	0,13	50	1600	≥ 900	D-s2,d2	

Material/ component	Reference to European standard or relevant product specification	Type	Dimensions (mm)	λ_d W/m.K	μ (-)	C_p J/kg.K	ρ kg/m ³	Reaction to fire	Remarks	
INSULATION MATERIALS										
Polyurethane - PU	EN 13165	Open elements CS(10\Y) 100 DS(TH) 8 Other elements CS(10\Y) 120 T2 DS(TH) 8	Dependent on element height	$\leq 0,029$	60	1400	≥ 30	NPD	CE - marked	
				$\leq 0,028$						Thickness < 80 mm
				$\leq 0,027$						$e \geq 80\text{mm}$ $e < 120$ mm
				$\leq 0,023$ (Between 2 vapour barriers)						$e \geq 120\text{mm}$
EPS	EN 13163	EPS 60 T1, L1, W1, S1, P4 DS(N) 5 DS(70-)3	Dependent on element height	$\leq 0,038$	60	1450	≥ 15	E	CE - marked	
XPS	EN 13164	CS(10\Y)300	Dependent on element height	$\leq 0,038$	150	1450	≥ 30	E	CE - marked	
Mineral wool	EN 13162		Dependent on element height	$\leq 0,037$	1	1030	≥ 16	A1	CE - marked	
Wood fibre	EN 13171		Dependent on element height	$\leq 0,040$	5	2100	≥ 40	E	CE - marked	
Flax	According to ETA		Dependent on element height	$\leq 0,040$					CE - marked	

Material/ component	Reference to European standard or relevant product specification	Type	Dimensions (mm)	λ_d W/m.K	μ (-)	C_p J/kg.K	ρ kg/m ³	Reaction to fire	Remarks
FOILS									
Vapour barrier					$s_d \geq 50$ m				
Watertight vapour open barrier	EN 13859-1				$s_d \leq 0,03\text{m}$				

Material/ component	Reference to European standard or relevant product specification	Type	Dimensions (mm)	λ_d W/m.K	μ (-)	C_p J/kg.K	ρ kg/m ³	Reaction to fire	Remarks
GLUE									
One component polyurethane glue	EN 15425	Type I							Board/ribs Counter batten/board Board core Finger joint in ribs
MUF glue	EN 301	Type I							Scarf joints board
Non-structural glue	EN 204	Minimal D3							Non-load bearing panels/ribs Non load bearing panels/core

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This European Technical Assessment has been issued by UBAtc asbl, Sint-Stevens-Woluwe, on the basis of the technical work carried out by the Assessment Operator, Wood.be.

On behalf of UBAtc asbl,

On behalf of the Assessment Operator,
Wood.be, responsible for the technical
content of the ETA,



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