European Technical Approval ETA 13/0297

Trade Name	Biospeedhome log building
Holder of the approval	BIOSPEEDHOME sa Zoning Industriel de Vaux-Chavanne Rue des Boussines, 46 6960 MANHAY BELGIUM
Website	www.biospeedhome.be
Generic type and use of construction product	Log building kit
Validity from:	07/06/2013
to	06/06/2018
Manufacturing plant(s):	BIOSPEEDHOME sa Zoning Industriel de Vaux-Chavanne Rue des Boussines, 46 6960 MANHAY BELGIUM
This European Technical Approval contains:	54 pages including 4 annexes which form an integral part of the document

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I. LEGAL BASES AND GENERAL CONDITIONS

1. This European Technical Approval is issued by UBAtc in accordance with:
   - Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products[1], modified by Council Directive 93/68/EEC[2] and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council[3],
   - Belgian law of 25 March 1996 concerning the adaptation of legislative and administrative provisions of Member States to the Construction Products Directive (89/106/EEC) for construction products[4] and Belgian Royal Decree of 18 August 1998 concerning construction products[5]
   - Common Procedural Rules for Requesting, Preparing and the Granting of European Technical Approvals set out in the Annex to Commission Decision 94/23/EC[6]
   - Guideline for European Technical Approval for log building kits, ETA-Guideline Nr 012
2. The UBAtc is authorized to check whether the provisions of this European Technical Approval are met. Checking may take place in the manufacturing plant(s). Nevertheless, the responsibility for the conformity of the products to the European Technical Approval and for their fitness for the intended use remains with the holder of the European Technical Approval.
3. This European Technical Approval is not to be transferred to manufacturers or agents of manufacturers other than those indicated on page 1, or manufacturing plants other than those laid down in the context of this European Technical Approval.
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[1] Official Journal of the European Communities N° L 40, 11.2.1989, p. 12
[2] Official Journal of the European Communities N° L 220, 30.8.1993, p. 1
[3] Official Journal of the European Union N° L 284, 31.10.2003, p. 1
[4] Belgian Law Gazette, 21.05.1996
[5] Belgian Law Gazette, 11.09.1998
[6] Official Journal of the European Communities N° L 17, 20.1.1994, p. 34

II. SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of product and intended use

1.1 Definition of the product

Biospeedhome log buildings are predesigned and prefabricated log building kits consisting of walls, suspended floors and roof structure.

The log building kits are prepared in the factory for each individual building, and delivered as a package to be assembled on site.

Normally, the timber parts of load bearing constructions are prefabricated so that only minor cutting or shaping is needed at the building site.

The main load-bearing construction of the building is made of a log frame and glulam joists. It may contain additional load-bearing components (e.g. steel girders for concentrated loads) which according to the structural analysis are required for each individual construction works.

Material and component specifications are given in Annex I.

All details of the essential construction elements are given in Annex II.

Detailed information about the assembly of the different parts is given in Annex III.

Thermal insulation materials, self-supporting composite panels for roof, windows and doors are not part of the kit, although they are generally accompanying the kit.

Profiled timber frames are placed around windows and doors for assembly on site.

Complementary parts like substructure, surface coverings, stairs, internal fittings, external facing, roofing materials, technical installations for water, heating, ventilation and electricity as well as other components necessary to form completed works are not covered by this approval.

Preparatory measures (holes) for the installation of electrical services are well foreseen.

1.2 Intended use

The kits are intended to be used as isolated residential buildings of maximum 3 storey's (including an attic). The building kits may also be used for non-residential applications when the performance requirements are those for residential buildings.

The building kits are suitable for terrain categories 0, I, II, III and IV as defined in EN 1991-1-4and for mountainous regions. The intended use shall always be evaluated in each individual case depending on the climatic boundary conditions, assuming that it satisfies the climatic conditions met in Zone B and moderate climate according to EOTA Guidance Document 003 "Assessment of working life of products".

The kits are intended to be placed on all types of foundations such as concrete slabs on ground, masonry or concrete basement walls or strip foundation.

The kits are intended to be used with every kind of external covering and are not foreseen to be directly exposed to external climatic conditions.

Adjustments depending on national regulations, regulations from other authorities, special demands from customers or specific climate conditions for the individual building may be necessary in certain cases and are then described in the design documentation for each individual work.

1.3 Assumed working life

The provisions made in this European Technical Approval are based on an assumed intended working life of the assembled kit of 50 years for the load-bearing structure and for non-accessible components and materials, and 25 years for repairable or replaceable components and materials like claddings, roofing materials, exterior trims, and integrated components like windows and doors, provided that the log building kit is subject to appropriate use and maintenance.

2 Characteristics of product and methods of verification

2.1 Mechanical resistance and stability (ER1)

The substructure is not part of the kit and shall be individually designed to correspond with the building site.

All building components which are necessary for the mechanical resistance and stability of the building, are listed in Annex II. And their load capacities are also given in Annex II.

Where required, the individual design of the building kit may be done with regard to seismic actions according to EN 1998-1.

2.2 Safety in case of fire (ER2)

2.2.1 Reaction to fire

The classification into Euroclasses according to EN 13501-1 of the components of the kit is given in Annex I. The materials, which are deemed to satisfy all of the requirements for the performance characteristic without the need for testing according to Commission Decisions, are indicated.

2.2.2 Resistance to fire

No performance determined.

The resistance to fire may be calculated according to Eurocode (EN 1995-1-2) and/or determined according to EN 13501-2.

2.2.3 External fire performance of roof covering

No performance determined. The roof covering is not part of the kit.

According to the Commission Decision 2000/553/EC , natural slates, fibre reinforced cement slates, roof tiles made from stone, concrete, clay, ceramic or steel can be considered to fulfil all of the requirements for the performance characteristic 'external fire performance' without the need for testing, subject to any national provisions on the design and execution of works being fulfilled.

2.3 Hygiene, health and the environment (ER3)

2.3.1 Vapour permeability and moisture resistance

Based on calculations according to EN ISO 13788 using normal climatic boundary conditions, the kit's external envelope has been assessed to provide adequate moisture control for the intended use taking into account the geographical restrictions specified in 1.2, provided that the building is heated during winter time.

2.3.2 Water tightness

When the kit has been properly assembled, according to the construction details shown in Annexes II and III and to the installation guide of the ETA-holder, the external envelope design has been assessed to have adequate water tightness against driving rain and snow penetration, taking into account the specifications of clause 1.2.

For protection against moisture from the substructure, water proof layers shall be installed between the substructure and the wood based components according to the construction details.

Watertight internal surfaces of wet areas as bathrooms are not part of the kit.

2.3.3 Release of dangerous substances

According to the declaration of the manufacturer, Biospeedhome building kit does not contain harmful or dangerous substances as defined in the EU database except of possibly formaldehyde.

The formaldehyde potential class of the wood based board materials has been classified E1 in accordance with EN 13986. When a glue containing formaldehyde is used, the amount of formaldehyde emitting from the seams of the glued logs is negligible.

The product used as wood preservative satisfies the requirements of Directive 98/8/EC on biocidal products.

In addition to the specific clauses relating to dangerous substances contained in this European Technical Approval, 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 the EU Construction Product Directive, these requirements need also to be complied with, when and where they apply.

2.4 Safety in use (ER4)

2.4.1 Slipperiness of floor finishes

No performance determined.

Floor finishes are not part of the kit.

2.5 Protection against noise (ER5)

2.5.1 Airborne sound insulation

No performance determined.

2.5.2 Impact sound insulation

No performance determined.

The suspended floor shall consist of a floating floor screed. In order to increase the impact sound insulation, a foam underlayment is placed between the particleboard and the screed.

2.5.3 Sound absorption

No performance determined.

2.6 Energy and heat retention (ER6)

2.6.1 Thermal resistance

Insulation materials are not part of the kit and are chosen according to the regulations applicable in the Member State in which the building is to be erected. All type of semi-rigid insulation board is accepted.

The thermal resistance R_T and the corresponding thermal transmittance coefficient U of the external building components have been determined in accordance with EN ISO 6946 and are tabulated in annex I.

The design value of thermal conductivity of the logs to be used in calculations is $\lambda = 0.13$ W/mK according to EN ISO 10456.

2.6.2 Air permeability

When the kit has been properly assembled, according to the construction details shown in Annexes II and III, the building envelope is sufficiently airtight for the intended use.

Where needed, the air permeability of the building envelope can be increased by an external membrane.

2.6.3 Thermal inertia

Density, specific heat capacity of the relevant materials and the thermal resistance are given in Annex I as a means for the designer to calculate the thermal inertia of the building.

2.7 Aspects of durability, serviceability and identification

2.7.1 Durability

When the kit has been properly assembled, according to the construction details, deterioration of materials and components during the assumed intended working life does not significantly affect the performance of the kit in relation to fulfilling all the Essential Requirements.

See also §1.2 intended use.

2.7.1.1 Biological resistance of timber material

In function of the inherent durability class of the timber components and their intended use, the timber components can be treated against timber-boring insects, fungi and blue stain.

Structural logs are in hazard class 2 according to EN 335-1.

Timber species used for logs is spruce with a natural durability class 4 regarding fungi attacks according to EN 350-2.

The sill log is treated in autoclave (A3).

2.7.1.2 Resistance to corrosion of metal fasteners

Metal fasteners and other structural connections are either inherently corrosion-resistant or are protected against corrosion according to EN 1995-1-1.

2.7.1.3 Aspects of serviceability

The stiffness of suspended floor structures is calculated according to EN 1995-1-1 (taking into account the provisions regarding vibrations of residential floors to check adequate serviceability under normal imposed loads). The load bearing capacities in Annex I consider a maximal deflection of L/300.

Suspended floors have sufficient stiffness to avoid unacceptable vibrations from normal use.

2.7.1.4 Settling of the construction

The settlement is taken into account in the design, planning and erection as well as maintenance of the construction.

The expected settling of the log building kits is about 15 mm/2 m wall height.

2.7.1.5 Identification

The building kit is identified by the CE-marking as described in clause 3.3.

The materials used in the log building kit shall be identified to their properties which have an influence to the ability of the kit to fulfil the Essential Requirements.

For the purposes of identification of the performance of kit, a specification sheet regarding the characteristics is always attached with the CE-marking. An example of a specification sheet is given in Annex IV.

3 Evaluation of conformity and CE marking

3.1 Attestation of conformity

According to the Decision 99/455/EC of the European Commission the system 1 of attestation of conformity applies.

This system of attestation of conformity is defined[7] as follows:

System 1: Certification of the conformity of the product by an approved certification body on the basis of:

a. Tasks for the ETA-holder:
   - Factory production control;
   - Further testing of samples taken at the factory by the manufacturer in accordance with a prescribed test plan;

b. Tasks for the notified body:
   - Initial type-testing of the product;
   - Initial inspection of factory and of factory production control;
   - Continuous surveillance, assessment and approval of factory production control;
   - Certification of the conformity of the log building kit.

3.2 Responsibilities

3.2.1 Tasks of the ETA-holder

3.2.1.1 Factory production control (FPC)

The ETA-holder exercises permanent internal control of the production. All the elements, requirements and provisions adopted by the ETA-holder are being documented in a systematic manner in the form of written policies and procedures. This factory production control system ensures that the products are in conformity with the European Technical Approval (ETA).

The ETA-holder shall only use such materials and components as covered in this European Technical Approval.

The factory production control shall be in accordance with a written quality manual ("Control Plan").

The personnel involved in the production process have been identified, sufficiently qualified and trained to operate and maintain the production equipment. Machinery equipment is being regularly maintained and this is being documented. All processes and procedures of production are being recorded at regular intervals.

The ETA-holder maintains a traceable documentation of the production process from purchasing or delivery of raw or basic raw materials up to the storage and delivery of finished products.

The ETA-holder proceeds to controls during the production according to specific policies. Those controls include:

- Control of the incoming raw material
  - Examination of type, quality and dimensions of all materials and components incorporated in the kit.
  - Examination of the moisture content of timber, dimensions, sort class, …
  - Archiving of the delivery notes of the incoming goods in self-monitoring.

[7] According to Council Directive (89/106/EEC) Annex III

- Control in production
  - Control of timber, cut boards, … during the assembling of the elements on basis of the plans
  - Control of wiring (empty conduits) on basis of plans
- Outgoing inspection with the loading
  - Control of completeness
  - Comparison with plans
  - Damage control

The production control system specifies how the control measures are carried out, and at which frequencies.

Products that do not comply with requirements as specified in the ETA are being separated from the conforming products and marked as such. The ETA-holder registers non-compliant production and action(-s) taken to prevent further non-conformities. External complaints are also being documented, as well as actions taken.

3.2.1.2 Testing of samples taken at the factory

No additional tests are required.

3.2.1.3 Declaration of conformity

When all the criteria of the Conformity Attestation are satisfied the manufacturer shall make a Declaration of Conformity, stating that the construction product is in conformity with the provisions of this European Technical Approval.

3.2.2 Tasks of notified bodies

3.2.2.1 Initial assessment of the product

Initial assessment of the Biospeedhome Log Building kits has been carried out by the approval body in accordance with section 6 of the ETA Guideline, and will serve as the initial product assessment for the notified body.

In general, product performance stated in the initial assessment has been characterized sufficiently to serve as a basis for subsequent quality assurance evaluations (to ascertain whether a given production lot remains well represented by the initial assessment material).

Characteristic for the product is that components of the kit may be changed from time to time provided that they fulfil the provisions set in the ETA. The adequacy of changeable components shall be proven each time by an initial assessment based on initial type testing, when this is stated in the respective harmonized product specification, or by CE marking of the component.

3.2.2.2 Initial inspection of factory and factory production control

The notified body shall conduct initial inspection of the factory in order to ensure that the ETA-holder has acceptable premises, technical equipment, qualified personnel and a factory production control system which is in accordance with the provisions in the ETA Guideline and this ETA.

3.2.2.3 Continuous surveillance, assessment and approval of the factory production control.

The notified body shall normally visit the factory at least twice a year for routine inspections, and primarily check that the production is in conformity with the factory production control plan.

The notified body shall in particular check that the manufacturer only uses materials and components which are specified in Annexes I and III of this ETA, and that all the specified case by case structural designs have been made and filed for each kit that is produced and delivered.

During the factory visits the notified body shall also inspect prefabricated elements, components and material made ready for shipment to the building site, and that the kits and assembly instructions are in conformity with the construction details in Annex II.

Continuous surveillance of factory production control necessary to ensure continuing conformity with the ETA has to be performed according to control plan.

3.2.2.4 Certification

When all the criteria of the Conformity Attestation are satisfied the notified body shall issue an EC Certificate of Conformity with this European Technical Approval.

In cases where the provisions of the European Technical Approval and the prescribed test plan are no longer fulfilled the Certification of Conformity shall be withdrawn.

3.3 CE marking

3.3.1 General

The CE marking shall be affixed on the commercial document(s) accompanying the product. In accordance with ETAG 012, the required information to accompany the CE symbol is:

- identification number of the notified body;
- the name or identifying mark of the ETA-holder and the registered address;
- last two digits of the year in which the marking was affixed;
- the number of the EC certificate of conformity;
- reference to the ETAG 012;
- number of the European Technical Approval
- Trade name of the product
- Identification of the components,

3.3.2 Example of CE marking:

See annex IV of this ETA

4 Assumptions under which the fitness of the product for the intended use was favourably assessed

4.1 Design and local building regulations

The production of components for the log building kits shall be done on the basis of a design made for each individual delivery.

The design process shall comply with the building regulations applicable in the Member State in which the building is to be erected and normally take into account the following:

- Requirements for structural design;
- Fire safety requirements;
- Special local requirements related to health and the environment;
- Safety in use requirements;
- Noise protection requirements;
- Energy saving requirements.

4.2 Manufacturing

All production is performed in dry, heated industrial halls. The materials being included in the kits are stored indoors under favourable conditions.

The kit is manufactured in accordance with the provisions of this ETA using the manufacturing process as identified during the inspection of the manufacturing plants by the approval body and laid down in the technical documentation.

4.3 Requirements for the substructure

This European Technical Approval does not comprise the substructure of the building.

A plan drawing with the dimensions and schematic details of the substructure are delivered by the ETA-holder. The substructure shall be individually designed according to the local building regulations to correspond to the building site.

The maximum required tolerances of the substructure dimensions are ± 10 mm. The maximum required tolerances of the substructure levelling are ± 10 mm on 10 m long.

A waterproof membrane shall be installed between the substructure and the wood based components according to the construction details.

4.4 Installation

Before the installation verification shall be performed to ensure that the components of the kit are not damaged during transport or storage. Damaged components and materials should be replaced by sound ones.

The kits are erected according to the relevant design description in Annex II,

The ETA-holder provides a general manual for the installation of the kit covering:

- Erection techniques and necessary equipment
- Temporary bracing and weather protection
- Completion of joints between kit components (structural fixing, weather sealing etc.)
- Measures taken to limit settlement of log walls
- Fixing of wind and any seismic anchorage to the substructure and between building parts
- Additional materials and components applied on the site, and which are a precondition for the fitness in use of the kit.
- protection against weather during erection

The completed building (the works) shall comply with the building regulations (regulations on the works) applicable in the Member States in which the building is to be constructed. The procedures foreseen in the Member State for demonstrating compliance with the building regulations shall also be followed by the entity held responsible for this act. The European Technical Approval does not amend this process in any way.

5 Recommendations

5.1 Recommendations on packaging, transport and storage

The ETA-holder's instructions regarding transport and storage shall be followed.

The components and materials shall be protected against harmful wetting during transport and storage.

The components shall not be lifted or stored in such a way that they will be damaged e.g. because of local stresses due to dead load or excessive bending deformation.

Before the installation, it shall be verified that the components of the building kit have not been damaged during transport or storage. Damaged components and materials shall be replaced by sound ones.

5.2 Recommendations on use, maintenance, repair

It is the responsibility of the ETA-holder to ensure that proper information for the use of the building kit is available at each delivery, including general guidance on the basis of this ETA and the specific installation plans and construction details mentioned in clause 4.4.

If there is a need to modify or repair the construction, this may be done if allowed for in the installation plans mentioned in clause 4.4. In any other case, modifications are allowed only upon written consent by the ETA-holder.

To retain its performance and to obtain the estimated working life, it is assumed that a log building kit needs certain regular maintenance. The type and frequency of such maintenance are specified in a manual.

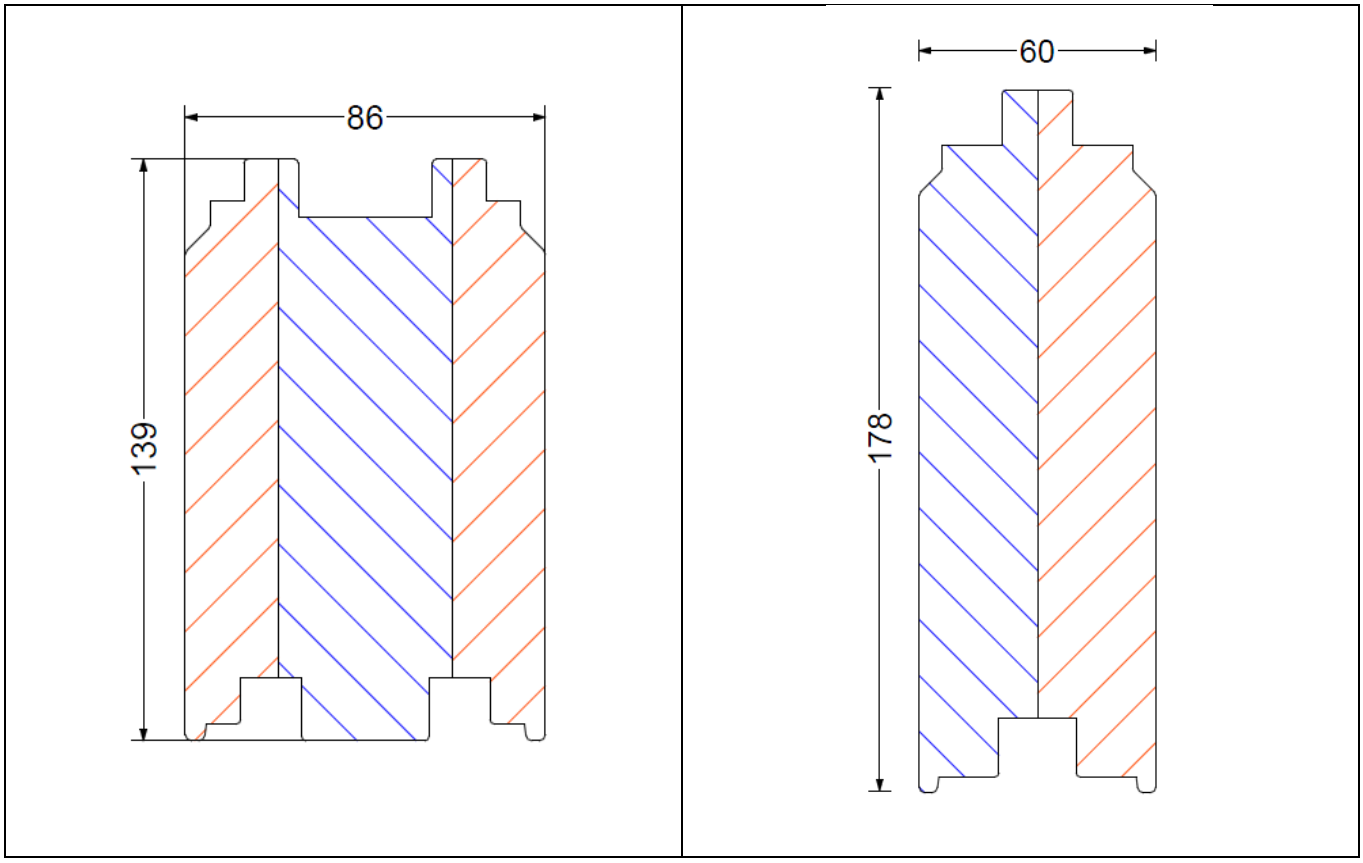
Annex I
Materials specification

This Annex presents more detailed information about the materials used in Biospeedhome log building kit.

I.1 Main parts of the building kits

The log frame is made of spruce laminated logs made up by gluing (using timber classified C24 in accordance with EN 338).

Biospeedhome proposes two different sizes for logs: 86 x 125 mm (3 ply) and 60 x 160 mm (2 ply)



The maximum length of the logs is 5.1 m.

The dimensions given are nominal; minor deviations may be caused by manufacturing technology and fluctuations in moisture.

The moisture content in solid wood materials shall be maximum 14% on average.

The elements constituting the logs are planed and stuck. Then the logs are shaped.

The glue used in laminated logs is classified according to EN 301 to be of type 1.

The timber components are treated against timber-boring insects and fungi.

I.2 Materials

The following materials and components could be part of the kit and the delivery:

	Material	Technical Specification	Class	Dimensions [mm]	Thermal conductivity λ [W/mK]	Density ρ [kg/m³]	Reaction to fire	Water vapour resistance	Air tightness	specific heat capacity c [kJ/kgK]	comment
WOOD AND WOOD-BASED PRODUCTS											
1	Logs	EN 14080		86x125 60x160	0.13	350	D-s2, d0[8]	50		1.6	Glued laminated solid timber classified C24
2	Joist	EN 14080 EN 1194 EN 386	GL24h	65x220 65x260							
3	Roof main beams	EN 14080									
4	Stiffeners	EN 14081		80x120							Glued laminated solid timber
5	Roof truss	EN 14250					D-s2, d0[9]				
6	KVH 60/220										slope 1 cm/m
	Wood-based panels	EN 13986									
7	Melamine faced particle board	EN 14322 EN 312	Type 5	18	0.13	700	D-s2, d0[10]			1.7	Formaldehyde rate :Class E1 (≤ 8 mg/100g)
8	OSB	EN 300	Type 3	18	0.13	600	D-s2, d0[11]	50			Formaldehyde rate :class E1 (≤ 8 mg/100g)
CONNECTIONS/FASTENERS											
	Wall ties	EN 845-1									Exposure class MX3
	Metal Strip										
	Angle plate										Galvanized
	Screws, nails, Bolts	EN 14592 EN 14545									
	Glue	EN 301									

[8]Commission Decision 2003/593/EC
[9]Commission Decision 2003/593/EC
[10]Commission Decision 2003/43/EC
[11]Commission Decision 2003/43/EC

Annex II
Specification of the components

This Annex presents more detailed information (constitution, mechanical capacities, thermal capacities …) regarding the components of Biospeedhome log building kit.

II.1 External wall

Biospeedhome proposes two possible thicknesses of logs (see annex I) for the external wall.

The usual height of the external wall is 2625 mm.

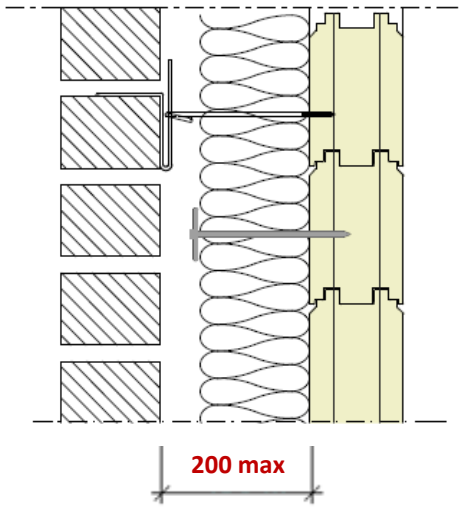
All wall elements are prefabricated in the factory according to the design of the building. Necessary openings for the assembly on site and preparatory measures (holes) for the installation of electrical services are foreseen.

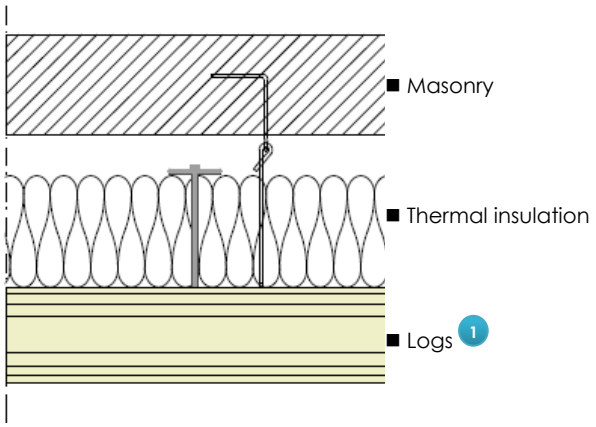
II.1.1 External wall configuration 1 (logs of 86 mm thick)

II.1.1.1 Description

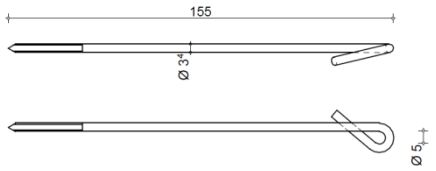
External cladding is not part of the kit but detail of each possibility is given below.

with brick cladding

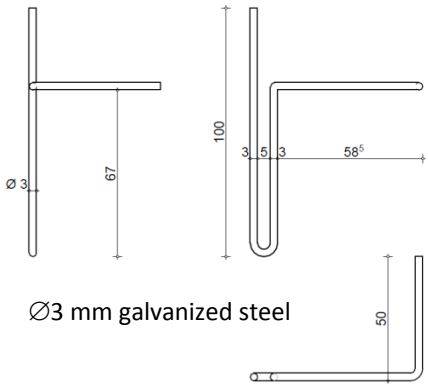




Detail of the wall ties



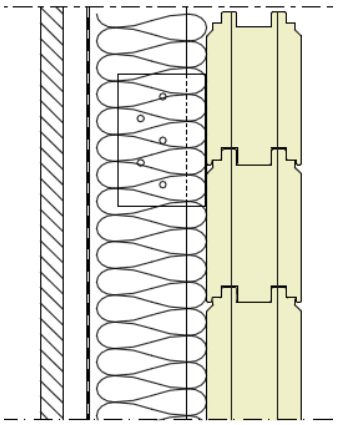
180 x ∅3.4 mm galvanized steel
(30 mm threaded)

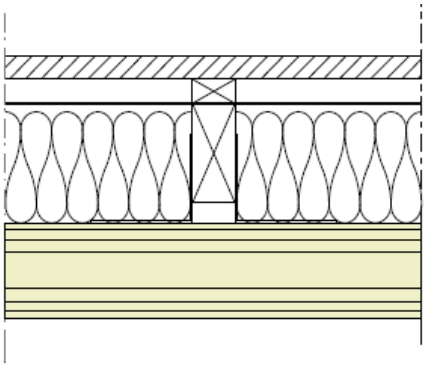


∅3 mm galvanized steel

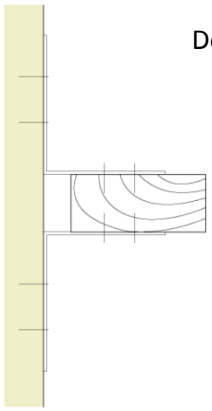
ETA Biospeedhome log building

With horizontal timber cladding



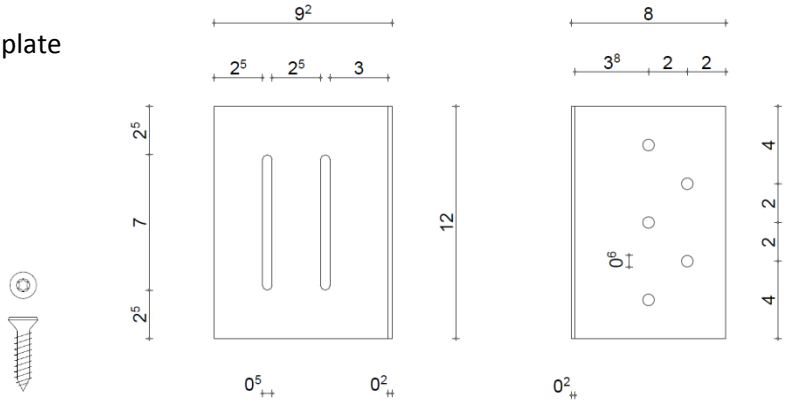


- External cladding
- Lath20x40mm
- Wind barrier
- Vertical stud CLS 38x89 or 38x140 (for thermal insul.> 100 mm) fixed by angle plate
- Thermal insulation
- Logs 1

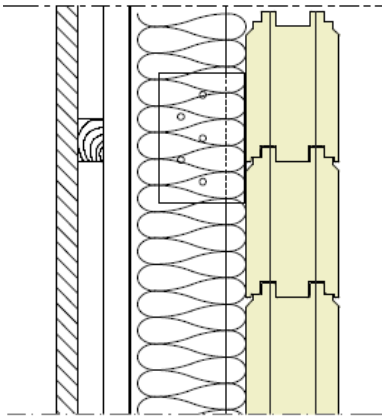


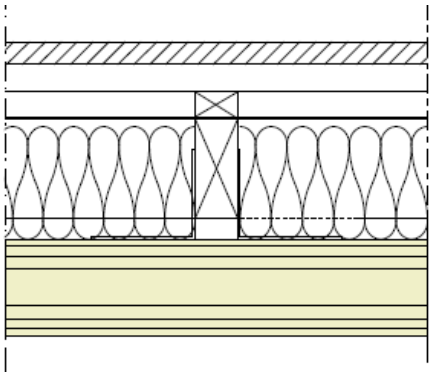
Detail of the angle plate

Screw 5 x 30



With vertical timber cladding

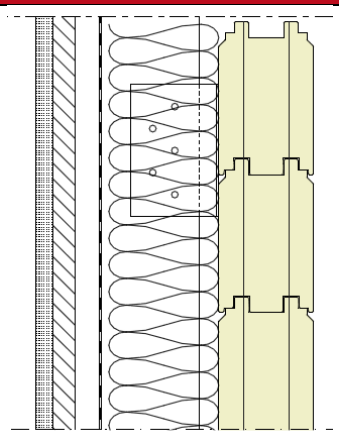


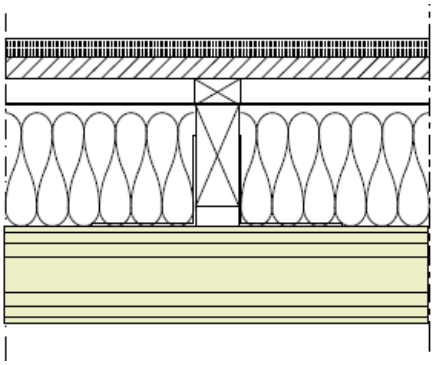


- External cladding
- Horizontal battens 20x40 mm
- Vertical battens 20x40 mm
- Wind barrier
- Vertical stud CLS 38x89 or 38x140 (for thermal insul.> 100 mm) fixed by angle plate
- Thermal insulation
- Logs 1

ETA Biospeedhome log building

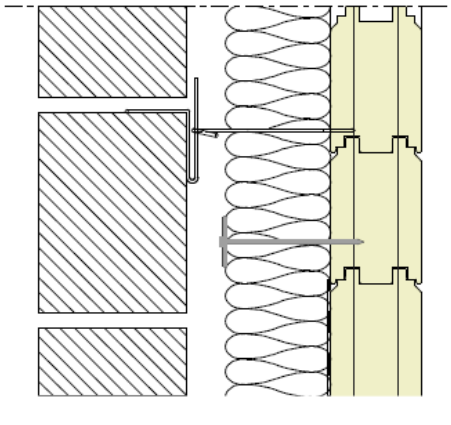
With render boards

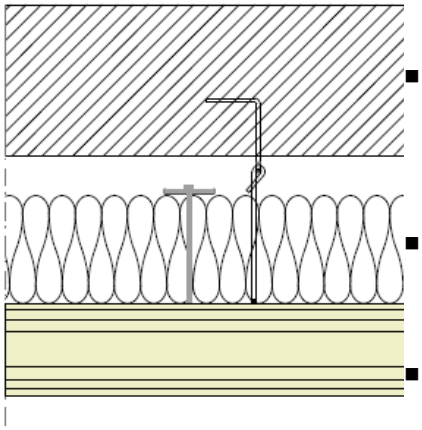




- Render
- Render board
- Vertical battens
- Wind barrier
- Vertical stud CLS 8x89 or 38x140 (for thermal insul.> 100 mm) fixed by angle plate
- Thermal insulation
- Logs [1]

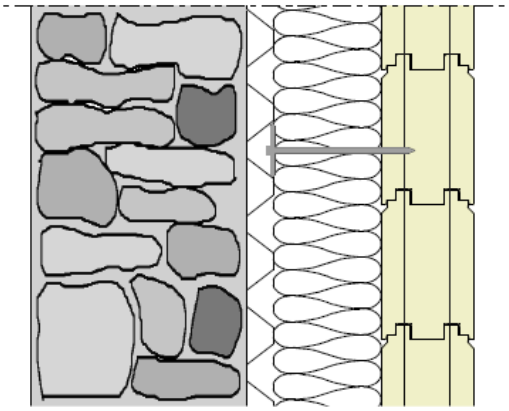
With blocks for render finishing, cement finishing, reconstituted stone finishing, …

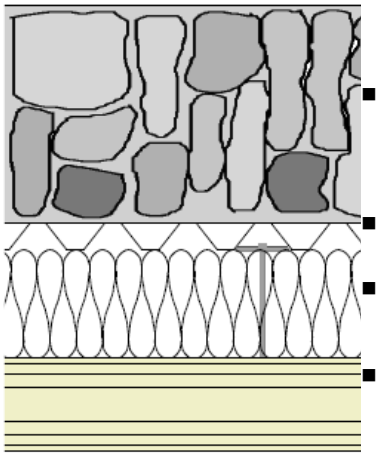




- Concrete masonry blocks
- Thermal insulation
- Logs [1]

With natural stone cladding

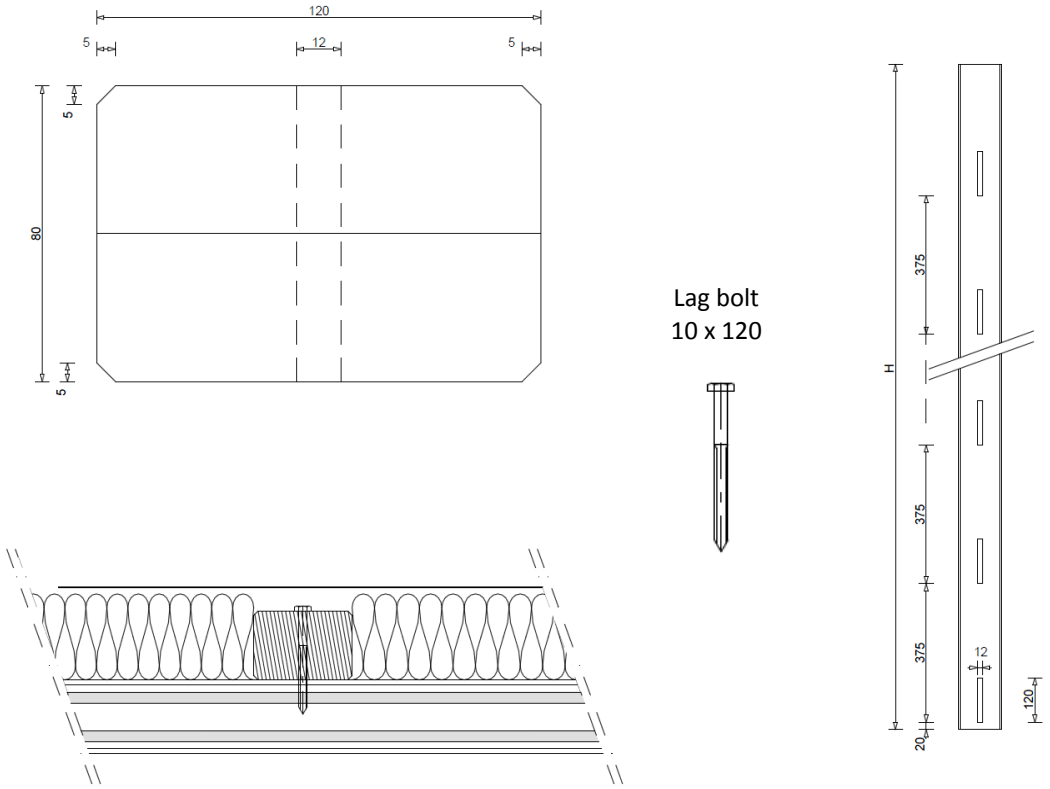




- Natural stone
- Dimpled membrane
- Thermal insulation
- Logs [1]

Stiffeners, placed on the outer face of the log wall, are used to increase the mechanical resistance of the wall. Elongated holes are foreseen to allow settlement.

Stiffener 4



II.1.1.2 Mechanical capacity

Vertical design resistance for medium and long term loading

Span between transvers walls (m)	Connection type 1		Connection type 2	
	q_d (kN/m) - medium term	q_d (kN/m) - long term	q_d (kN/m) - medium term	q_d (kN/m) - long term
3,5	12,5	10,9	19,9	17,4
4,0	9,6	8,4	15,2	13,3
4,5	7,8	6,8	12,2	10,7
5,0	6,7	5,9	10,4	9,1

Connection type1 is shown on page 29 and connection type2 is shown on page 30.

The tabulated value is a design value which is a result of a load combination. Only vertical loads are considered in the load combination. The load combination can be computed as:

$$q_d = 1{,}35 \times q_{g,k} + 1{,}50 \times q_{Q,k,1} + 1{,}50 \times \left(\Sigma_{i>1} \psi_{0,i} \times q_{Q,k,i} \right)$$

where $q_{g,k}$ is the characteristic value of the permanent load, $q_{Q,k,i}$ are the characteristic values of the variable loads and $\psi_{0,i}$ the factor for combination of variable loads. The variable loads are considered to be medium term.

The design value is calculated for service class 2.

The tabulated values are those for standard wall configurations. The wall height is 2600 mm. The values are obtained using a second order calculation model with an initial eccentricity of e =B/4. For other eccentricities, the design resistance can be calculated by the manufacturer.

The tabulated values do not take into any stiffening of the wall. If necessary, the design capacity is improved by adding steel tubes or wooden stiffeners to the wall.

Vertical design resistance in combination with horizontal loads can be calculated. The effect of the horizontal load is taken into account in the second order calculation of the wall.

II.1.1.3 Thermal capacity

The thermal resistance of the wall is mainly defined by the choice of insulation material. According to the regulations applicable in the Member State in which the building is to be erected, the appropriate insulation material is chosen.
The Biospeedhome log building kit allows semi-rigid thermal insulation boards up to 160 mm thick for the external walls.
The design value of thermal conductivity of the logs used for calculations is λ = 0.13 W/mK according to EN ISO 10456.
The following tables give the thermal resistance (m²K/W) and the thermal transmittance (W/m²K) for the external wall configuration 1.

Table 1 - Thermal transmittance of the external wall configuration 1

U [W/m²K]	Thickness [cm]				
λ_d [W/mK]	8	10	12	14	16
0.020	0,21	0,17	0,15	0,13	0,11
0.025	0,25	0,21	0,18	0,16	0,14
0.030	0,29	0,24	0,21	0,18	0,16
0.035	0,32	0,27	0,24	0,21	0,19
0.040	0,36	0,30	0,26	0,23	0,21
0.045	0,39	0,33	0,29	0,25	0,23
0.050	0,41	0,36	0,31	0,28	0,25

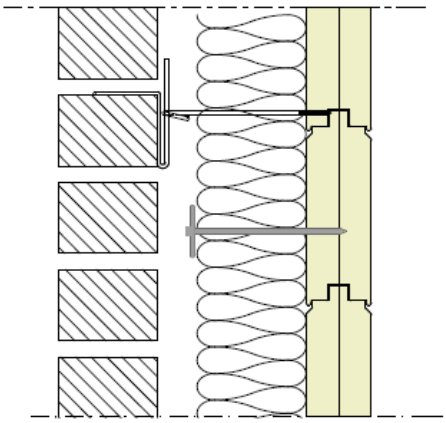
Table 2 - Thermal resistance of the external wall configuration 1

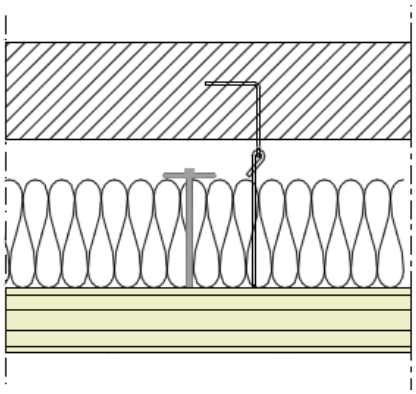
R_T[m²K/W]	Thickness [cm]				
λ_d [W/mK]	8	10	12	14	16
0.020	4,81	5,81	6,81	7,81	8,81
0.025	4,01	4,81	5,61	6,41	7,21
0.030	3,48	4,14	4,81	5,48	6,14
0.035	3,10	3,67	4,24	4,81	5,38
0.040	2,81	3,31	3,81	4,31	4,81
0.045	2,59	3,03	3,48	3,92	4,37
0.050	2,41	2,81	3,21	3,61	4,01

II.1.2 External wall configuration 2 (logs of 60 mm thick)

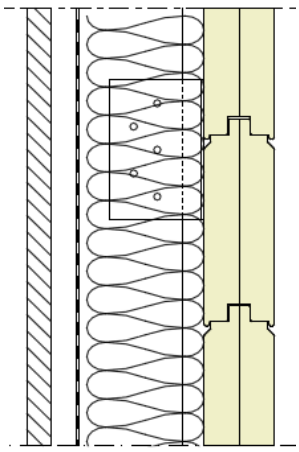
II.1.2.1 Description

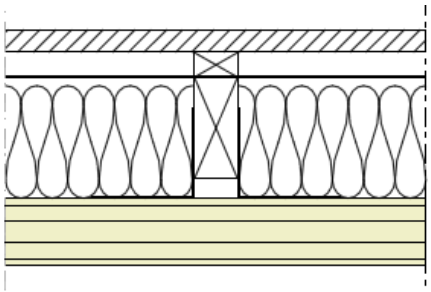
with brick cladding



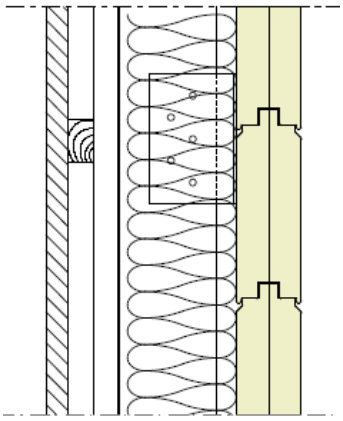


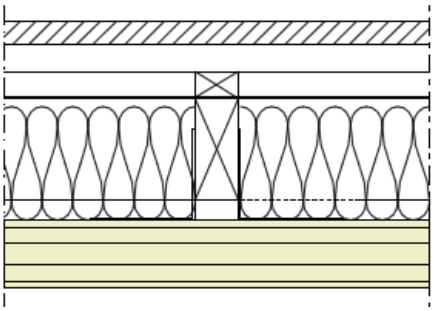
With horizontal timber cladding





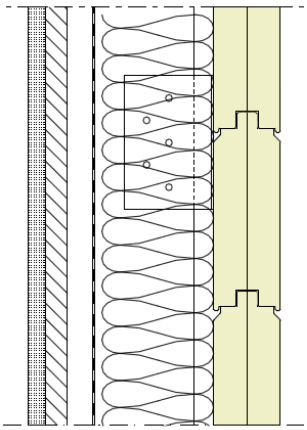
With vertical timber cladding

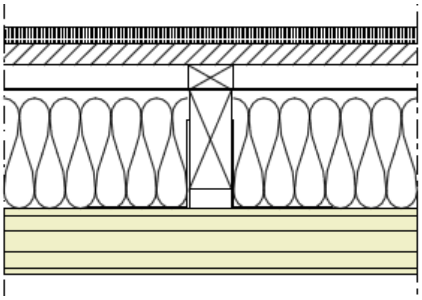




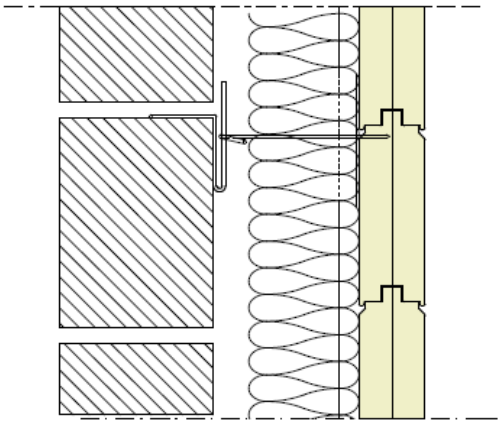
ETA Biospeedhome log building

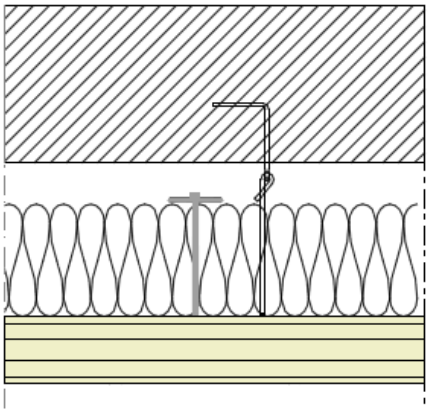
With render panel



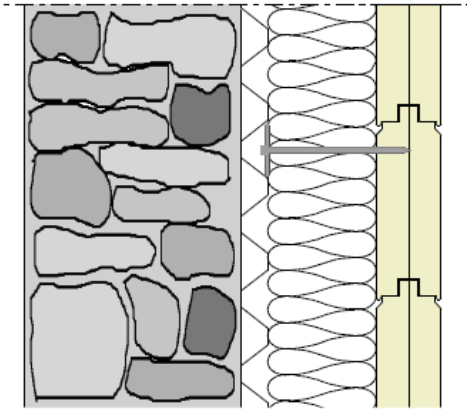


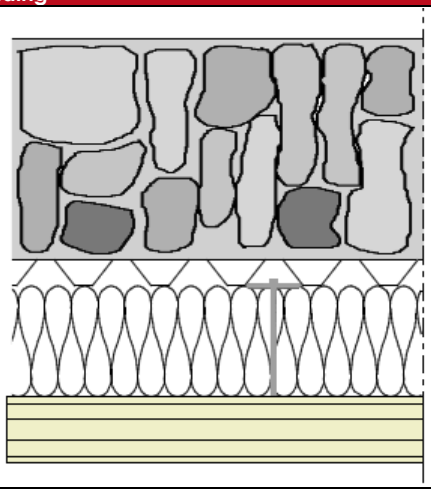
With blocks for plaster finishing, cement finishing, reconstituted stone finishing, …





With natural stone cladding





II.1.2.2 Mechanical capacity

Vertical design resistance for medium and long term loading

Span between transvers walls (m)	Connection type 1		Connection type 2	
	q_d (kN/m) - medium term	q_d (kN/m) - long term	q_d (kN/m) - medium term	q_d (kN/m) - long term
3,5	13,8	12,1	11,3	9,9
4,0	10,0	8,7	8,1	7,1
4,5	7,8	6,8	6,3	5,5
5,0	6,4	5,6	5,2	4,6

Connection type1 is shown on page 31 and connection type2 is shown on page 32.

The tabulated value is a design value which is a result of a load combination. Only vertical loads are considered in the load combination. The load combination can be computed as:

$$q_d = 1{,}35 \times q_{g,k} + 1{,}50 \times q_{Q,k,1} + 1{,}50 \times \left(\Sigma_{i>1} \psi_{0,i} \times q_{Q,k,i} \right)$$

where $q_{g,k}$ is the characteristic value of the permanent load, $q_{Q,k,i}$ are the characteristic values of the variable loads and $\psi_{0,i}$ the factor for combination of variable loads. The variable loads are considered to be medium term.

The design value is calculated for service class 2.

The tabulated values are those for standard wall configurations. The wall height is 2600 mm. The values are obtained using a second order calculation model with an initial eccentricity of e =B/4. For other eccentricities, the design resistance can be calculated by the manufacturer.

The tabulated values do not take into any stiffening of the wall. If necessary, the design capacity is improved by adding steel tubes or wooden stiffeners to the wall.

Vertical design resistance in combination with horizontal loads can be calculated. The effect of the horizontal load is taken into account in the second order calculation of the wall.

II.1.2.3 Thermal capacity

The thermal resistance of the wall is mainly defined by the choice of insulation material. According to the regulations applicable in the Member State in which the building is to be erected, the appropriate insulation material is chosen.
The Biospeedhome log building kit allows semi-rigid thermal insulation boards up to 160 mm thick for the external walls.
The design value of thermal conductivity of the logs used for calculations is λ = 0.13 W/mK according to EN ISO 10456.
The following tables give the thermal resistance (m²K/W) and the thermal transmittance (W/m²K) for the external wall configuration 2.

Table 3 - Thermal transmittance of the external wall configuration 2

U [W/m²K]	Thickness [cm]				
λ_d [W/mK]	8	10	12	14	16
0.020	0,22	0,18	0,15	0,13	0,12
0.025	0,26	0,22	0,18	0,16	0,14
0.030	0,31	0,25	0,22	0,19	0,17
0.035	0,35	0,29	0,25	0,22	0,19
0.040	0,38	0,32	0,28	0,24	0,22
0.045	0,42	0,35	0,31	0,27	0,24
0.050	0,45	0,38	0,33	0,29	0,26

Table 4 - Thermal resistance of the external wall configuration 2

R_T[m²K/W]	Thickness [cm]				
λ_d [W/mK]	8	10	12	14	16
0.020	4,61	5,61	6,61	7,61	8,61
0.025	3,81	4,61	5,41	6,21	7,01
0.030	3,28	3,94	4,61	5,28	5,94
0.035	2,90	3,47	4,04	4,61	5,18
0.040	2,61	3,11	3,61	4,11	4,61
0.045	2,39	2,83	3,28	3,72	4,17
0.050	2,21	2,61	3,01	3,41	3,81

II.2 Internal wall

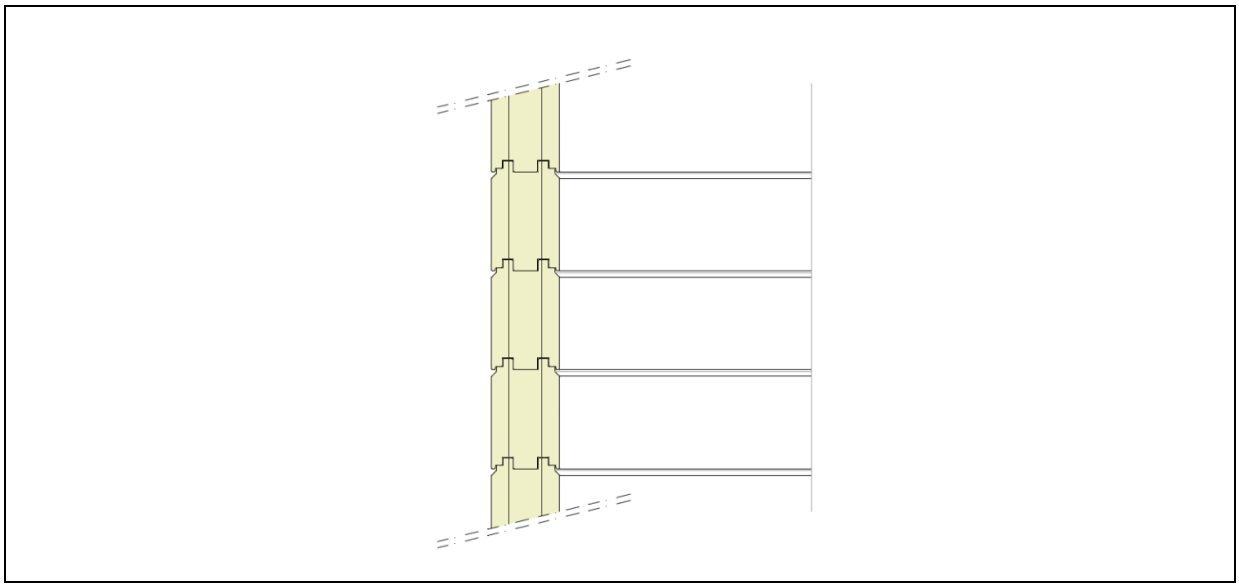
Biospeedhome uses two possible thicknesses of logs (see annex I) for the internal wall.

The usual height of the internal wall is 2625 mm.

All internal walls are prefabricated in the factory according to the design of the building. Necessary openings for assembly on site are foreseen

II.2.1 Internal wall configuration 1 (logs of 86 mm thick)

II.2.1.1 Description

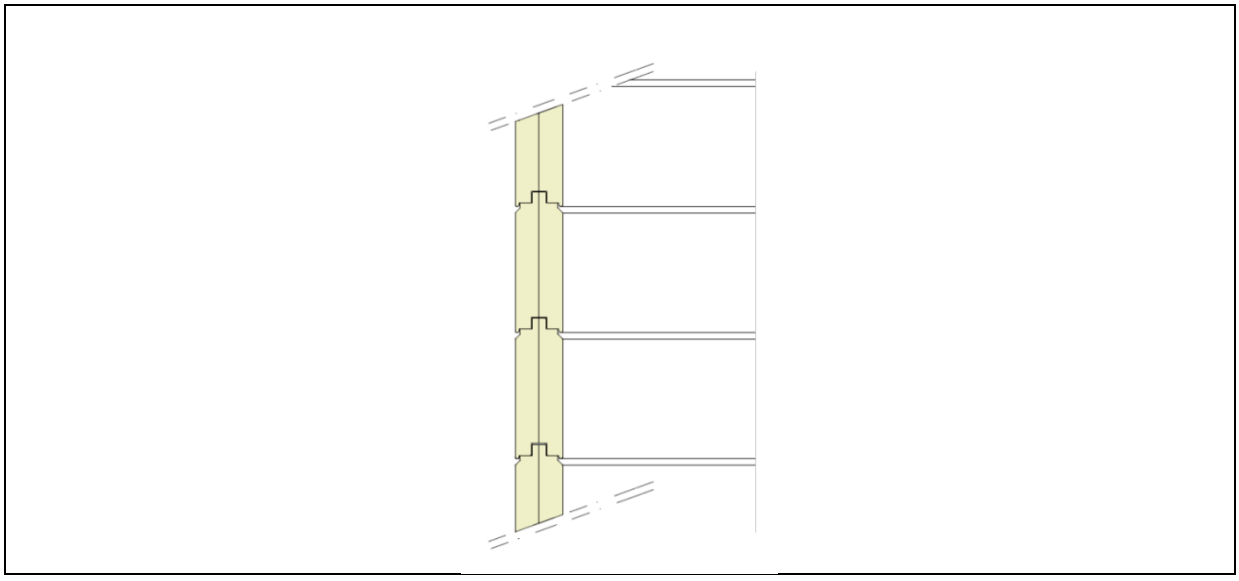


II.2.1.2 Mechanical capacity (only for load bearing wall)

See II.1

II.2.2 Internal wall configuration 2 (logs of 60 mm thick)

II.2.2.1 Description

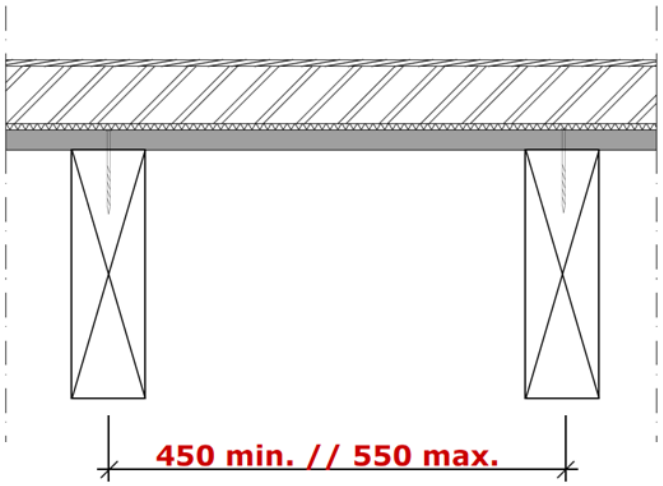


II.2.2.2 Mechanical capacity (only for load bearing wall)

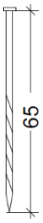
See II.1

II.3 Suspended floor

II.3.1 Description



- Floor finishing
- Concrete screed 60 mm
- Acoustical insulation
- water-resistant melamine faced particleboards 18 mm 7
- White spruce glulam joist 2 65 x 220 or 65 x 260 (according to calculation)



Particle boards are fixed to the joists with twisted nail 3.5 x 65 mm every 300 mm

The ceiling could also be finished with plaster boards on lathing.

II.3.2 Mechanical capacity

The following table gives the net vertical uniformly distributed medium – term imposed floor load resistance in kN/m². The tabulated value is a characteristic value for the imposed load, given a permanent load g = 1.90 kN/m². The value also guarantees a deflection limited to L/250 or L/500. The calculations are performed in service class 1. In special cases, the load bearing capacity of the suspended floor may differ from the tabulated values. In that case a specific calculation note is provided.

q_k (kN/m²)	JOIST GL24h 65 mm x 220 mm						JOIST GL24h 65 mm x 260 mm					
	Spacing (mm)						Spacing					
	450		500		550		450		500		550	
Span (m)	L/250	L/500	L/250	L/500	L/250	L/500	L/250	L/500	L/250	L/500	L/250	L/500
3,00	8,49	4,59	7,47	3,87	6,63	3,29	10,68	9,26	9,44	8,07	8,43	7,10
3,25	6,98	3,06	6,11	2,50	5,40	2,04	9,72	6,73	8,58	5,80	7,65	5,04
3,50	5,78	1,94	5,03	1,49	4,42	-	8,75	4,87	7,71	4,13	6,85	3,52
3,75	4,76	-	4,03	-	3,43	-	7,41	3,48	6,49	2,88	5,75	2,38
4,00	3,47	-	2,87	-	2,37	-	6,30	2,42	5,50	1,92	4,85	1,51
4,25	2,47	-	1,96	-	1,55	-	5,39	1,59	4,68	-	4,10	-
4,50	1,67	-	1,25	-	-	-	4,44	-	3,73	-	3,16	-
4,75	-	-	-	-	-	-	3,39	-	2,79	-	2,30	-
5,00	-	-	-	-	-	-	2,53	-	2,02	-	1,61	-
5,25	-	-	-	-	-	-	1,84	-	1,40	-	-	-
5,50	-	-	-	-	-	-	1,26	-	-	-	-	-

The following table gives the vertical local concentrated medium term imposed floor load resistance in kN/m². The tabulated value is a characteristic value for the imposed load, given a permanent load g = 1,90 kN/m². The value also guarantees a deflection limited to L/250 or L/500. The calculations are performed in service class 1. . In special cases, the load bearing capacity of the suspended floor may differ from the tabulated values. In that case a specific calculation note is provided.

Qk (kN)	JOIST GL24h 65 mm x 220 mm						JOIST GL24h 65 mm x 260 mm					
	Spacing (mm)						Spacing					
	450		500		550		450		500		550	
Span (m)	L/250	L/500	L/250	L/500	L/250	L/500	L/250	L/500	L/250	L/500	L/250	L/500
3,00	5,73	3,87	5,60	3,63	5,47	3,39	7,21	7,21	7,08	7,08	6,95	6,95
3,25	5,10	2,80	4,96	2,54	4,83	2,28	7,11	6,15	6,97	5,89	6,83	5,63
3,50	4,55	1,91	4,40	1,63	4,25	1,34	6,89	4,80	6,74	4,52	6,59	4,23
3,75	4,06	-	3,90	-	3,74	-	6,25	3,67	6,09	3,37	5,93	3,07
4,00	3,62	-	3,45	-	3,26	-	5,67	2,72	5,50	2,40	5,33	2,07
4,25	2,95	-	2,61	-	2,26	-	5,15	1,89	4,97	1,55	4,79	1,21
4,50	2,12	-	1,75	-	1,39	-	4,68	-	4,49	-	4,29	-
4,75	1,38	-	-	-	-	-	4,24	-	4,04	-	3,76	-
5,00	-	-	-	-	-	-	3,56	-	3,16	-	2,76	-
5,25	-	-	-	-	-	-	2,72	-	2,29	-	1,87	-
5,50	-	-	-	-	-	-	1,96	-	1,51	-	-	-

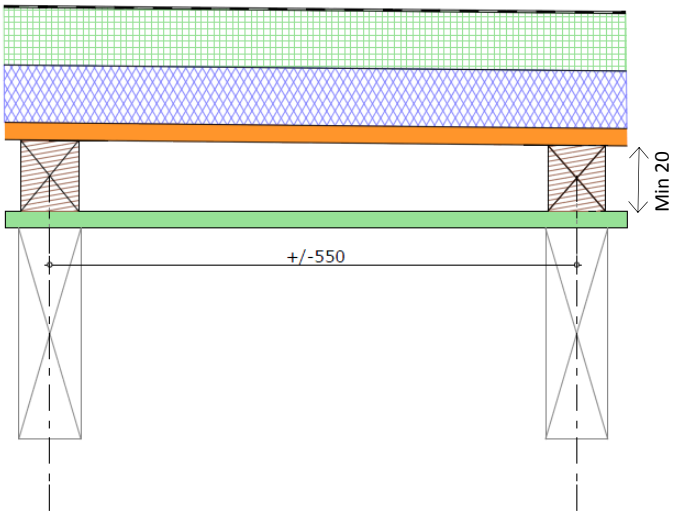
The following table gives the design value of the maximal bearing load. This value is a result of a load combination. In special cases, the connection to the wall can be improved resulting in better capacities. In that case, the bearing capacity can be calculated by the manufacturer.

R_d (kN) Joists	Logs 86 mm	Logs 60 mm
65 x 220	6,6	4,6
65 x 260	6,1	4,6

II.4 Roof

II.4.1 Flat roof

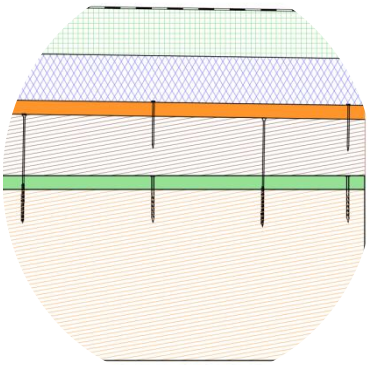
II.4.1.1 Description



- EPDM membrane
- Thermal insulation (e.g. PUR 60 mm)
- Thermal insulation (e.g. MW 60 mm)
- OSB 18 mm 8
- KVH 60/220 (slope 1 cm/m) 6
- Water-resistant melamine faced particleboard 18 mm 7
- White spruce glulam joist 2

The following fasteners are used:

Building material	Fasterner	Spacing (mm)*
particleboard 18 mm	twisted nails 3.5 x 55 mm	300
KVH	Torx screws 5x100, 6x140 or 6x180	
OSB	Galvanised nails 4 x 61 mm	



II.4.1.2 Mechanical capacity

The following table gives the net vertical uniformly distributed rood load for short term loading, assuming the roof simply supported at two points. The tabulated value is the characteristic value for the imposed load, given a permanent load g=0,5 kN/m². The load value guarantees a deflection limited to L/250 or L/500. The spacing between the joists is 550 mm. The calculation is performed in service class 2. In special cases, the load bearing capacity of the flat roof may differ from the tabulated values. In that case a specific calculation note is provided.

q_k (kN/m²)	JOIST C24 60 mm x 220 mm	
Span (m)	L/250	L/500
3,00	8,21	5,16
3,25	6,93	3,86
3,50	5,92	2,91
3,75	5,10	2,20
4,00	4,21	1,66
4,25	3,36	1,23
4,50	2,69	-
4,75	2,15	-
5,00	1,72	-
5,25	1,36	-

II.4.1.3 Thermal capacity

The thermal resistance of the roof is mainly defined by the choice of insulation material. According to the regulations applicable in the Member State in which the building is to be erected, the appropriate insulation material is chosen.

Biospeedhome log building kit allows all kind of insulation aimed for flat roof.
The design value of thermal conductivity of the joist used for calculations is λ = 0.13 W/mK according to EN ISO 10456.
The following tables give the thermal resistance (m²K/W) and the thermal transmittance (W/m²K) for the flat roof.

Table 5 Thermal transmittance of the flat roof

	Thickness [cm]								
λ_d [W/mK]	8	10	12	14	16	18	20	22	24
0.020	0,22	0,18	0,15	0,13	0,12	0,11	0,10	0,09	0,08
0.025	0,27	0,22	0,19	0,16	0,15	0,13	0,12	0,11	0,10
0.030	0,32	0,26	0,22	0,19	0,17	0,15	0,14	0,13	0,12
0.035	0,36	0,30	0,26	0,22	0,20	0,18	0,16	0,15	0,14
0.040	0,40	0,34	0,29	0,25	0,22	0,20	0,18	0,17	0,15
0.045	0,44	0,37	0,32	0,28	0,25	0,22	0,20	0,19	0,17
0.050	0,48	0,40	0,35	0,31	0,27	0,25	0,22	0,21	0,19

Table 6 - Thermal resistance of the flat roof

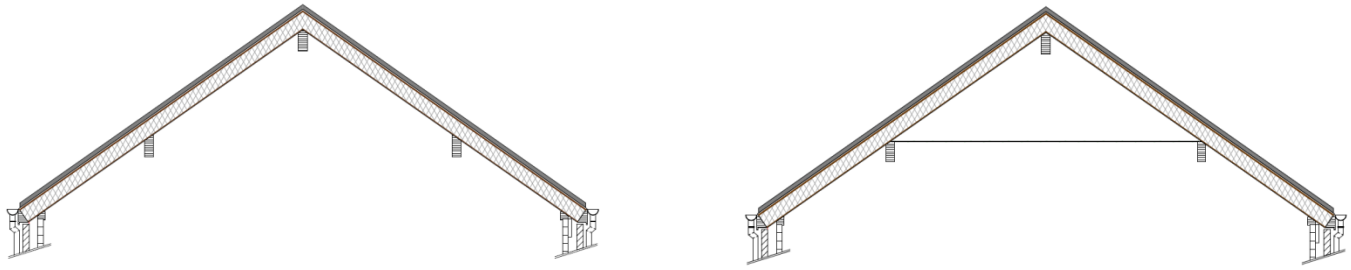
	Thickness [cm]								
λ_d [W/mK]	8	10	12	14	16	18	20	22	24
0.020	4,473	5,473	6,473	7,473	8,473	9,473	10,473	11,473	12,473
0.025	3,673	4,473	5,273	6,073	6,873	7,673	8,473	9,273	10,073
0.030	3,140	3,806	4,473	5,140	5,806	6,473	7,140	7,806	8,473
0.035	2,759	3,330	3,901	4,473	5,044	5,616	6,187	6,759	7,330
0.040	2,473	2,973	3,473	3,973	4,473	4,973	5,473	5,973	6,473
0.045	2,251	2,695	3,140	3,584	4,028	4,473	4,917	5,362	5,806
0.050	2,073	2,473	2,873	3,273	3,673	4,073	4,473	4,873	5,273

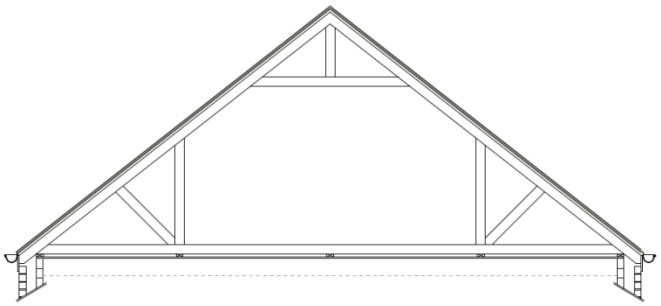
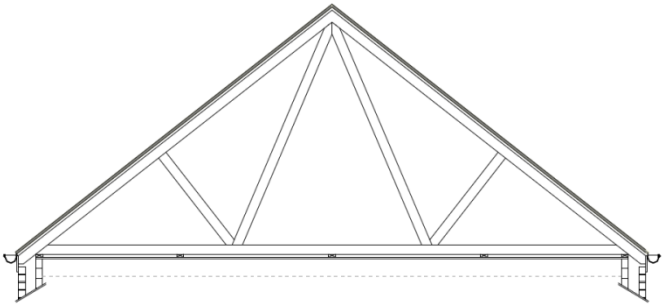
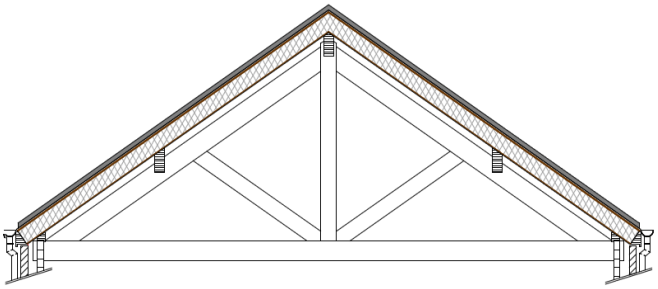
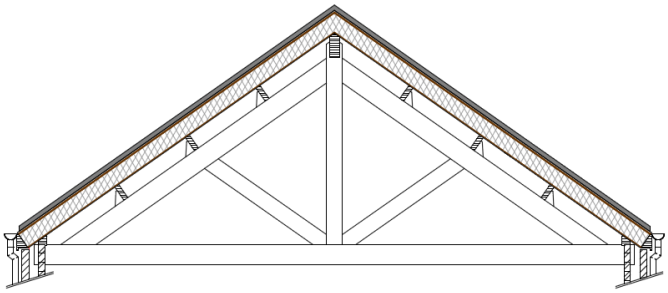
II.4.2 Inclined roof

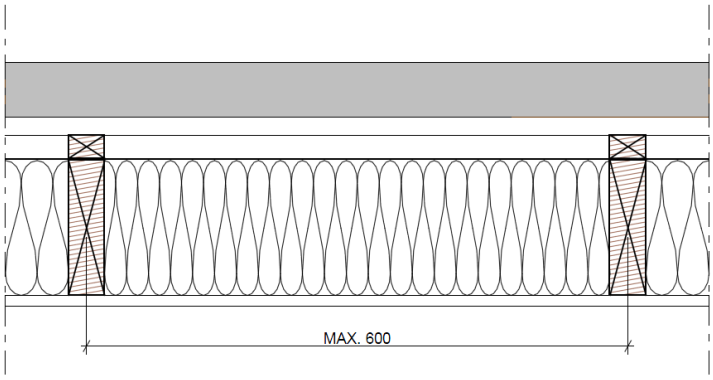
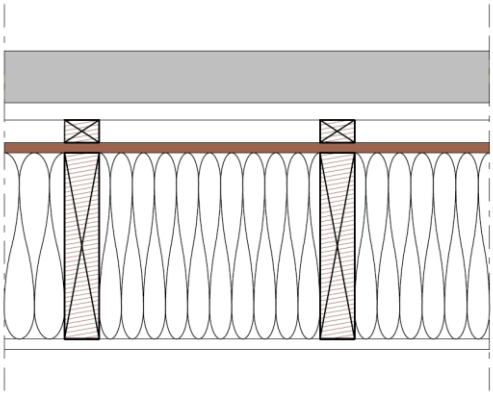
Biospeedhome proposes three possible configurations for inclined roof: self-supporting composite panels, prefabricated roof truss or traditional roof truss.

II.4.2.1 Description

Self-supporting composite panels



Prefabricated roof truss with usable roof space	Prefabricated roof trusswith unusable roof space
	
Traditional roof truss (with self-supporting composite panels)	
	

Inclined roof with prefabricated roof truss	
	■Roof covering ■Lathing ■ Roof underlay ■Roof trusses 5 ■ Thermal insulation (between rafters) ■ceiling finishing
Inclined roof with self-supporting composite panel	
	■ Roof covering ■ Lathing ■Self-supporting composite panels

II.4.2.2 Mechanical capacity

The mechanical capacity of the roof configuration is depending on the design of the roof and can be calculated using Eurocodes.

II.4.2.3 Thermal capacity

The thermal resistance of the roof is mainly defined by the choice of insulation material. According to the regulations applicable in the Member State in which the building is to be erected, the appropriate insulation material is chosen.
In case of self-supporting composite panels, the thermal resistance of the roof is determined by the thermal resistance of the composite panels.
In case of prefabricated truss, Biospeedhome log building kit allows all kind of semi-rigid insulation panels and rolls.
The design value of thermal conductivity of the truss used for calculations is λ = 0.13 W/mK according to EN ISO 10456.
The following tables give the thermal resistance (m²K/W) and the thermal transmittance (W/m²K) for the inclined roof.

Table 7 Thermal transmittance of the inclined roof with prefabricated roof truss

	Thickness [cm]								
λ_d [W/mK]	8	10	12	14	16	18	20	22	24
0.020	0,22	0,19	0,16	0,14	0,12	0,11	0,10	0,09	0,08
0.025	0,27	0,22	0,19	0,17	0,15	0,14	0,12	0,11	0,10
0.030	0,31	0,26	0,22	0,20	0,18	0,16	0,14	0,13	0,12
0.035	0,35	0,29	0,25	0,22	0,20	0,18	0,17	0,15	0,14
0.040	0,38	0,33	0,28	0,25	0,22	0,20	0,19	0,17	0,16
0.045	0,41	0,35	0,31	0,27	0,25	0,22	0,21	0,19	0,18
0.050	0,44	0,38	0,34	0,30	0,27	0,24	0,22	0,21	0,19

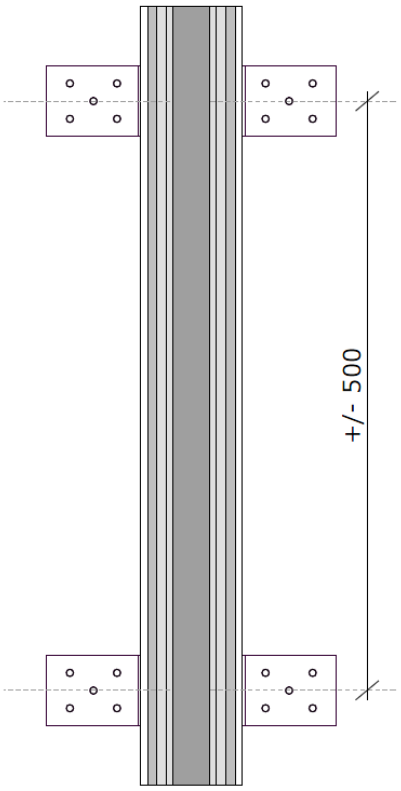
Table 8 - Thermal resistance of the inclined roof with prefabricated roof truss

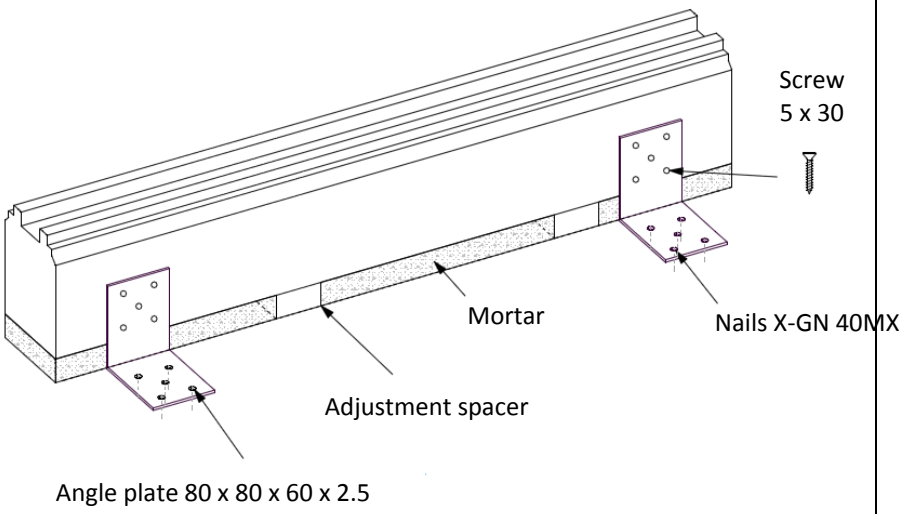
	Thickness [cm]								
λ_d [W/mK]	8	10	12	14	16	18	20	22	24
0.020	4,455	5,375	6,295	7,215	8,135	9,055	9,975	10,895	11,815
0.025	3,719	4,455	5,191	5,927	6,663	7,399	8,135	8,871	9,607
0.030	3,229	3,842	4,455	5,069	5,682	6,295	6,909	7,522	8,135
0.035	2,878	3,404	3,930	4,455	4,981	5,507	6,032	6,558	7,084
0.040	2,615	3,075	3,535	3,995	4,455	4,915	5,375	5,835	6,295
0.045	2,411	2,820	3,229	3,637	4,046	4,455	4,864	5,273	5,682
0.050	2,247	2,615	2,983	3,351	3,719	4,087	4,455	4,823	5,191

Annex III
Assembly of log building kit

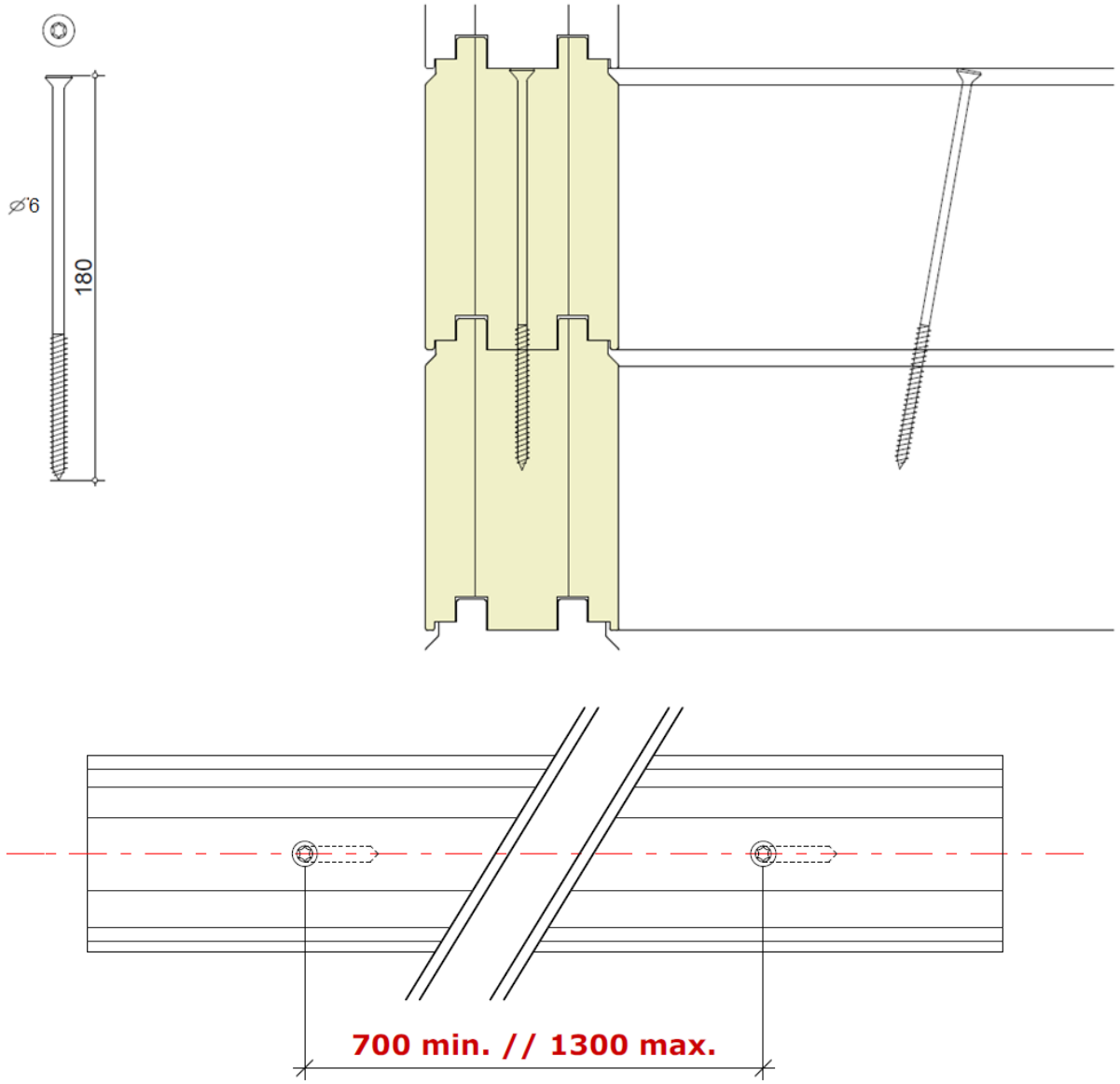
This annex provides details about the assembly of the different components of the Biospeedhome log building kit

Substructure – wall

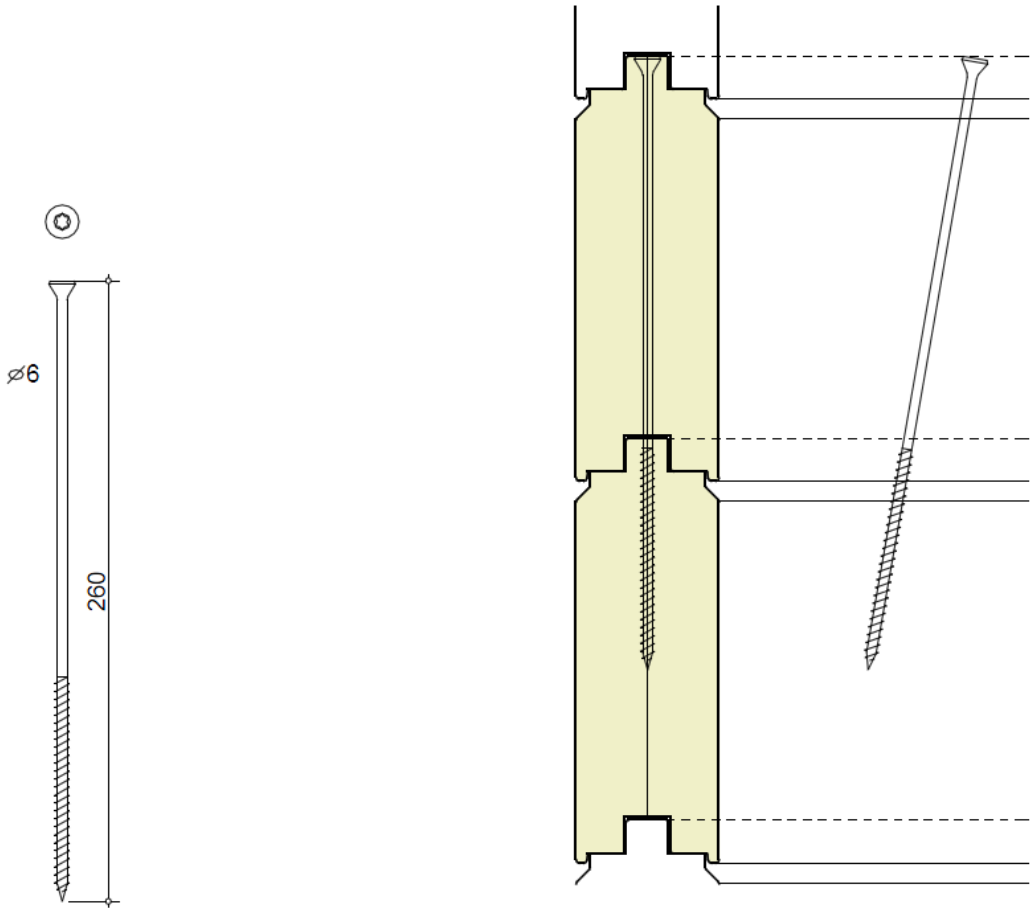


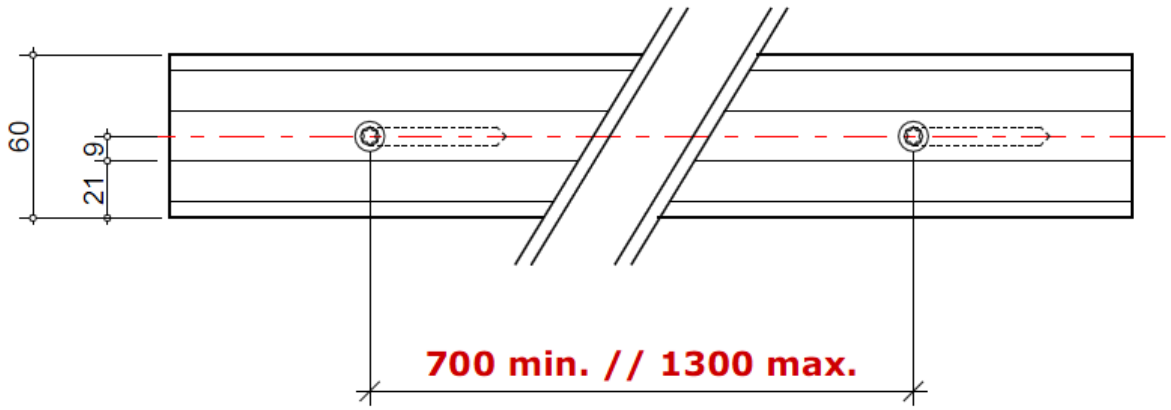


Vertical assembly of 86mm thick logs

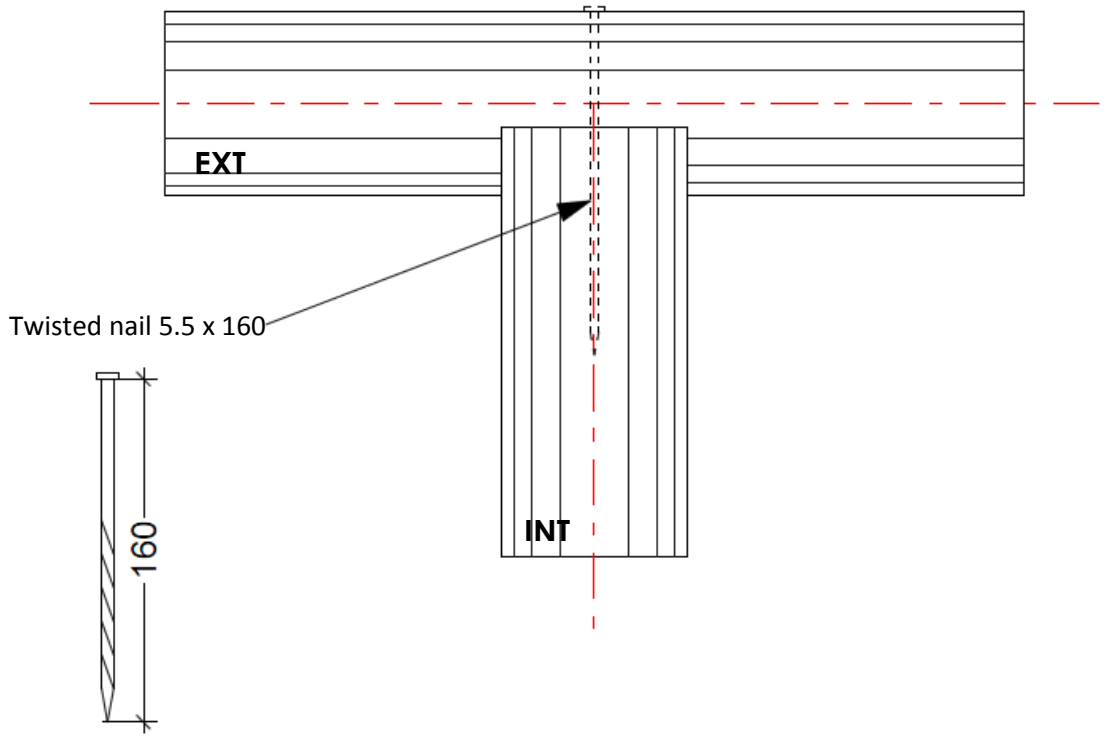


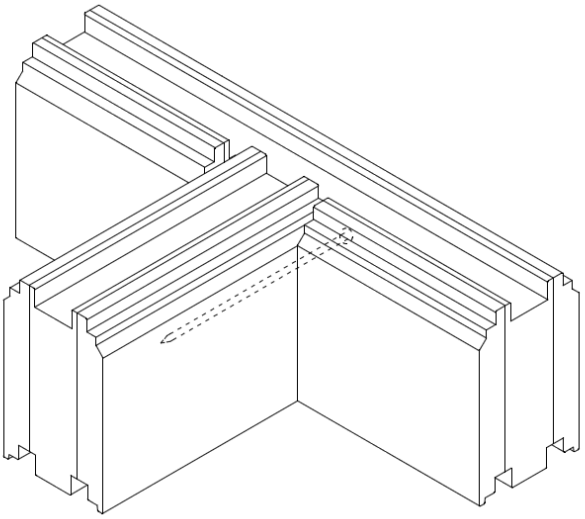
Vertical assembly of 60 mm thick logs



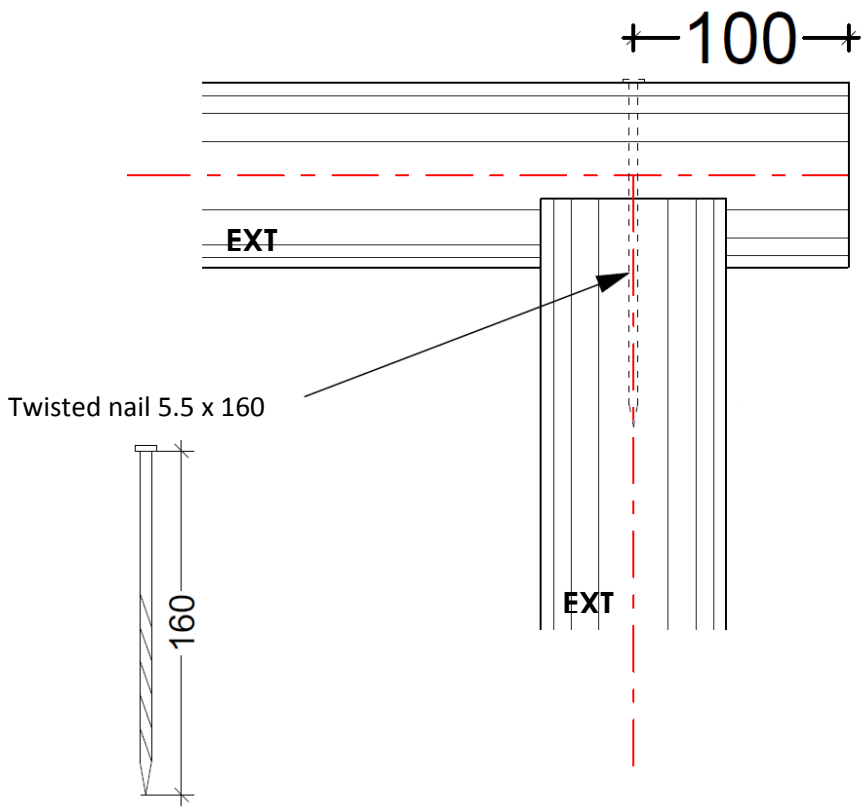


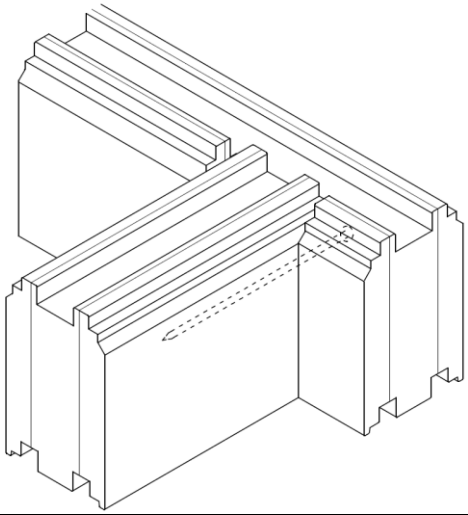
Perpendicular assembly of an external and an internal wall composed of 86 mm thick logs



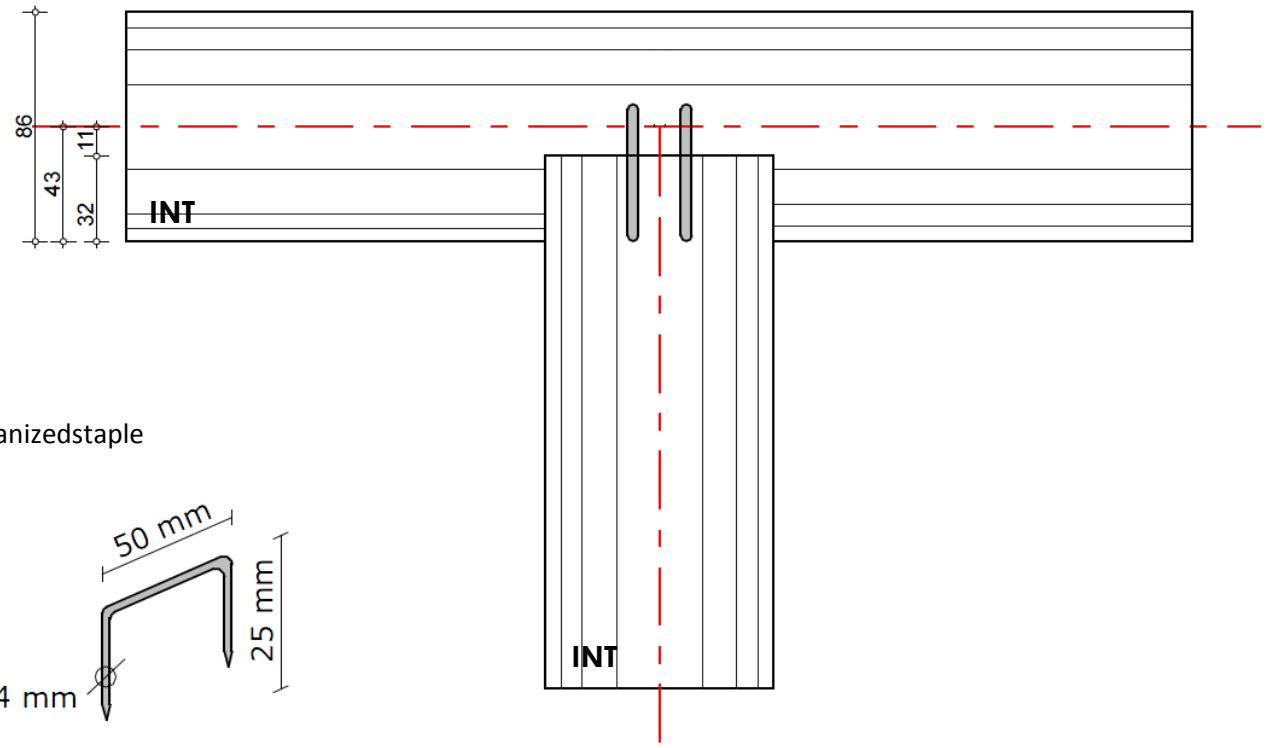


Perpendicular assembly of two external wall composed of 86 mm thick logs

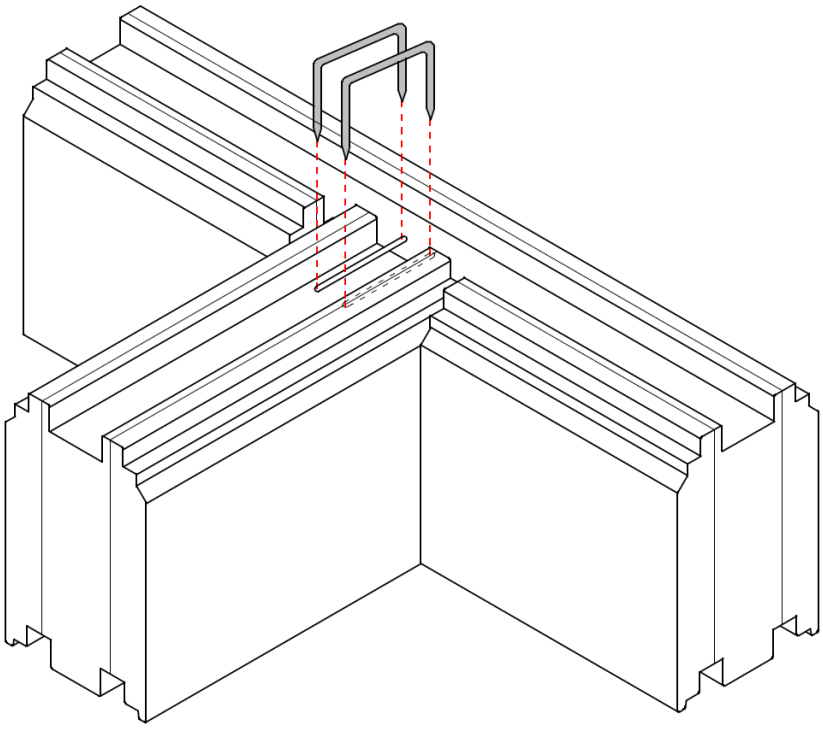




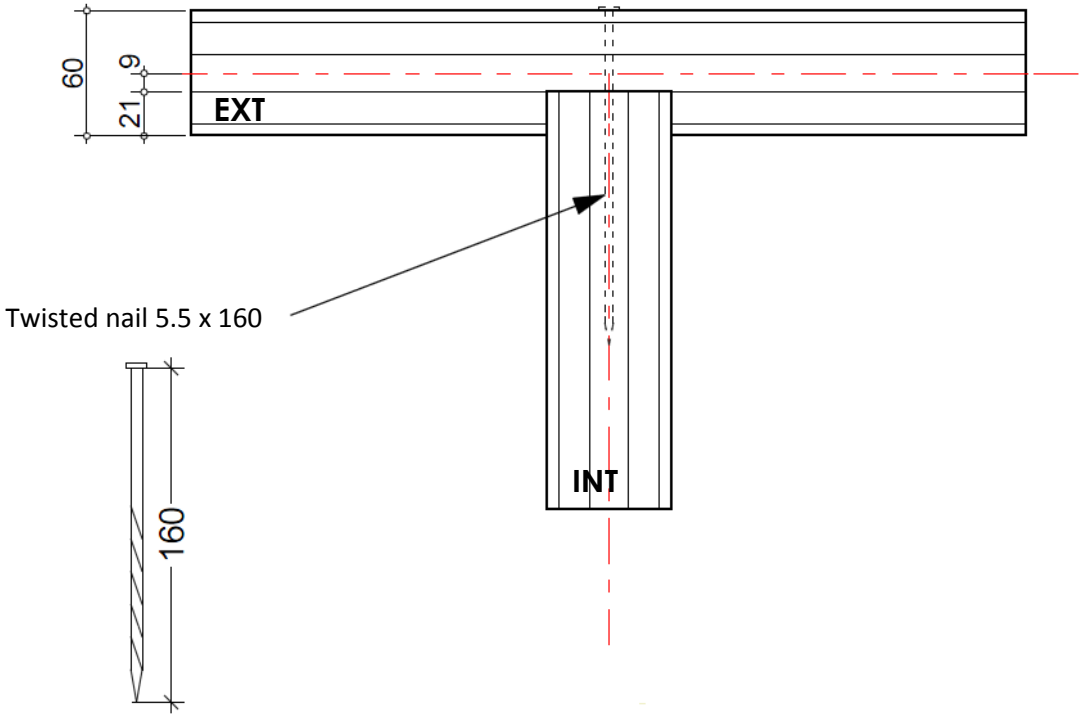
Perpendicular assembly of two internal wall composed of 86 mm thick logs

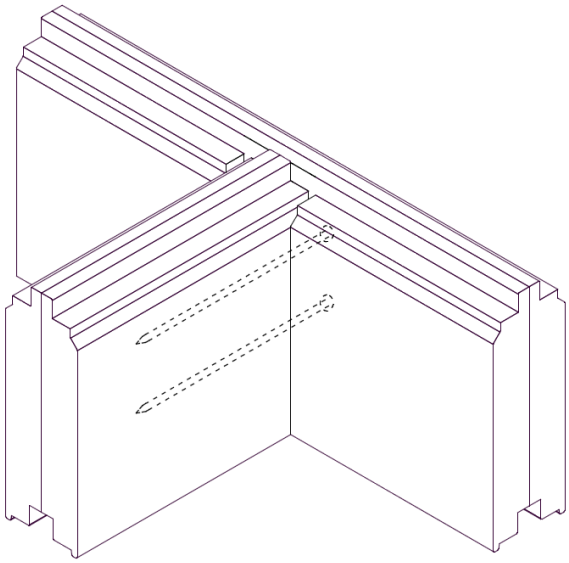


Galvanizedstaple

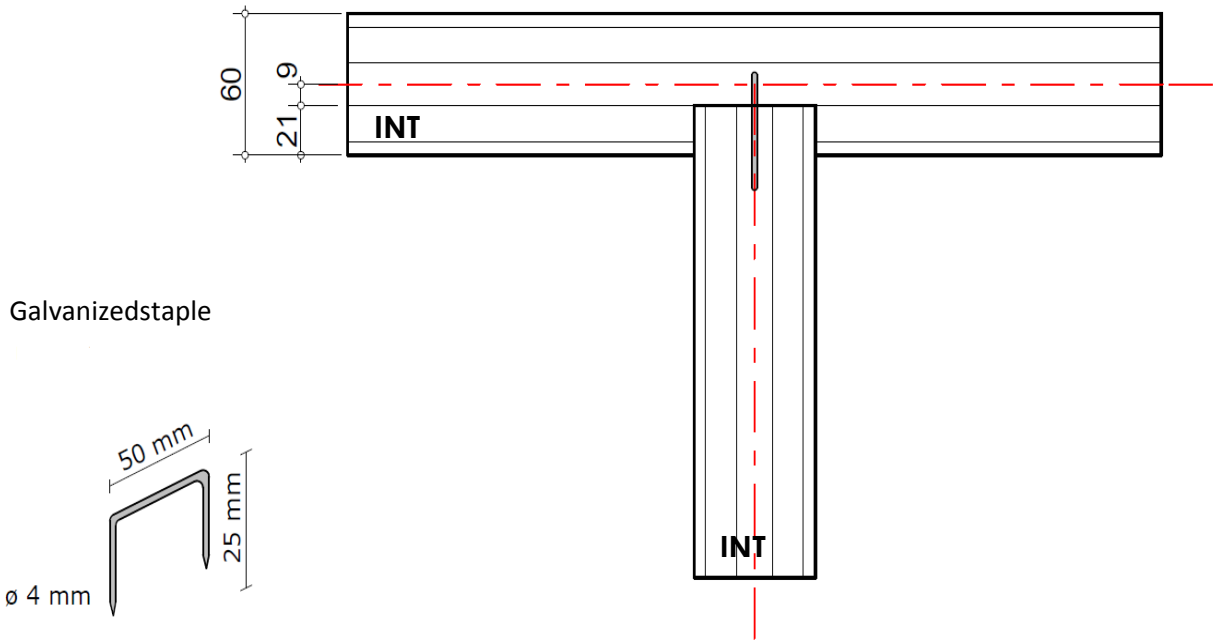


Perpendicular assembly of an external and an internal wall composed of 60 mm thick logs

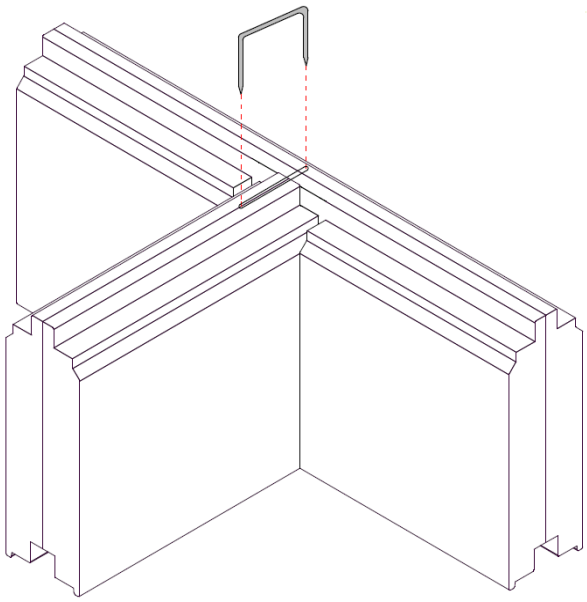




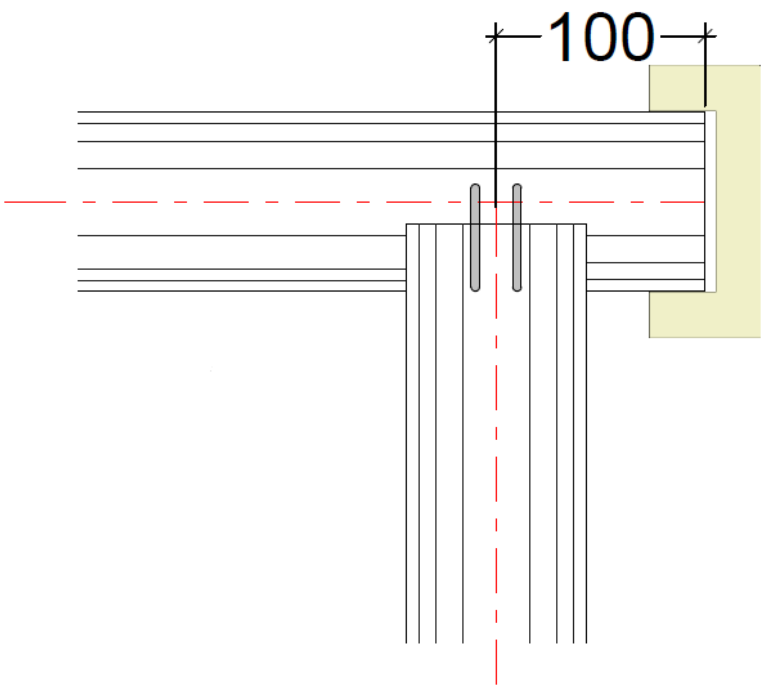
Perpendicular assembly of two internal wall composed of 60 mm thick logs



Galvanizedstaple

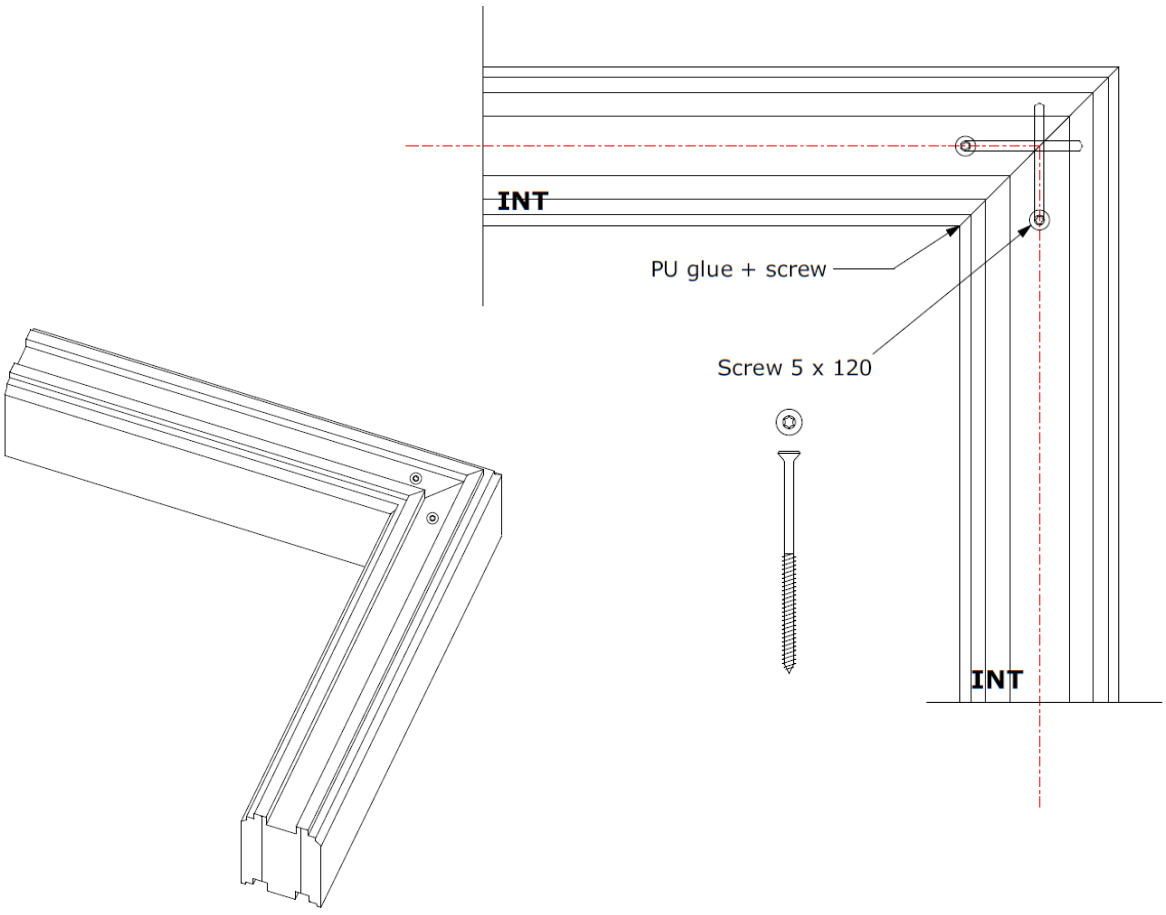


90° corner assembly of two internal wall (standard solution)

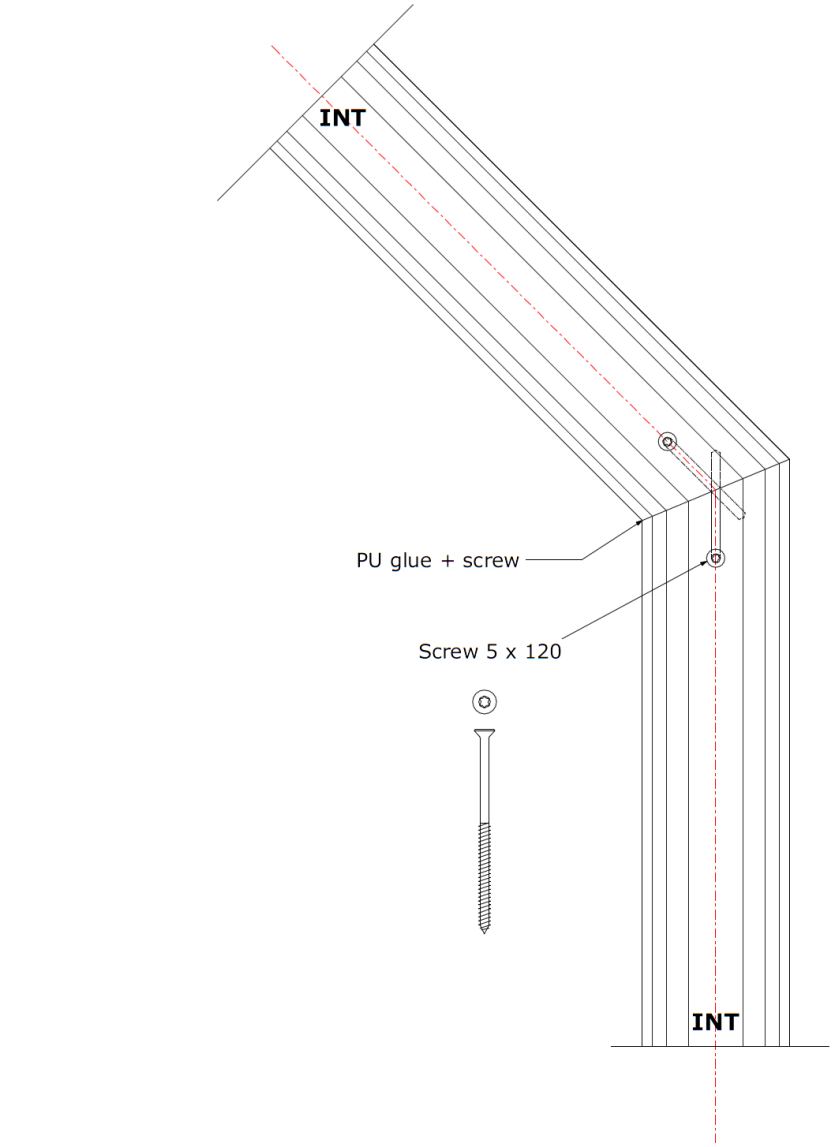


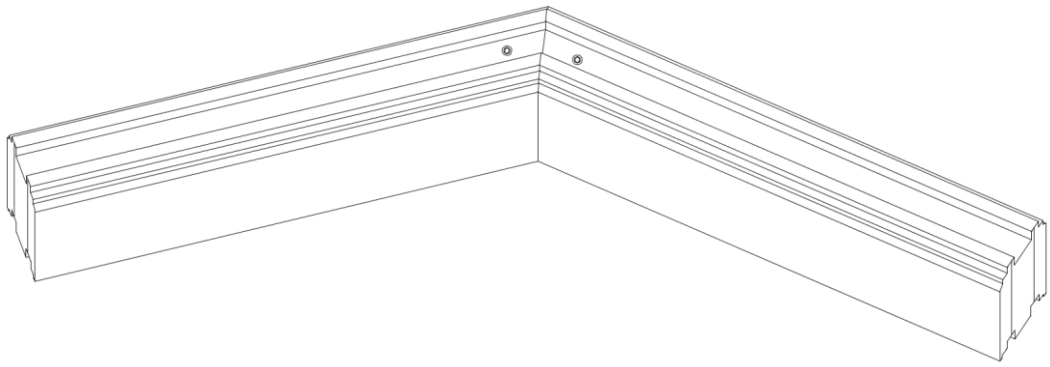
White spruce glulam finishing profile

90° corner assembly of two internal wall (alternative solution)

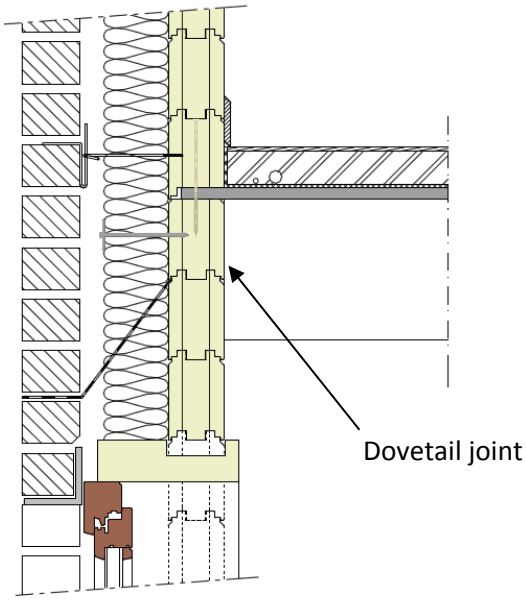


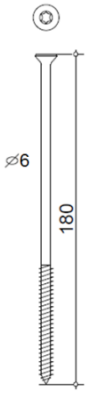
135° corner assembly of two internal wall



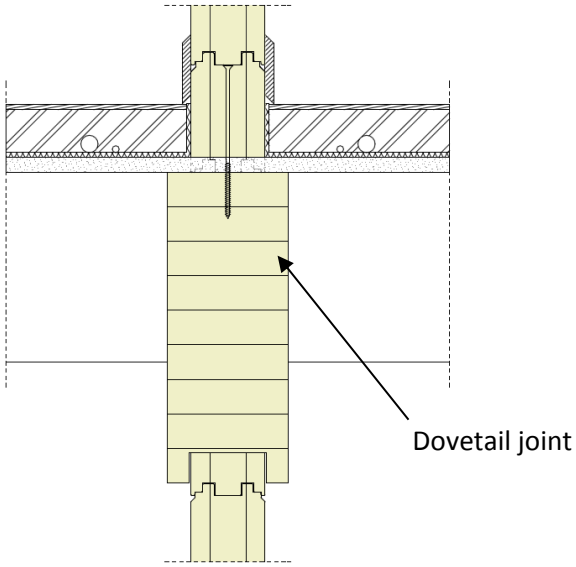


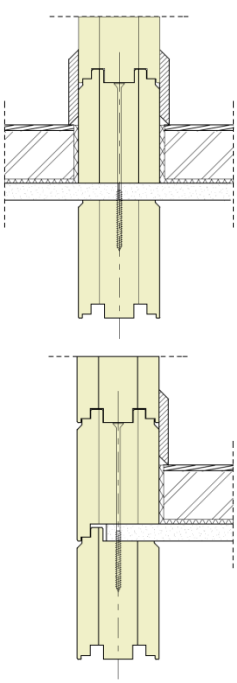
External wall – Suspended floor



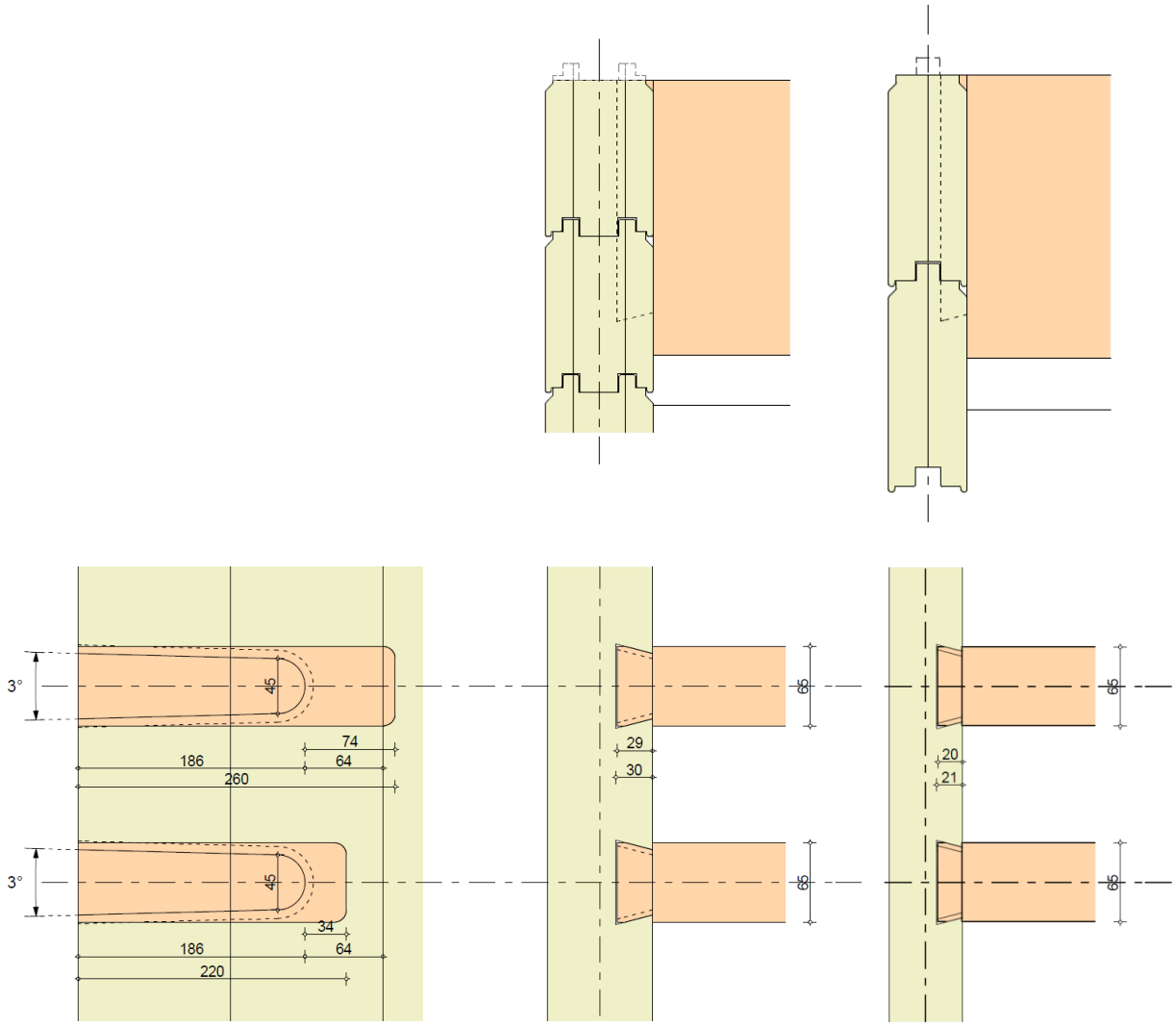


Internal wall – Suspended floor

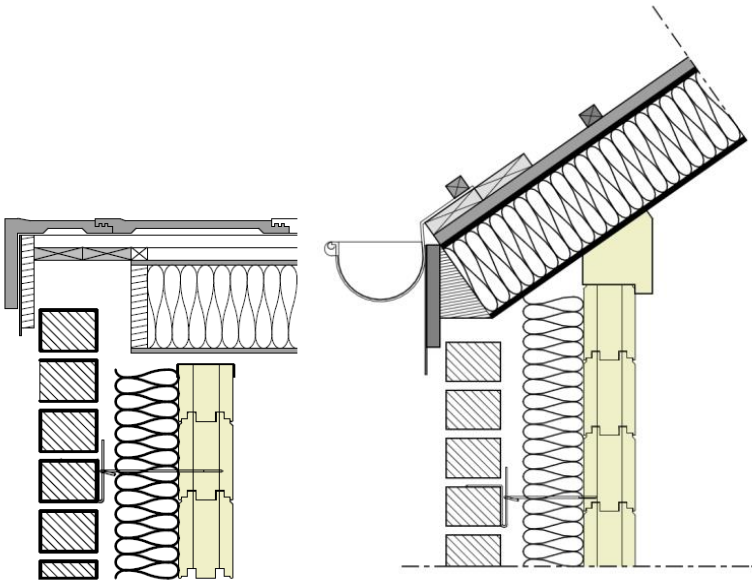


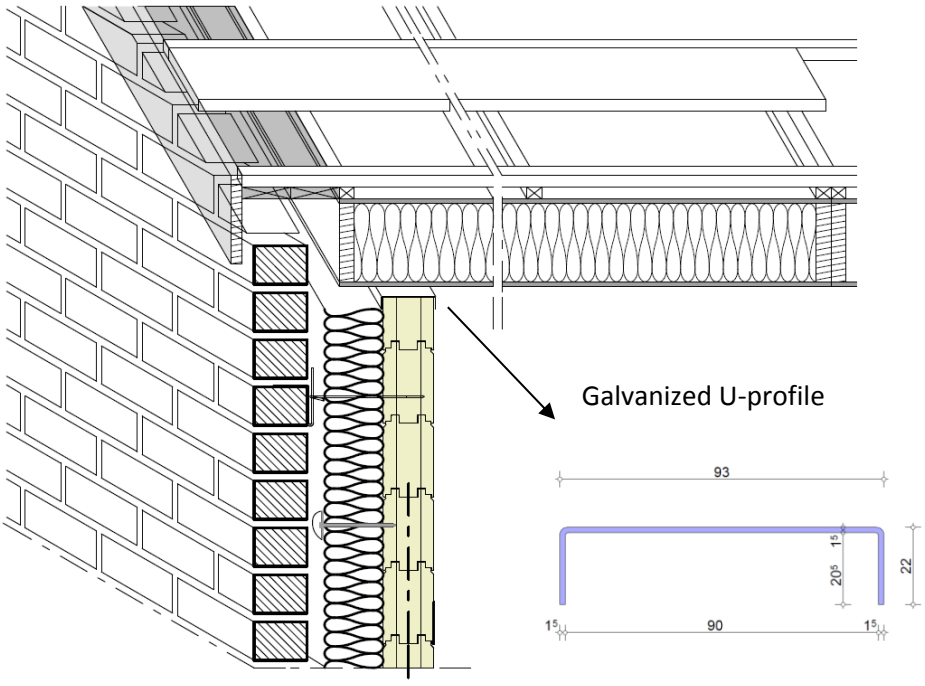


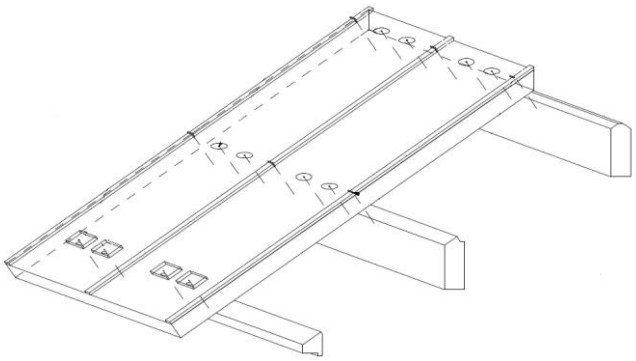
Detail of the dovetail joint

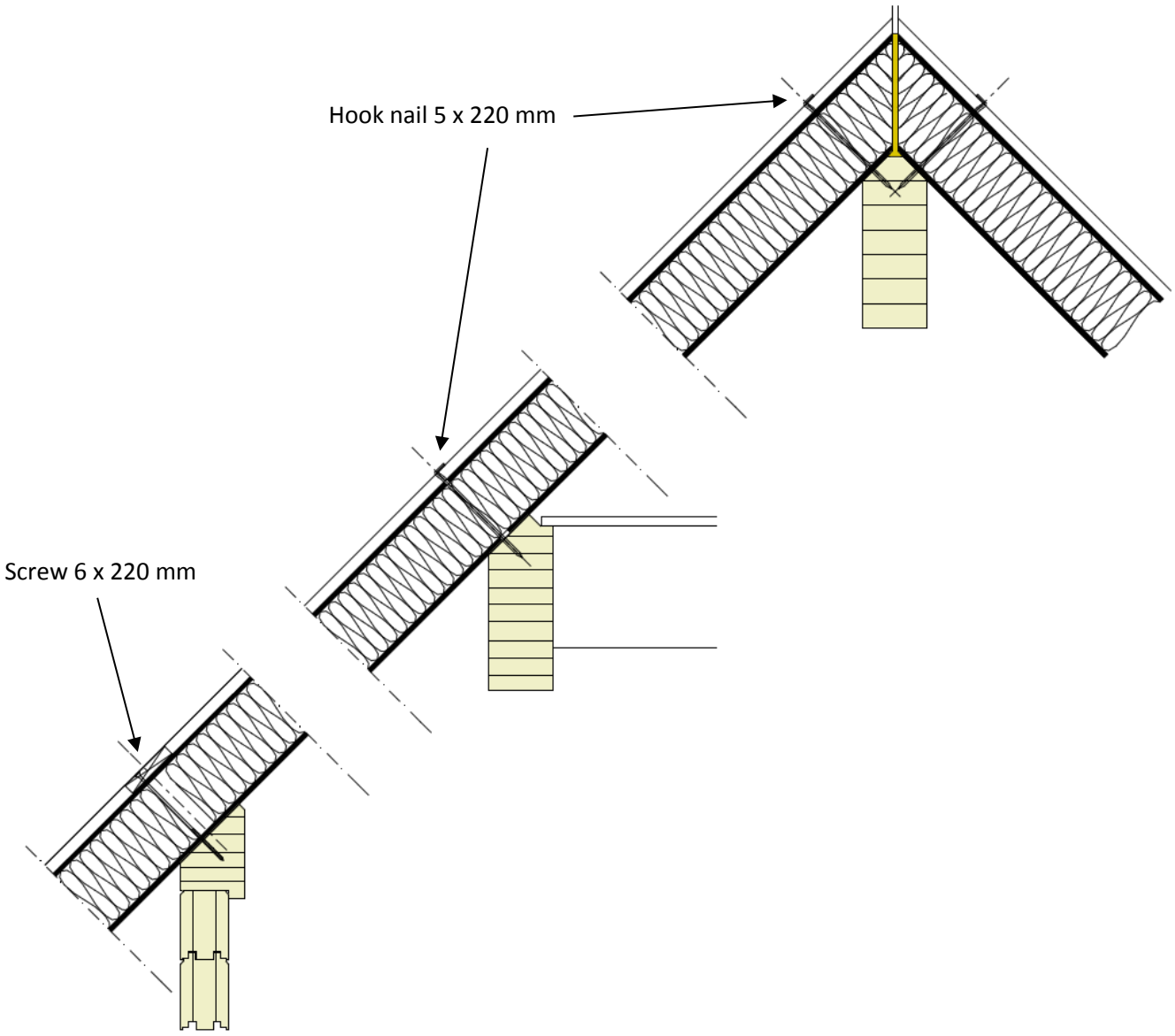


External wall - Inclined roof with self-supporting composite panels

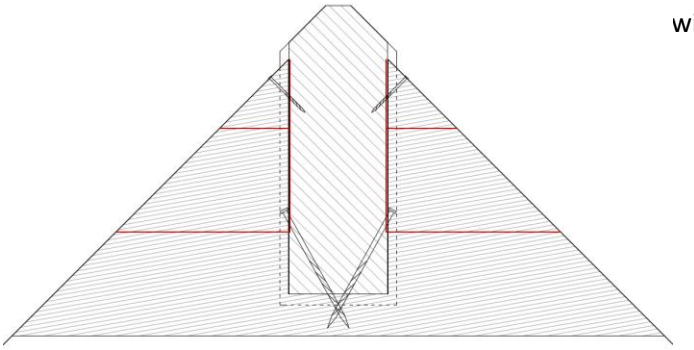






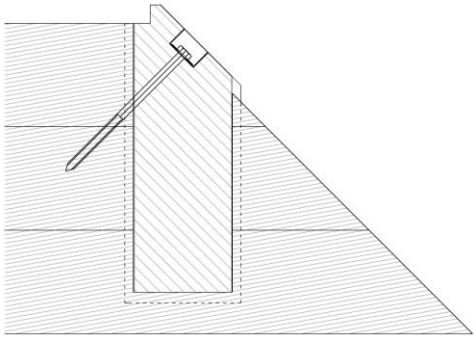

Hook nail 5 x 220 mm
Screw 6 x 220 mm

Detail of the fixation of the glulam joists with the external wall

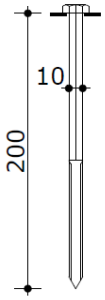


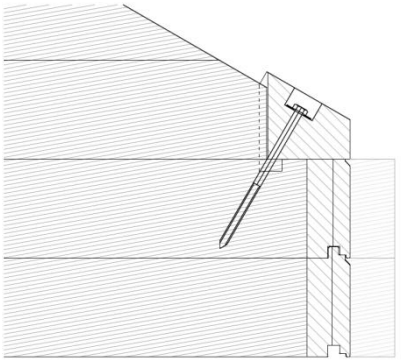
wisted nail 3.5 x 55 mm

Twisted nail 6 x 160 mm

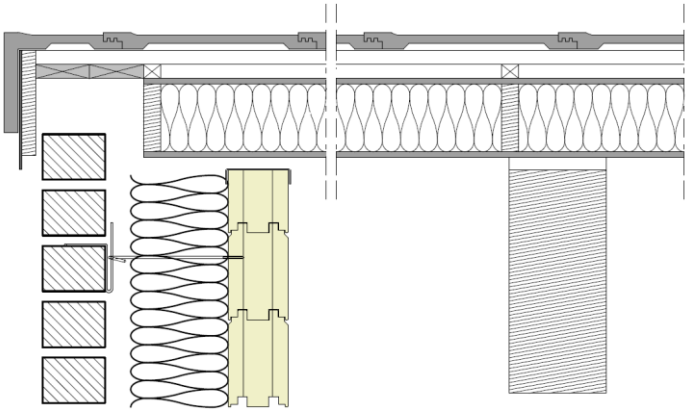


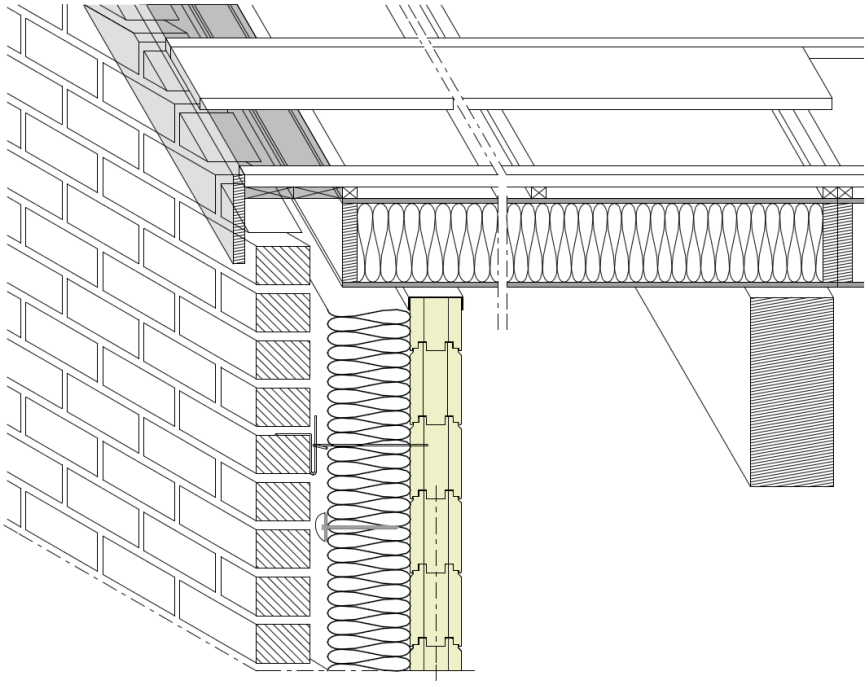
Lag bolt 10 x 200 mm



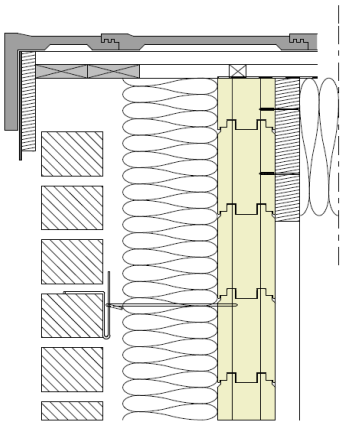


External wall – Inclined roof with traditional roof truss

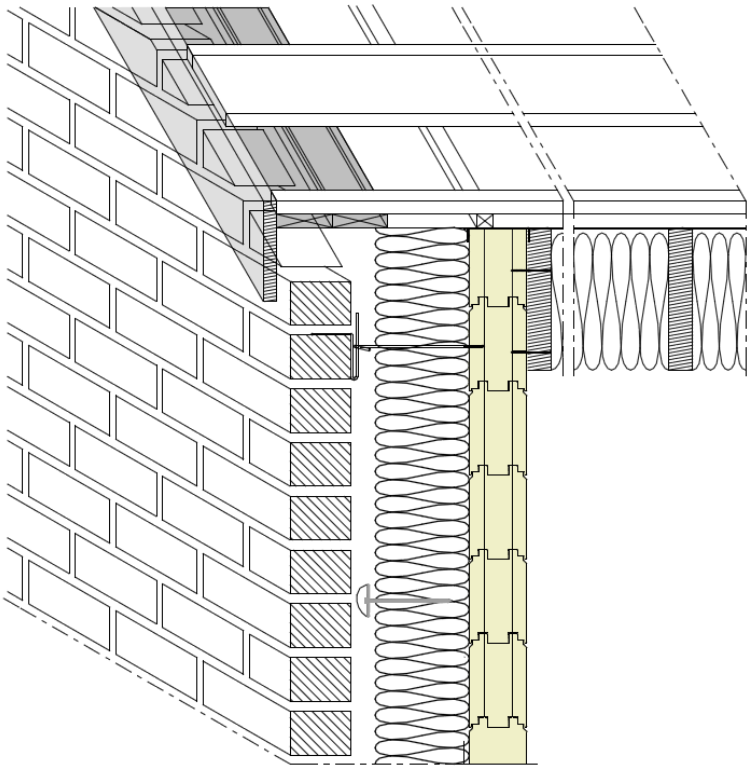




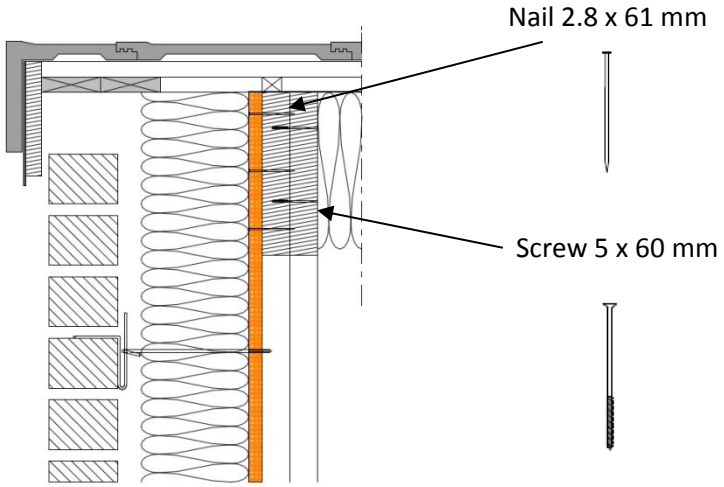
External wall – Inclined roof with prefabricated roof truss

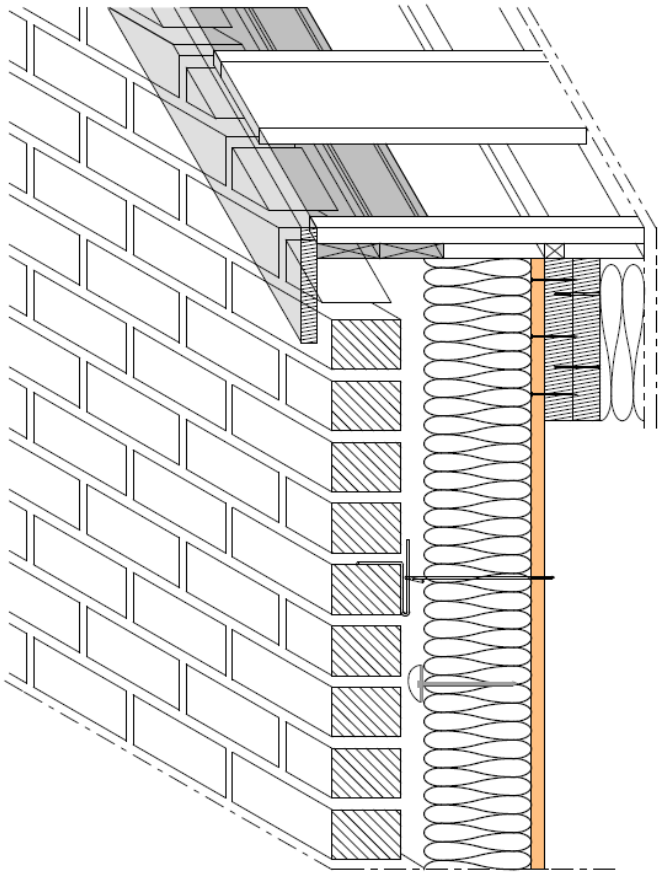


Screw 5 x 60 mm

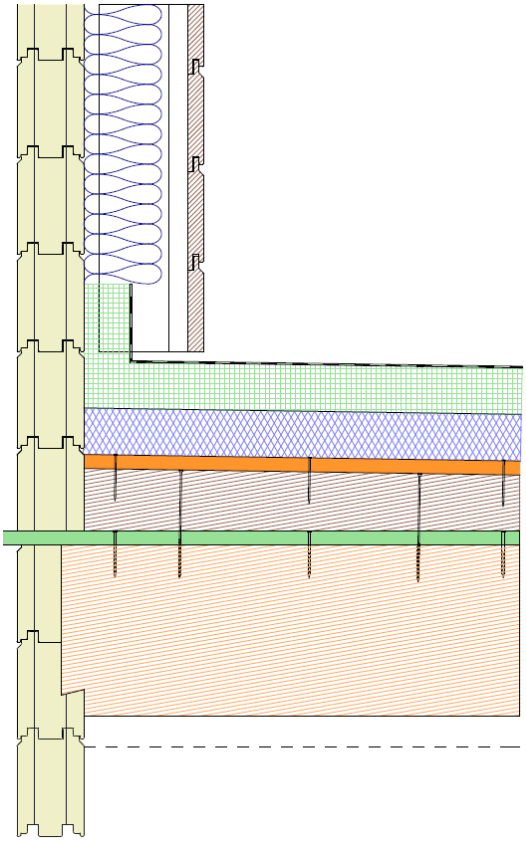


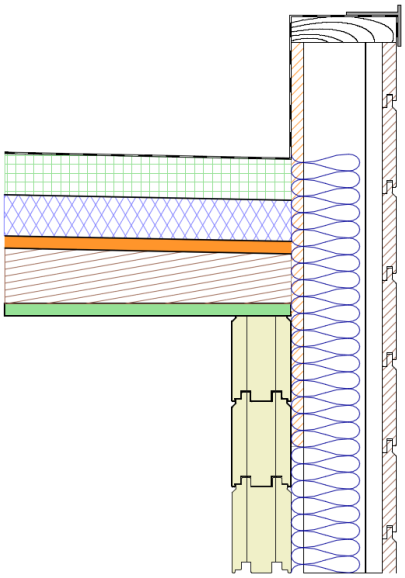
If there is no opening (window) in the gable, the prefabricated roof truss could be doubled and stiffened by OSB boards. To increase the mechanical resistance (to rigidify the junction with the wall below made up with logs) more stiffener are placed on the outer face of the wall.





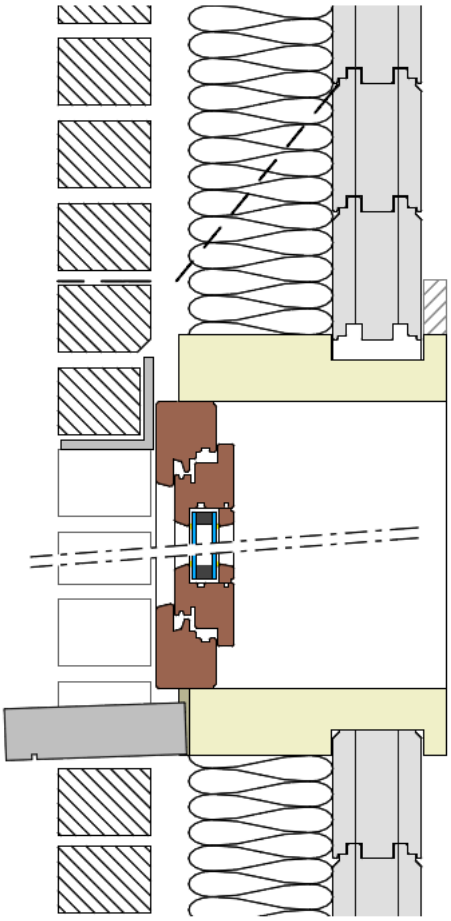
External wall – Flat roof

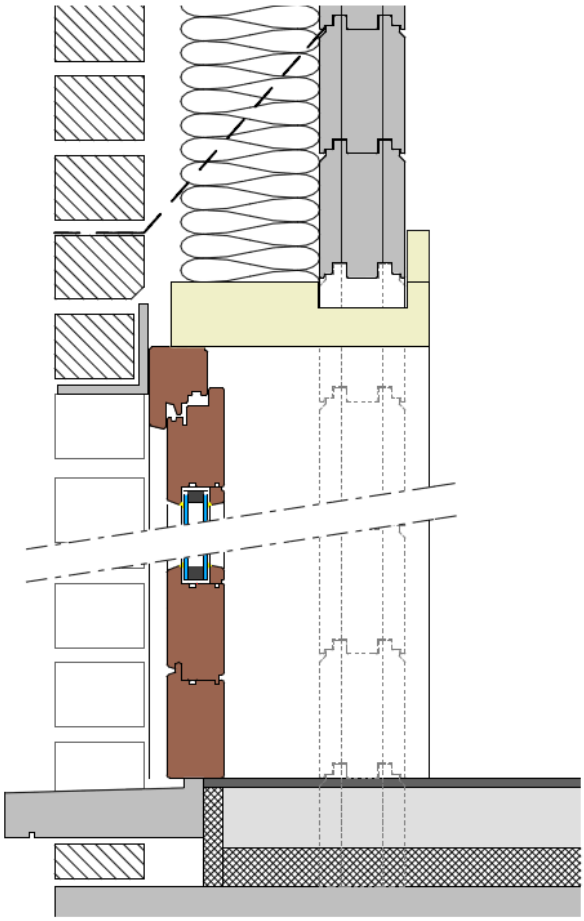


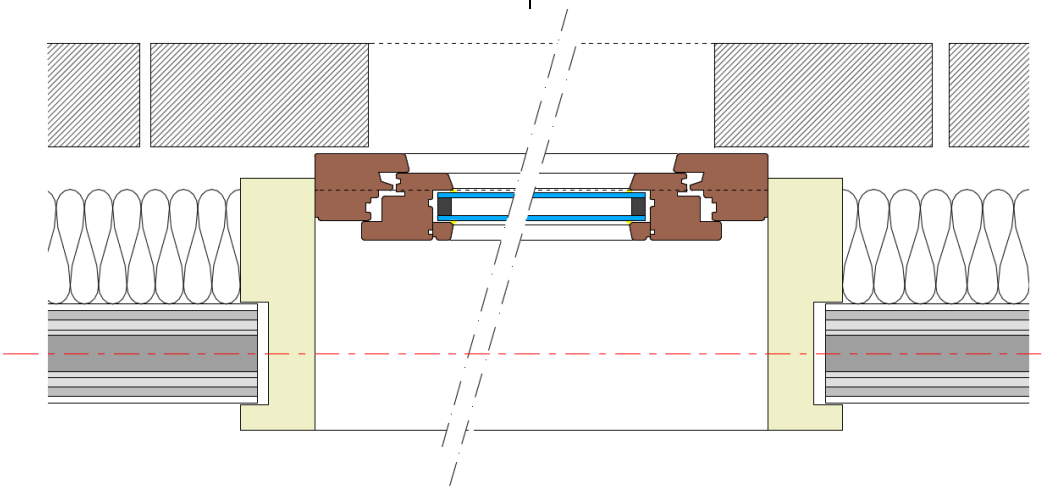


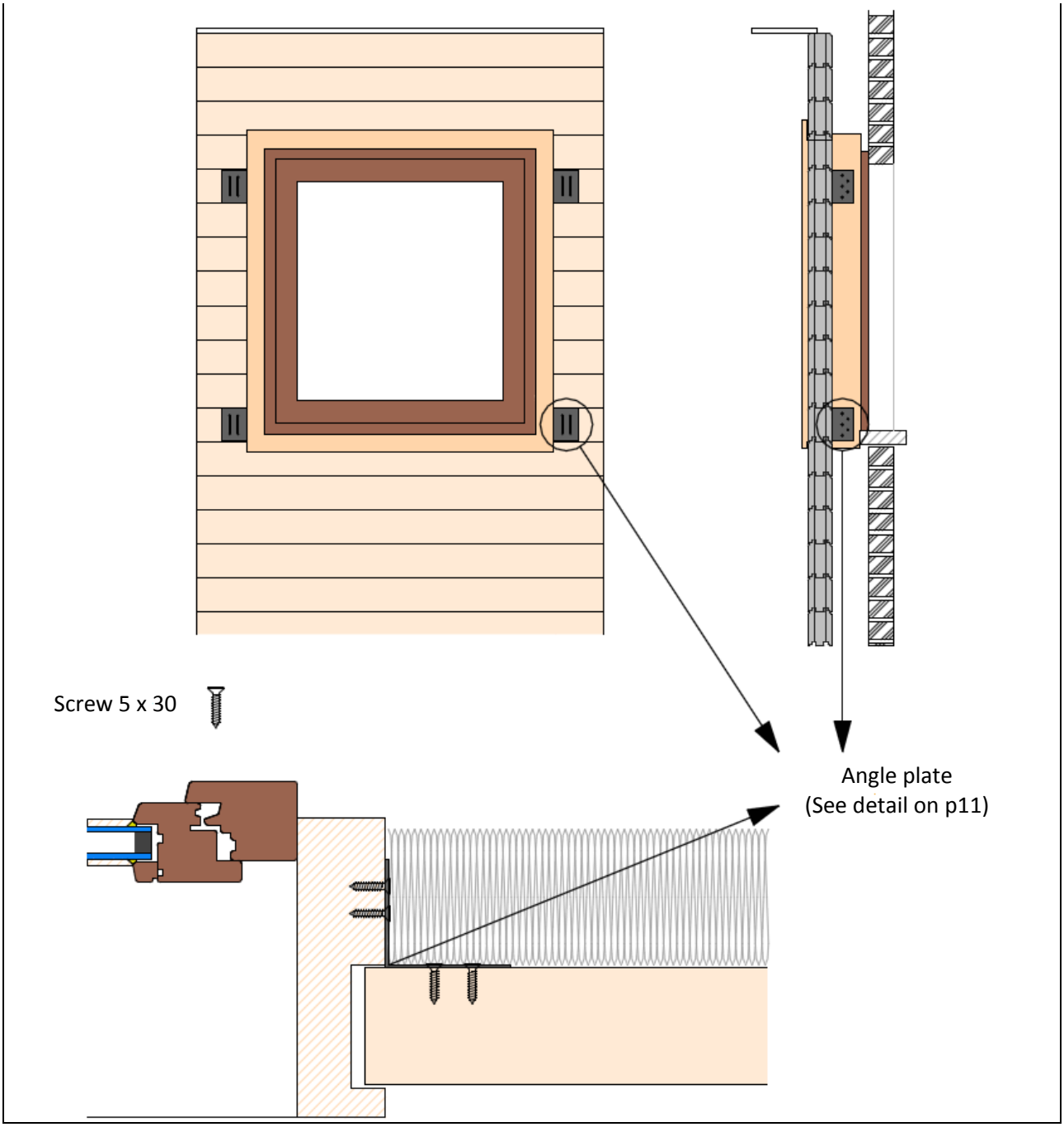
External wall – Windows & doors

Profiled timber frames are placed around windows and doors

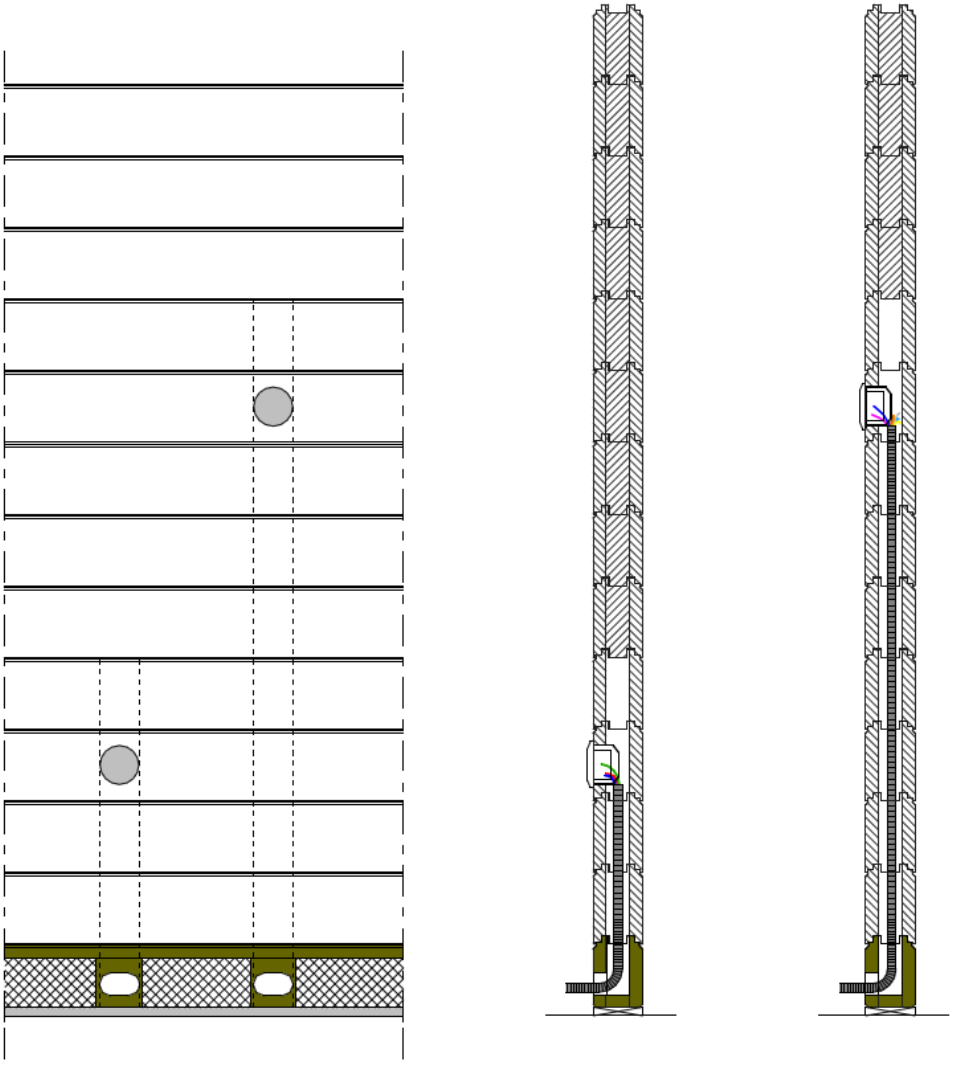


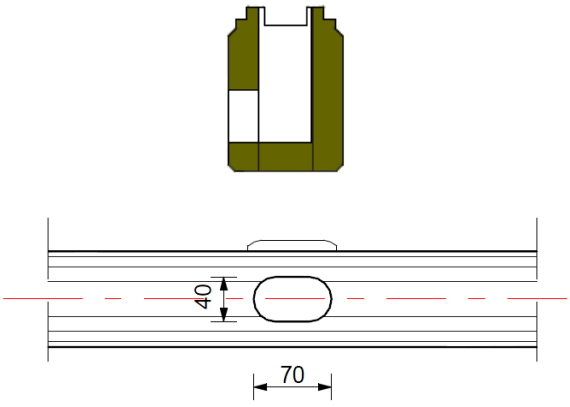


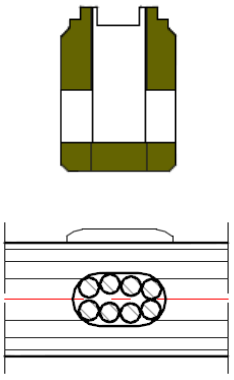


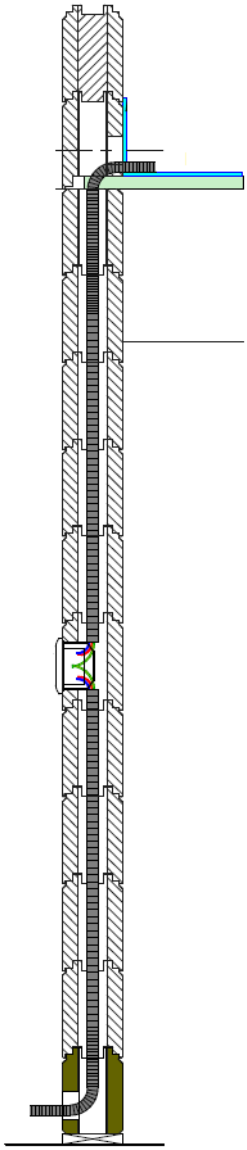

Screw 5 x 30
Angle plate
(See detail on p11)

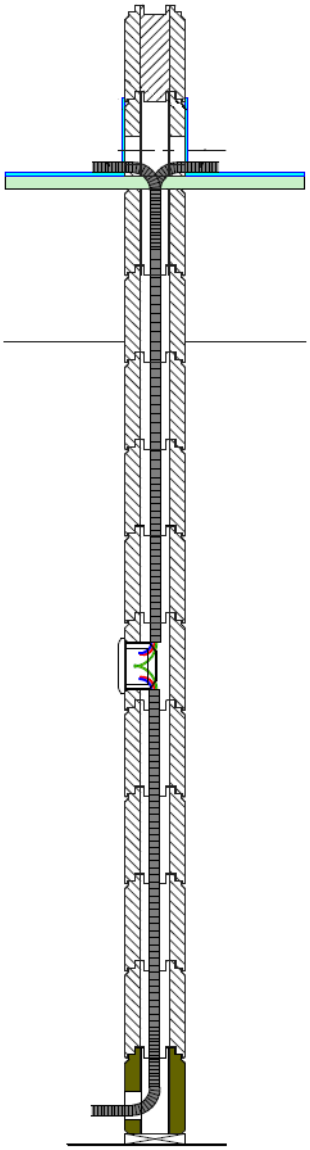
Details of preparatory measures (holes) for the installation of electrical services for 86 mm thick logs

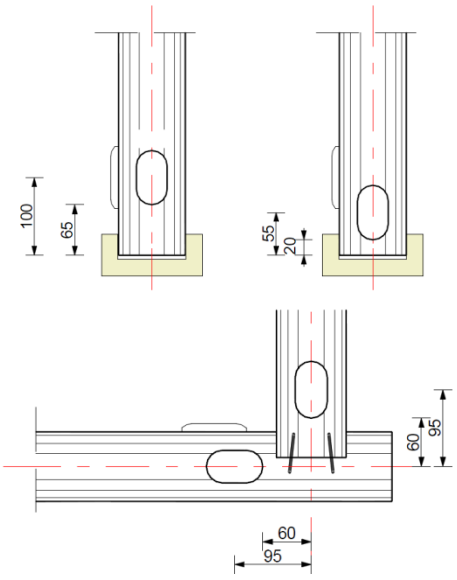


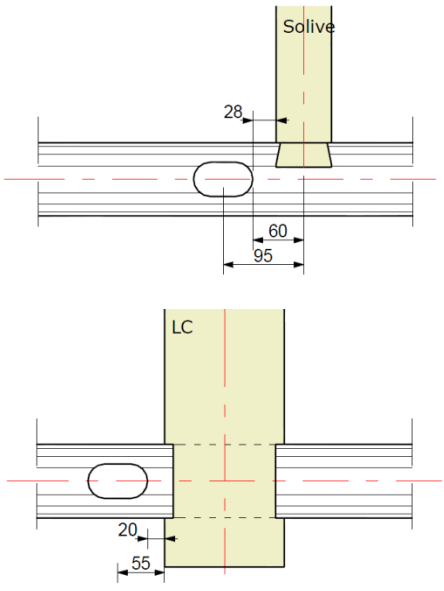


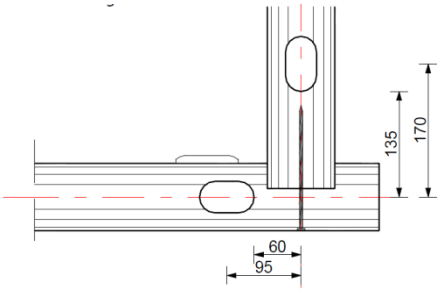


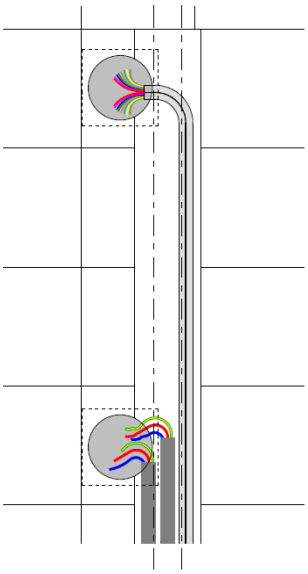


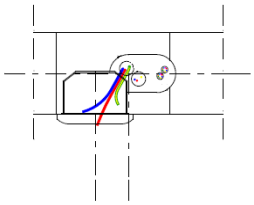


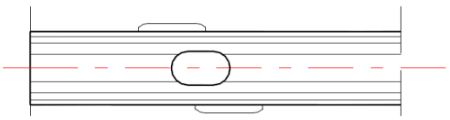

100
65
55
20
60
95
60
95

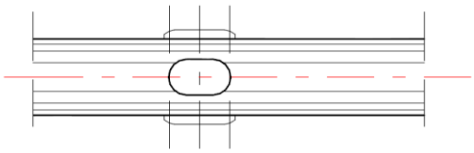

Solive
28
60
95
LC
20
55

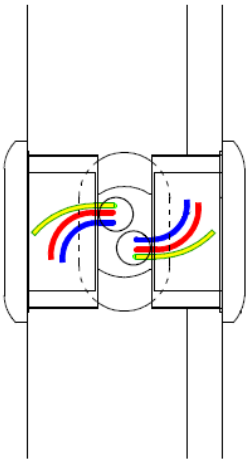

135
170
60
95



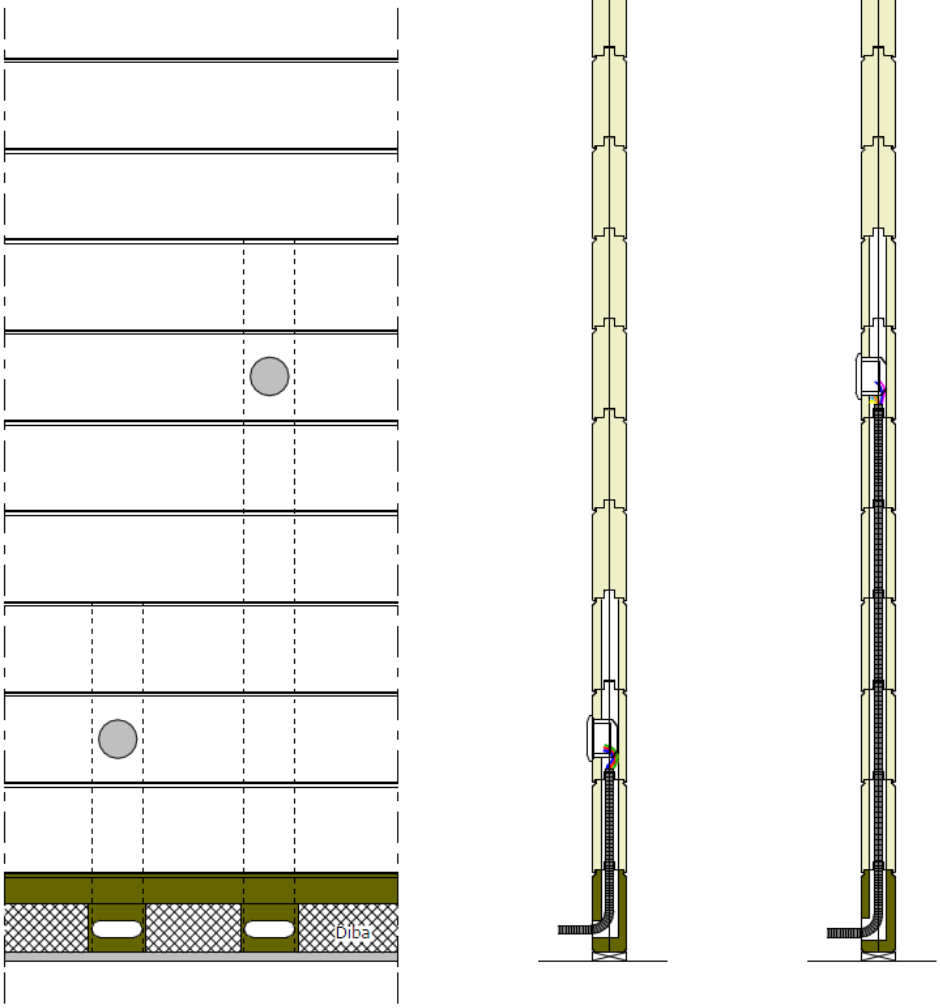


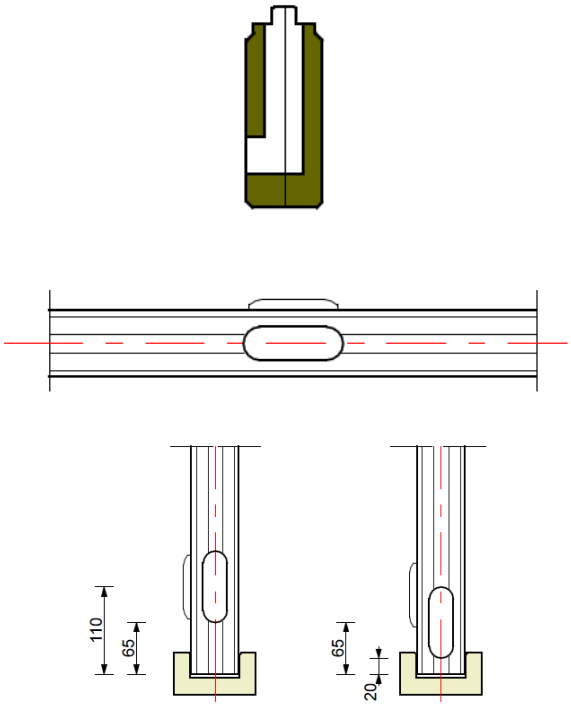


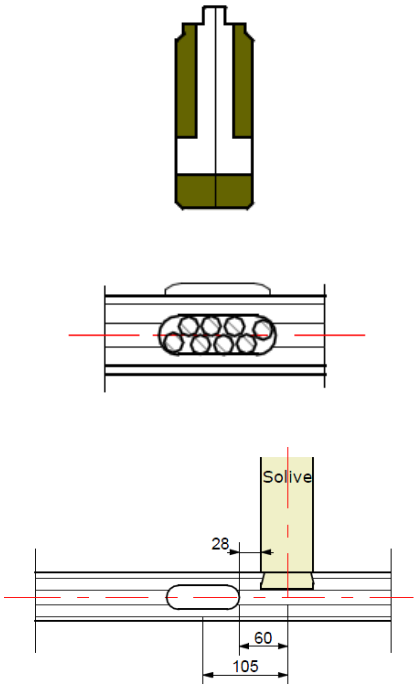


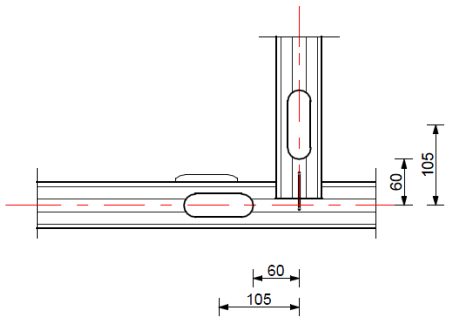


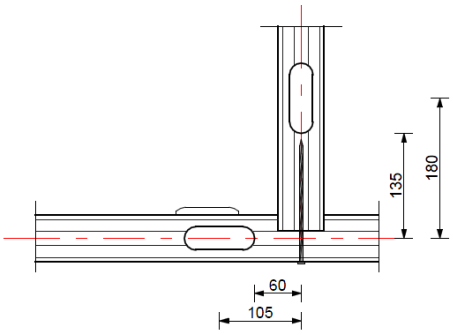
Details of preparatory measures (holes) for the installation of electrical services for 60 mm thick logs

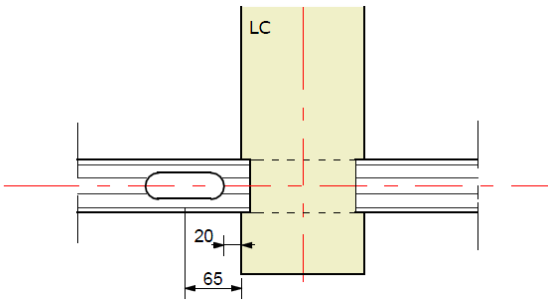


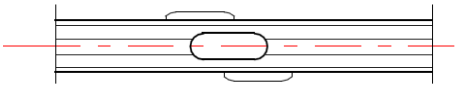




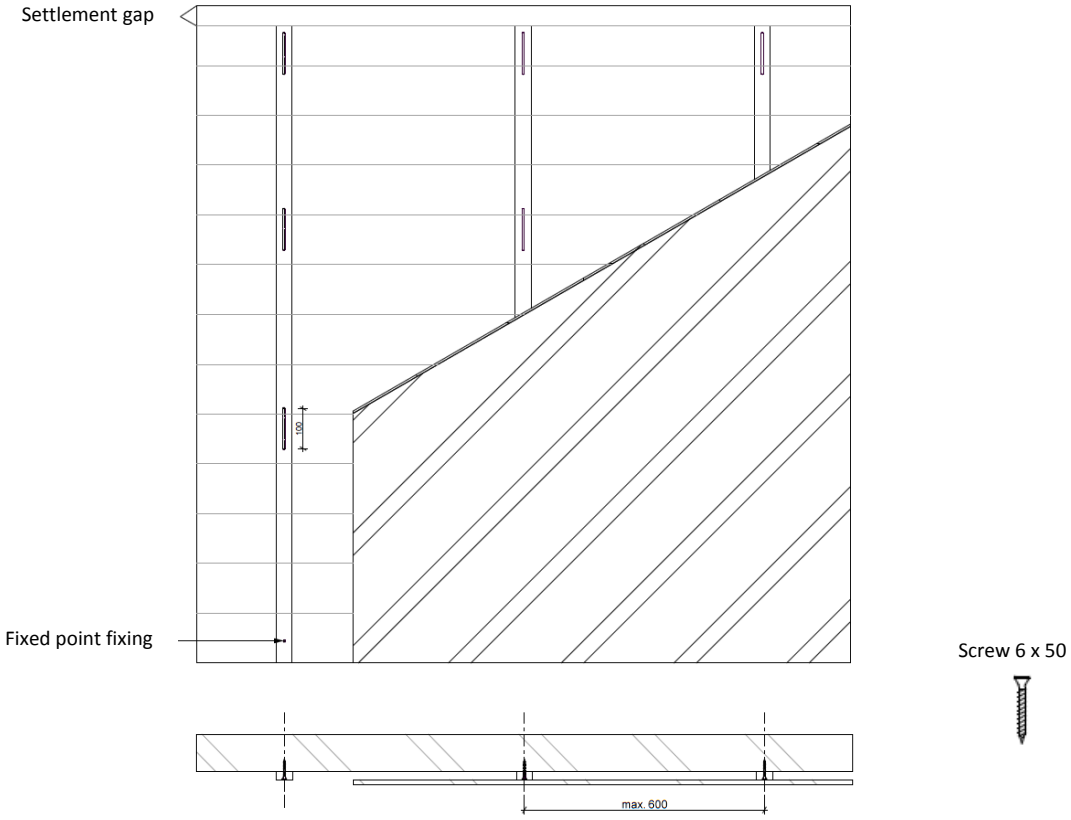

60
105
60
105


135
180
60
105

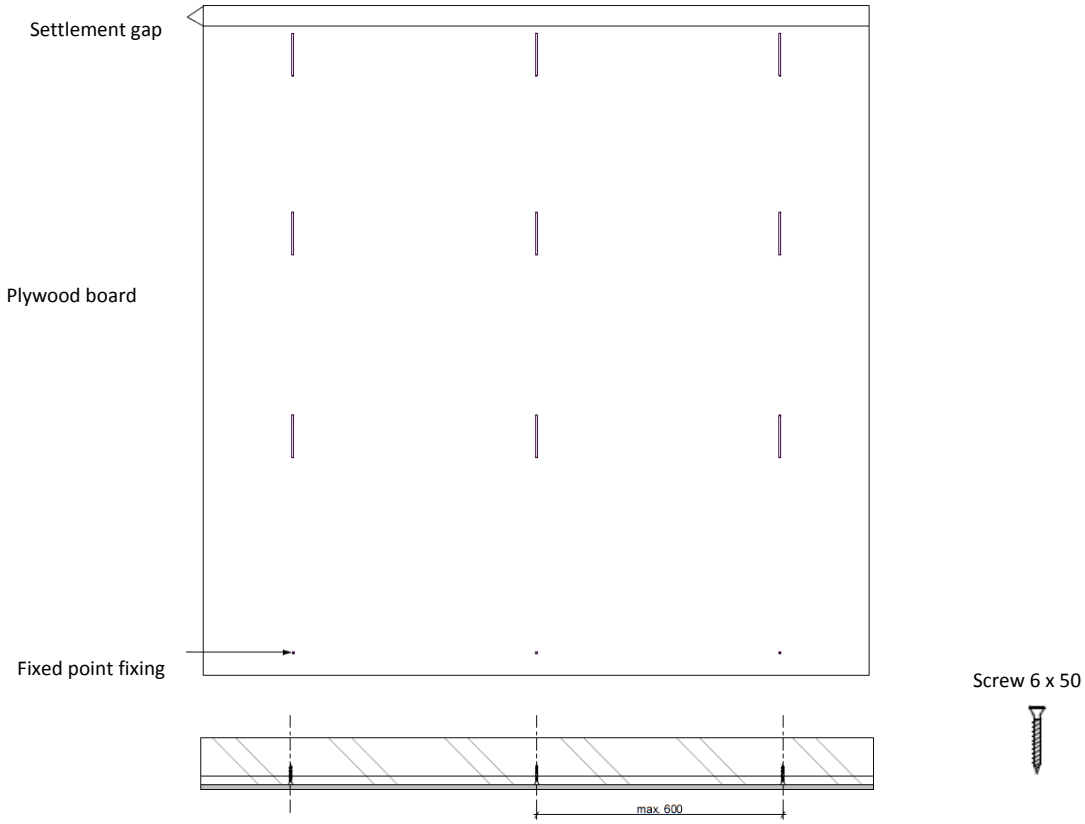

LC
20
65



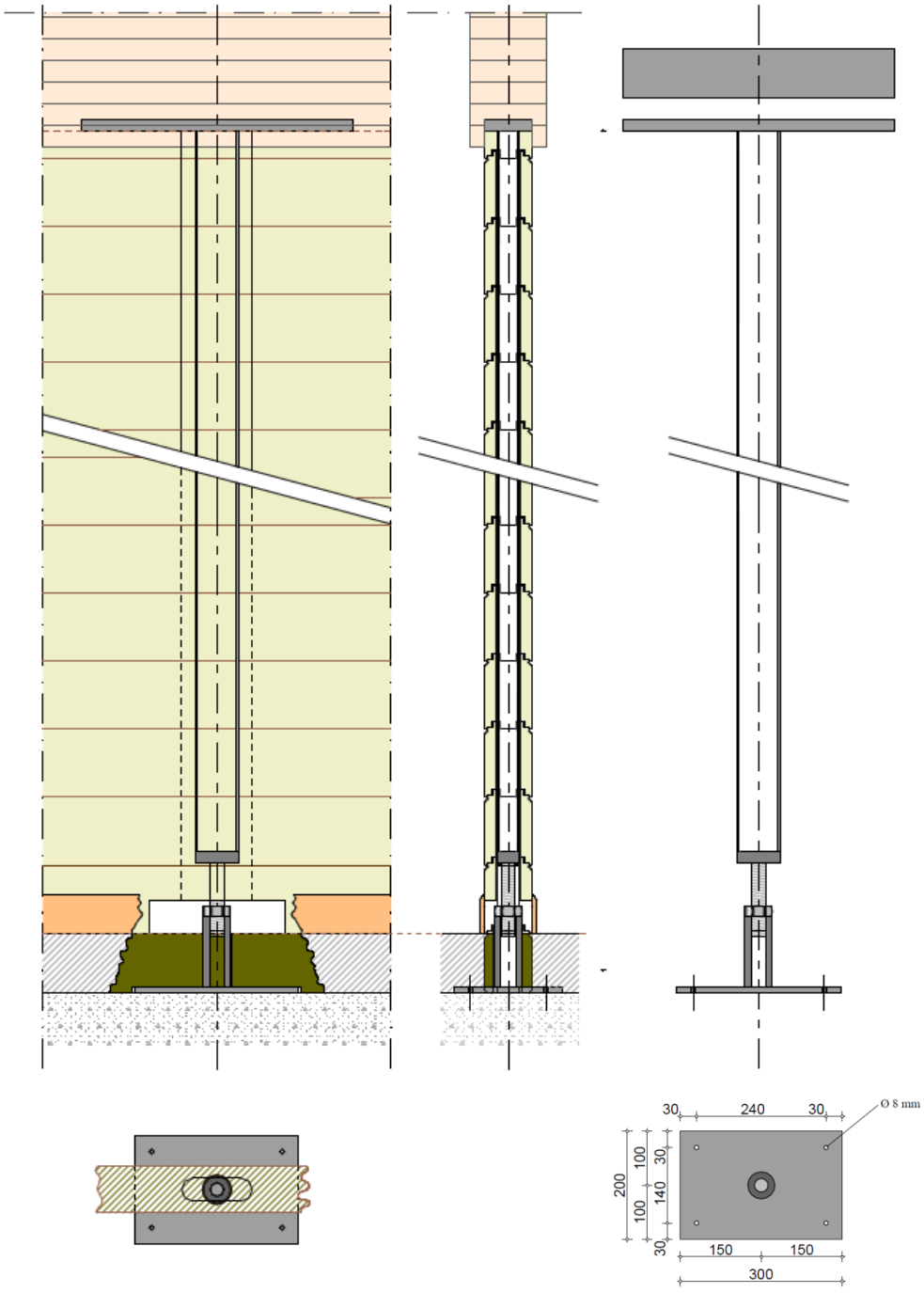
Details in case of plasterboard wall finishing



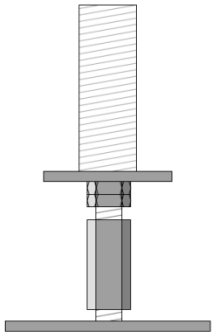
Standard solution for wall tiles

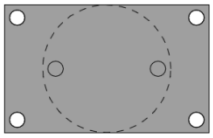


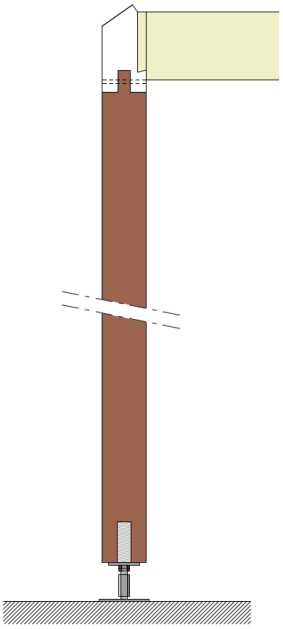
Example of used metal column with adjustable foot to resume the settlement



Adjustable feet for wooden columns







Annex IV
Example of CE –Marking

CE	CE conformity marking, consisting of the "CE" symbol given in Directive 93/68/EEC
nnnn	Number of Notified Body
BIOSPEEDHOME sa **Zoning Industriel de Vaux-Chavanne** **Rue des Boussines, 46** **6960 MANHAY** **BELGIUM**	Name and address of the ETA-holder
13	Two last digits of the year of affixing CE marking
yyyy-CPD-XXXX	Number of EC certificate of conformity
ETAG 012	ETAG Reference
ETA 13/0297	ETA Number
Biospeedhome Log Building	Trade Name

WHOLE BUILDING KIT

Name of the customer	Order number	Model

LOGS

✓ 86 x 125	60 x 160

EXTERNAL CLADDING

Bricks	Vertical timber cladding	Horizontal timber cladding	Render panel	Blocks + finishing	Natural stone
✓					

SUSPENDED FLOOR

✓ Joists 65 x 220	Joists 65 x 260

ROOF

Inclined roof

✓ Self-supporting composite panels	Prefabricated roof truss	Traditional roof truss

Flat roof

Product identification