

European Technical Approval ETA-13/0010

English translation prepared by DIBt - Original version in German language

Handelsbezeichnung
Trade name

OPTIMA, DOH, BIO

Zulassungsinhaber
Holder of approval

KAGER® HISA d.o.o.
Ob Dravi 4a
2250 PTUJ
SLOWENIEN

Zulassungsgegenstand
und Verwendungszweck

*Generic type and use
of construction product*

Bausätze für den Holzrahmenbau für Wohngebäude und ähnliche
Konstruktionen

Timber frame building kits for dwelling-houses and similar structures

Geltungsdauer:
Validity:

vom
from
bis
to

1 February 2013

1 February 2018

Herstellwerk
Manufacturing plant

KAGER® HISA d.o.o.
Ob Dravi 4a
2250 PTUJ
SLOWENIEN

Diese Zulassung umfasst
This Approval contains

44 Seiten einschließlich 2 Anhänge
44 pages including 2 annexes

I LEGAL BASES AND GENERAL CONDITIONS

- 1 This European technical approval is issued by Deutsches Institut für Bautechnik 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 products¹, modified by Council Directive 93/68/EEC² and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council³;
 - *Gesetz über das In-Verkehr-Bringen von und den freien Warenverkehr mit Bauprodukten zur Umsetzung der Richtlinie 89/106/EWG des Rates vom 21. Dezember 1988 zur Angleichung der Rechts- und Verwaltungsvorschriften der Mitgliedstaaten über Bauprodukte und anderer Rechtsakte der Europäischen Gemeinschaften (Bauproduktengesetz - BauPG) vom 28. April 1998⁴, as amended by Article 2 of the law of 8 November 2011⁵;*
 - Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex to Commission Decision 94/23/EC⁶;
 - Guideline for European technical approval of "Timber building kits", ETAG 007.
- 2 Deutsches Institut für Bautechnik is authorized to check whether the provisions of this European technical approval are met. Checking may take place in the manufacturing plant. 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 indicated on page 1 of this European technical approval.
- 4 This European technical approval may be withdrawn by Deutsches Institut für Bautechnik, in particular pursuant to information by the Commission according to Article 5(1) of Council Directive 89/106/EEC.
- 5 Reproduction of this European technical approval including transmission by electronic means shall be in full. However, partial reproduction can be made with the written consent of Deutsches Institut für Bautechnik. In this case partial reproduction has to be designated as such. Texts and drawings of advertising brochures shall not contradict or misuse the European technical approval.
- 6 The European technical approval is issued by the approval body in its official language. This version corresponds fully to the version circulated within EOTA. Translations into other languages have to be designated as such.

¹ Official Journal of the European Communities L 40, 11 February 1989, p. 12
² Official Journal of the European Communities L 220, 30 August 1993, p. 1
³ Official Journal of the European Union L 284, 31 October 2003, p. 25
⁴ *Bundesgesetzblatt Teil I 1998*, p. 812
⁵ *Bundesgesetzblatt Teil I 2011*, p. 2178
⁶ Official Journal of the European Communities L 17, 20 January 1994, p. 34

II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of the kit and intended use

1.1 Definition of the kit

"Kager-Hisa" is a timber frame building kit. The building kit is available in three different systems "OPTIMA", "DOH" and "BIO".

The building kit consists of pre-defined wall, roof and ceiling components, which are available depending on the application (constructing project) in different numbers and dimensions. The building kit is assembled at the factory depending on the construction and mounted on site.

The main load-bearing structure is a timber frame with planking.

The prefabricated components and related components are shown in Annex A. Annex B is the supplementary document where essential construction details are given, including their connections. Annex B is an official part of the ETA.

The inner cladding, roofing materials, stairs, service installations and other components that are necessary for a finished building, are not part of this ETA.

The floor covering is also not part of this European technical approval.

This also applies to additional load-bearing components (e.g. beams or steel beams for concentrated loads), which are required according to the static calculation for each building.

Windows and doors are part of the building system. Matured timber is not used for the kit.

1.2 Intended use

The range of application of "Kager-Hisa" is:

- housing (single-, multi-storey)
- commercial buildings (hotels, office buildings, industrial buildings)

The proposed use must be assessed in each individual case depending on climatic conditions.

The provisions of this European technical approval are based on an assumed working life of "Kager-Hisa" of at least 50 years, provided that the conditions laid down in sections 4.2 / 5.1 / 5.2 are met. The information about the working life can not be interpreted as a guarantee of the manufacturer, but are regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

2 Characteristics of the kit and methods of verification

ER 1 Mechanical resistance and stability

All building components (exterior walls, interior walls, ceilings and roofs) that are necessary for the mechanical strength and stability of the building or save the space enclosure are listed in Annex A and described with regard to their components and their structure.

By means of this exact description of the load bearing building components both mechanical resistance and stability for each load bearing building component and their connections between the components shall be determined. When calculating, the valid requirements prevailing in the respective member state shall be taken into account.

For seismic actions no performance is determined.

ER 2 Reaction to fire

Reaction to fire

The classification for reaction to fire of the components is given in Annex A.

Fire Resistance

no performance determined

External fire performance of the roof covering

No performance of the roof covering was determined because it is not part of the kit.

The roof covering is to be designed and verified in a way that the requirements of the member state where the kit was assembled are met.

ER 3 Hygiene, health and environment

Vapour permeability and moisture resistance

no performance determined

The construction works shall be designed in such a way that the general requirements related to interstitial and surface condensation of moisture of the external envelope are met.

Water tightness

With proper preparation and proper assembly of the building system the building envelope is resistant to penetrating water (even under heavy rain) and to penetrating snow. For applications with extreme rain and snow conditions, the proposed use must be assessed individually.

No performance is determined to the surface of internal building components, because these are not part of the kit.

Release of dangerous substances

The building system meets the requirements of the Directive (EC) no. 1907/2006⁷.

Specific stipulations for the components of the kit:

Wooden components can be treated with wood preservative. The wood preservatives shall comply with 98/8/EC⁸. The carried out wood preservation shall meet the local regulations of the member state where the kit was assembled.

The treatment of the kit resp of components of the kit with fire protection agents is not subject of this ETA.

As far as components of the kit in this ETA are specified via a hEN the requirements of the hEN have to be met and the supplementary implemented national legal and administrative provisions shall be observed.

⁷ Official Journal of the European Communities L 396, 30 December 2006, p 3

⁸ Official Journal of the European Communities L 123, 16 February 1989, p 1

The wood based components satisfy formaldehyde class E1 according to EN 13986⁹.

The mineral fibres used for heat insulation/impact sound insulation agree with the EC-guideline 97/69/EC¹⁰.

Note: 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. national law and administrative provisions). In order to meet the provisions of the EC Construction Products Directive, these requirements need also to be complied with, when and where they apply.

ER 4 Safety in use

Slipperiness of floor finishes

no performance determined

Floor finishes are not part of this European technical approval.

Impact resistance

Due to technical experience the impact resistance is sufficient. The complete wall construction with a gypsum board having a thickness of 12.5 mm is sufficiently shock-proof.

ER 5 Protection against noise

no performance determined

The element is to be designed and verified in a way that the requirements of the member state where the kit was assembled are met.

ER 6 Energy economy and heat retention

Thermal transmittance coefficient

no performance determined

The element is to be designed and verified in a way that the requirements of the member state where the kit was assembled are met.

Air permeability

When the kit has been properly manufactured and assembled the building envelope is sufficiently airtight.

Thermal inertia

no performance determined

The element is to be designed and verified in a way that the requirements of the member state where the kit was assembled are met.

Aspects of durability, serviceability and identification

Durability

Wooden components are normally untreated. If a wood preservative is used national regulations of the member state where the kit is assembled are to be considered.

Corrosion protection for fasteners used for this kit is described in Annex A. Corrosion protection shall meet the local requirements at the place of use.

When the kit is properly executed and set up followed by proper maintenance the durability for the intended working life of the kit is guaranteed.

⁹ EN 13986:2004 Wood-based panels for use in construction - Characteristics, evaluation of conformity and marking

¹⁰ Reference: In Germany prevails additional the GefStoffV, Annex IV Nr. 22 or the ChemVerbotsV chapter 23 in the annex to § 1 respectively.

Serviceability

For the serviceability of the kit it shall be ensured that suspended floors have sufficient stiffness to avoid unacceptable vibrations through normal use.

Identification

The building system is identified with the CE marking in accordance with Chapter 3.3. All components are listed in Annex A and specified.

3 Evaluation and attestation of conformity and CE marking

3.1 System of attestation of conformity

According to the decision of the European Commission 99/455/EC¹¹ the system 1 of attestation of conformity applies.

This system of attestation of conformity is defined as follows:

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

(a) Tasks for the manufacturer:

- (1) factory production control;
- (2) further testing of samples taken by the manufacturer in accordance with a prescribed test plan;

(b) Tasks for the approved body:

- (3) initial type-testing of the kit;
- (4) initial inspection of factory and of factory production control;
- (5) continuous surveillance, assessment and approval of factory production control.

Note: Approved bodies are also referred to as "notified bodies".

3.2 Responsibilities

3.2.1 Tasks of the manufacturer

3.2.1.1 Factory production control

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. The factory production control shall insure that the product is in conformity with this European technical approval.

The manufacturer may only use components stated in the technical documentation of this European technical approval.

The factory production control shall be in accordance with the control plan which is part of the technical documentation of this European technical approval. The control plan is laid down in the context of the factory production control system operated by the manufacturer and deposited with Deutsches Institut für Bautechnik¹².

The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

¹¹ Official Journal of the European Communities L 178/56, 14 April 1999

¹² The control plan is a confidential part of the European technical approval and only handed over to the approved body involved in the procedure of attestation of conformity. See section 3.2.2.

European technical approval**ETA-13/0010**

Page 7 of 44 | 1 February 2013

*English translation prepared by DIBt***3.2.1.2 Other tasks of manufacturer**

The manufacturer shall, on the basis of a contract, involve a body which is approved for the tasks referred to in section 3.1 in the field of timber frame building kits in order to undertake the actions laid down in section 3.2.2. For this purpose, the control plan referred to in sections 3.2.1.1 and 3.2.2 shall be handed over by the manufacturer to the approved body involved.

The manufacturer shall make a declaration of conformity, stating that the kit is in conformity with the provisions of the European technical approval ETA-13/0010 granted on 1 February 2013.

3.2.2 Tasks of approved bodies

The approved body shall perform the

- initial type-testing of the kit,
- initial inspection of factory and of factory production control,
- continuous surveillance, assessment and approval of factory production control

in accordance with the provisions laid down in the control plan.

The approved body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in a written report.

The approved certification body involved by the manufacturer shall issue an EC certificate of conformity of the kit stating the conformity with the provisions of this European technical approval.

In cases where the provisions of the European technical approval and its control plan are no longer fulfilled the certification body shall withdraw the certificate of conformity and inform Deutsches Institut für Bautechnik without delay.

3.3 CE marking

The CE marking shall be affixed on the label attached to it, the packaging or the accompanying commercial document. The letters "CE" shall be followed by the identification number of the approved certification body and be accompanied by the following additional information:

- the name and address of the producer (legal entity responsible for the manufacture),
- the last two digits of the year in which the CE marking was affixed,
- the number of the EC certificate of conformity for the kit,
- the number of the European technical approval,
- the number of the guideline for European technical approval (ETAG 007),
- trade name of the kit,
- indication of the intended use,
- specification of the kit¹³,
- statement of dangerous substances.

¹³

Each specific kit shall be identified according to the specific design made for each kit. The complete structural design and/or dimensioning of all components of the kit shall be included to every kit, but it is not part of the ETA.

In case of preservative treatment the following information shall be added (see EN 15228¹⁴):

- treated component,
- name of the wood preservative,
- penetration class,
- retention value,
- method of treatment with wood preservative,
- target biological agents,
- kind of wood/moisture of the wood in case of treatment.

4 Assumptions under which the fitness of the kit for the intended use is favourably assessed

4.1 Local building regulations

As basis for the manufacture and dimensioning of the kit a specification of the relevant requirements for the structural design, reaction to fire and the resistance to fire, protection against noise, the thermal insulation and the heat retention shall be drafted.

The verifications shall correspond to the intended methods and requirements including the verification of the stability prevailing in the member states where the building is to be erected.

4.2 Manufacture, planning and design

The kit shall be produced on the basis of a specific structural design for the construction works. The structural design shall comply with the building regulations (regulations concerning construction works) applicable in the member states in which the building is to be constructed.

The fabrication of the building components and the temporary storage of the components shall be done in dry and heatable premises.

The internal or lower side of external building components shall be made air tight, also in the area of penetrations and connections.

The external and internal wall elements have a maximum length of 9 m and a maximum height of 2.90 m. The ribs are arranged in a grid of 62.5 cm. The wood products in mounting the wall elements have a moisture content of $\leq 15\%$.

Non load-bearing interior walls may be arranged in any way.

The ceiling elements are manufactured according to statics. The ceiling elements are manufactured with a width of 1 m of up to 2.80 m maximum. The ceiling beams are arranged in a grid pattern of 62.5 cm. On delivery to the plant the wooden components have a moisture content of $\leq 15\%$.

The ceiling elements are brought at the site as prefabricated elements. The impact sound insulation and the floor finishes are not part of the kit. They will be installed on the site.

The roofing elements are manufactured according to statics. The roofing elements are manufactured with a width of 1 m of up to 2.80 m maximum. The rafters are arranged in a grid pattern according to static calculation. On delivery to the plant the wooden components have a moisture content of $\leq 15\%$.

The insulation boards (EPS according EN 13163¹⁵) are glued with the glue "LEPILO LINE" over the entire surface amount of wet application approx. 1.0 kg/m² onto the fibre gypsum boards of the external walls type OPTIMA, OPTIMA plus and VITA NOVA (Annex A).

The composition of the glue is deposited with DIBt. It is a dispersion mortar. The insulation boards can additionally be fixed with suitable mechanical fasteners. The insulation boards shall be used with the designation T2-L2-W2-S2-P4-DS(70,-)2-DS(N)2 and a tensile strength according to EN 1607¹⁶ of at least 100 kPa¹⁷ shall be used. The surface of the wall shall be flat, dry, free of grease and dust-free and shall have a bond strength of at least 0.08 N/mm².

The insulation boards are coated with the plaster "MALTA LINE" amount of wet application approx. 3.1 kg/m² and a thickness from 2.0 to 3.0 mm. The composition of the plaster is deposited with Deutsches Institut für Bautechnik. The reinforcement "VERTEX R 131", "VERTEX R 171" or "KELTEX Staklena mreza SM-25F" is worked into the outer third of base coat. The reinforcement consists of coated glass fibre mesh, with a mass per unit area of about 1.1 kg/m² and a mesh size of 3 mm x 4 mm. Additional information is deposited with Deutsches Institut für Bautechnik.

The external plaster "TIMFAS AKRIL K 2.0" is used amount of wet application 3.4 kg/m² and a thickness up to approx. 2.0 mm. The composition of the external plaster is deposited with Deutsches Institut für Bautechnik.

For the external walls type DOH & BIO and BIO Passiv (Annex A) the insulation (Insulation boards made of wood fibre according to EN 13171¹⁸) has to be fixed to the underground with staples. The staples according to EN 14592¹⁹ are made of stainless steel or an equivalent steel with regard to corrosion behaviour. The nominal diameter shall be $d_n \geq 1.8$ mm, the width of the staple crown shall be $b_R \geq 27$ mm and the length of the staple leg shall be $l_n \geq 75$ mm.

The insulation boards are to be fastened with at least 16 staples per m². The vertical distance of the fasteners is 150 mm. The anchoring length in the construction wood shall be at least 30 mm. The insulation boards are fastened with the staples to the ribs i.e. any fastening is to place through the lining or planking. Every insulation board is to fasten to at least two ribs with at least three staples.

The insulation boards shall be used with the designation T4-WS1.0-MU5 and a tensile strength according to EN 1607 of at least 8 kPa and a compression stress of at least 100 kPa with 10 % compression according to EN 826²⁰ shall be used. The apparent density according EN 1602²¹ has to be 250 kg/m³ (± 20 kg/m³).

The insulation boards are coated with the plaster "INTHERMO HDF-Armierungsmasse" (amount of wet application approx. 5.5 up to 10.0 kg/m² and a thickness from 4.0 to 7.0 mm). The composition of the plaster is deposited with Deutsches Institut für Bautechnik. The reinforcement "INTHERMO HDF-Armierungsgewebe" is worked into the outer third of base coat. The reinforcement consists of coated glass fibre mesh, with a mass per unit area of about 160 g/m² and a mesh size of 4 mm x 4 mm. Additional information is deposited with Deutsches Institut für Bautechnik.

- | | | |
|----|--|---|
| 15 | EN 13163:2008 | Thermal insulation products for buildings - Factory made products of expanded polystyrene (EPS) - Specification |
| 16 | FprEN 1607:2012 | Thermal insulations products for building applications - Determination of tensile strength perpendicular to faces |
| 17 | Each individual value of a test result shall include the value given here. | |
| 18 | EN 13171:2008 | Thermal insulation products for buildings - Factory made wood fibre (WF) products - Specification |
| 19 | EN 14592:2008+A1:2012 | Timber structures - Dowel-type fasteners - Requirements |
| 20 | FprEN 826:2012 | Thermal insulation products for building applications - Determination of compression behaviour |
| 21 | EN 1602:2012 | Thermal insulation products for building applications - Determination of the apparent density |

The external plaster "TIMFAS AKRIL K 2.0" is used (amount of wet application approx. 4 kg/m² resp 2 kg/m² and a thickness each with approx. 3.0 mm). The composition of the external plaster is deposited with Deutsches Institut für Bautechnik.

As windows wooden or plastic windows are used. In Annex A a plastic and a wooden window are listed. Other windows may also be used that meet the requirements at the construction site.

For roof covering normally concrete tiles according to EN 490²²/491²³ or clay tiles according to EN 1304²⁴ are used. Other roofings which fulfil the requirements at the place of use may also be used. The roof coverings are not part of the kit.

The connections to each other of the individual building components are shown in Annex B.

The necessary characteristic values for structural design can be gathered from Annex A or the standards referred to there, the ETAs, etc.

The anchorage of the external wall building components to the substructure (basement or foundation slab made of concrete) is performed with steel angles which are connected with screws with the external walls and with steel dowels with the foundation slab. The anchorage of the external wall building components to the substructure is shown in Annex B. The verification of the suction safety of the wall building components with the substructure shall be performed according to the relevant regulations of the member states where the kit was assembled.

The building components of the kit are compiled at the manufacturing plant in accordance with this ETA.

The European technical approval is issued for the kit on the basis of agreed data/information, deposited with Deutsches Institut für Bautechnik, which identifies the kit that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to Deutsches Institut für Bautechnik before the changes are introduced. Deutsches Institut für Bautechnik will decide whether or not such changes affect the ETA and consequently the validity of the CE marking on the basis of the ETA and if so whether further assessment or alterations to the ETA shall be necessary.

4.3 Substructure

This European technical approval does not include the base of the building.

The building system can be used for a separate building or attached as an increase to an existing building. The substructure must be made of concrete of at least strength class C20/25 according to EN 206-1²⁵ at least and must have a minimum thickness of 15 cm.

The tolerances of the surface of the base substructure shall be ± 5 mm.

More information as to the dimensions, if necessary, and the presentation of the details (e. g. as protective measures against rising moisture) for the manufacture of the substructure will be delivered by the manufacturer of the kit. The substructure will be designed and builded in accordance with local building regulations.

22	EN 490:2011	Concrete roofing tiles and fittings for roof covering and wall cladding - Product specification
23	EN 491:2011	Concrete roofing tiles and fittings for roof covering and wall cladding - Test methods
24	EN 1304:2005	Clay roofing tiles and fittings - Product definitions and specifications
25	EN 206-1:2000	Concrete - Part 1: Specification, performance, production and conformity

4.4 Execution of construction works

The manufacturer presented specific instructions for the installation of the kit into the works to the approval body. The specific instruction covers all important aspects related to the work on site, such as:

- erection techniques and necessary equipment,
- temporary bracing and weather protection,
- completion of joints between components of the kit (fixing, sealing against climatic influences, etc.),
- fixing of wind anchorage to the substructure and between building parts,
- additional building materials and building components applied on site and which are a precondition for the fitness of use of the kit,
- special boundary conditions (e.g. special crane requirements, hoisting strap positions, etc),
- the safety-at-work and health protection regulations have to be observed.

The completed building (construction 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 applicable procedures in the member state for demonstrating compliance with the building regulations shall also be observed by the entity responsible for this act. An ETA for a timber frame building kit does not amend this process in any way.

5 Indications for the manufacture and user

5.1 Packaging, transport and storage

The manufacturer's instructions with regard to packaging transport and storage must be obeyed. During transportation and storage the parts, components and materials shall be protected against mechanical damage and detrimental moisture effects.

5.2 Use, maintenance, repair

It is the manufacturer's responsibility to ensure that exact instructions are enclosed to each delivery as to the use of the kit which includes both the general conditions of this ETA as well as the specific installation instructions.

Damaged building elements or components of the kit may neither be used nor installed. Damaged building elements or components of the kit shall be exchanged immediately and replaced by flawless ones.

With regard to the assumed working life a regular maintenance is necessary. The manufacturer shall add written documents to the kit which contain descriptions about type and frequency of the maintenance.

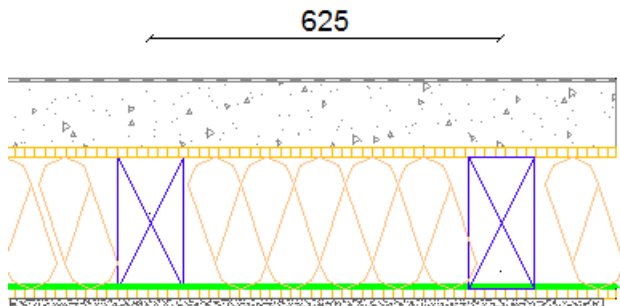
Georg Feistel
Head of Department

beglaubigt:
Niebur

ANNEX A – DESCRIPTION OF COMPONENTS

Elements of external walls

External wall OPTIMA (horizontal section)



Components (from bottom to top)

Nr.	Product	Dimensions [mm]	EN ETA	Reaction to fire
1	Gypsum plasterboard* (paper weight > 220 g/m ² ≤ 320 g/m ²)**	12.5	EN 520	B-s1, d0 (2006/673/EC)
2.1	Wood-based panel	12	EN 13986	D-s2, d0 (2007/348/EC)
2.2	Gypsum fibre board	12.5	ETA-03/0050	A2-s1, d0
3	Vapour barrier Airstop vap	0.2	EN 13984	Test method acc to EN 13501-1 Tab. 1, if required (req'd)
4.1	Mineral fibre insulation 035 MW-EN 13162-T2-AF.5	160	EN 13162	A1 (96/603/EC, supplemented by 2000/605/EC)
4.2	Cellulose 038	160	ETA-06/0076	B-s2, d0
5	Timber studs C24	80/160	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
	Top chord C24	80/160	as above	D-s2, d0 (2003/593/EC)
	Bottom chord C24	80/160	as above	D-s2, d0 (2003/593/EC)
6	Gypsum fibre board (ρ _{min} = 1000 kg/m ³)	12.5	ETA-03/0050	A2-s1, d0

External wall claddings:

7a	Adhesive mortar	2	ETA-10/0426	according to ETA-10/0426
7b	Polystyrene EPS EN 13163-T2- L2-W2-S2-P4-DS(70,-)2-DS(N)2	80	EN 13163	E
7c	Reinforced mortar	2-3	ETA-10/0426	according to ETA-10/0426
7d	Top coat	3	ETA-10/0426	according to ETA-10/0426

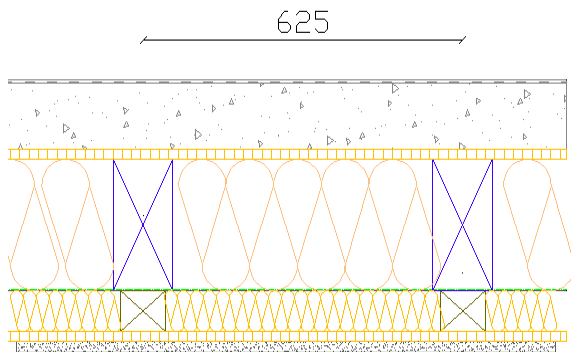
* The board also meets the requirements of DIN 18180.

** joints between the gypsum plasterboard ≤ 4mm

Fasteners

Components	Type	Spacing [mm]		Description
		Edge	Middle	
Wood-based panel to timber studs	Staples 155/45 CSG	≤ 75	≤ 150	P. 33
Gypsum plasterboard to wood-based panel	Screws TN35/212	≤ 250	≤ 250	P. 33

External wall OPTIMA plus (horizontal section)



Components (from bottom to top)

Nr.	Product	Dimensions [mm]	EN ETA	Reaction to fire
1	Gypsum plasterboard* (paper weight > 220 g/m ² ≤ 320 g/m ²)**	12.5	EN 520	B-s1, d0 (2006/673/EC)
2.1	Wood-based panel	12	EN 13986	D-s2, d0 (2007/348/EC)
2.2	Gypsum fibre board	12.5	ETA-03/0050	A2-s1, d0
3	Mineral fibre insulation 035 MW-EN 13162-T2-AF.5	50	EN 13162	A1 (96/603/EC, supplemented by 2000/605/EC)
4	Batten C24	50/60	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
5	Vapour barrier	0.2	EN 13984	Test method acc to EN 13501-1 Tab. 1, if req'd
6.1	Mineral fibre insulation 035 MW-EN 13162-T2-AF.5	160	EN 13162	A1 (96/603/EC, supplemented by 2000/605/EC)
6.2	Cellulose 038	160	ETA-06/0076	B-s2, d0
7	Timber studs C24	80/160	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
	Top chord C24	80/160	as above	D-s2, d0 (2003/593/EC)
	Bottom chord C24	80/160	as above	D-s2, d0 (2003/593/EC)
8	Gypsum fibre board (ρ _{min} = 1000 kg/m ³)	12.5	ETA-03/0050	A2-s1, d0

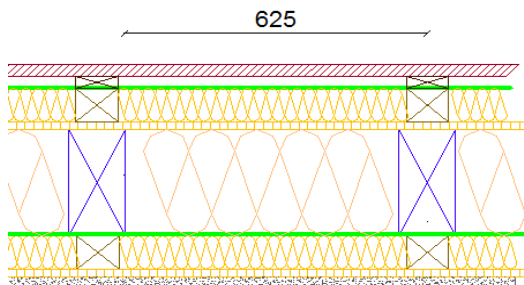
External wall claddings:

9a	Adhesive mortar	2	ETA-10/0426	according to ETA-10/0426
9b	Polystyrene EPS EN 13163-T2-L2-W2-S2-P4-DS(70,-)2-DS(N)2	80	EN 13163	E
9c	Reinforced mortar	2-3	ETA-10/0426	according to ETA-10/0426
9d	Top coat	3	ETA-10/0426	according to ETA-10/0426

Fasteners

Components	Type	Spacing [mm]		Description
		Edge	Middle	
Gypsum plasterboard to wood-based panel	Screws TN35/212	≤ 250	≤ 250	P. 33
Wood-based panel to batten	Staples 155/45 CSG	≤ 75	≤ 150	P. 33
Batten to studs	Ring nails 3,1/120	≤ 250	≤ 250	P. 33
Wood-based panel to studs	Staples 155/45 CSG	≤ 75	≤ 150	P. 33

External wall OPTIMA PLUS – Wooden facades (Horizontal section)



Components (from bottom to top)

Nr.	Product	Dimensions [mm]	EN ETA	Reaction to fire
1	Gypsum plasterboard* (paper weight > 220 g/m ² ≤ 320 g/m ²)**	12.5	EN 520	B-s1, d0 (2006/673/EC)
2.1	Wood-based panel	12	EN 13986	D-s2, d0 (2007/348/EC)
2.2	Gypsum fibre board	12.5	ETA-03/0050	A2-s1, d0
3	Mineral fibre insulation 035 MW-EN 13162-T2-AF.5	50	EN 13162	A1 (96/603/EC, supplemented by 2000/605/EC)
4	Batten C24	50/60	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
5	Vapour barrier Airstop vap	0.2	EN 13984	Test method acc to EN 13501-1 Tab. 1, if req'd
6	Mineral fibre insulation 035 MW-EN 13162-T2-AF.5	160	EN 13162	A1 (96/603/EC, supplemented by 2000/605/EC)
7	Timber studs C24	80/160	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
	Top chord C24	80/160	as above	D-s2, d0 (2003/593/EC)
	Bottom chord C24	80/160	as above	D-s2, d0 (2003/593/EC)
8.1	Wood-based panel	12	EN 13986	D-s2, d0 (2007/348/EC)
8.2	Gypsum fibre board	12.5	ETA-03/0050	A2-s1, d0

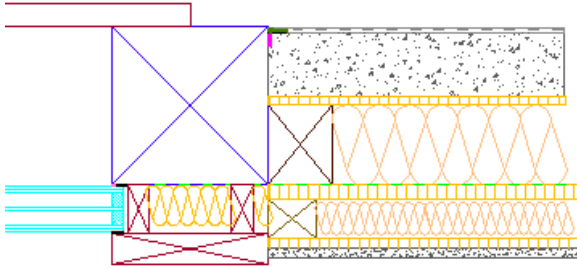
External wall claddings:

9a	Batten C24	50/60	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
9b	Mineral fibre insulation 035 MW-EN 13162-T2-AF.5	50	EN 13162	A1 (96/603/EC, supplemented by 2000/605/EC)
9c	Diffusion open foil	0.20	EN 13859-1-2	DIN 4102-B2
9d	Batten C24	28	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
9e	Wooden facade formwork	22	as above	D-s2, d0 (2003/593/EC)

Fasteners

Components	Type	Spacing [mm]		Description
		Edge	Middle	
Gypsum plasterboard to wood-based panel	Screws TN35/212	≤ 250	≤ 250	P. 33
Wood-based panel to batten	Staples 155/45 CSG	≤ 75	≤ 150	P. 33
Batten to studs	Ring nails 3,1/120	≤ 250	≤ 250	P. 33
Wood-based panel to studs	Staples 155/45 CSG	≤ 75	≤ 150	P. 33

External wall VITA NOVA (Horizontal section)



Components (from bottom to top)

Nr.	Product	Dimensions [mm]	EN ETA	Reaction to fire
1	Gypsum plasterboard* (paper weight > 220 g/m ² ≤ 320 g/m ²)**	12.5	EN 520	B-s1, d0 (2006/673/EC)
2.1	Wood-based panel	12	EN 13986	D-s2, d0 (2007/348/EC)
2.2	Gypsum fibre board	12.5	ETA-03/0050	A2-s1, d0
3	Mineral fibre insulation 035 MW-EN 13162-T2-AF.5	50	EN 13162	A1 (96/603/EC, supplemented by 2000/605/EC)
4	Batten C24	50/60	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
5	Wood-based panel	18	EN 13986	D-s2, d0 (2007/348/EC)
6	Vapour barrier	0.2	EN 13984	Test method acc to EN 13501-1 Tab. 1, if req'd
7.1	Mineral fibre insulation 035 MW-EN 13162-T2-AF.5	100	EN 13162	A1 (96/603/EC, supplemented by 2000/605/EC)
7.2	Cellulose 038	100	ETA-06/0076	B-s2, d0
8	Timber studs C24	80/100	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
	Top chord C24	80/100	as above	D-s2, d0 (2003/593/EC)
	Bottom chord C24	80/100	as above	D-s2, d0 (2003/593/EC)
9	Gypsum fibre board (ρ _{min} = 1000 kg/m ³)	12.5	ETA-03/0050	A2-s1, d0

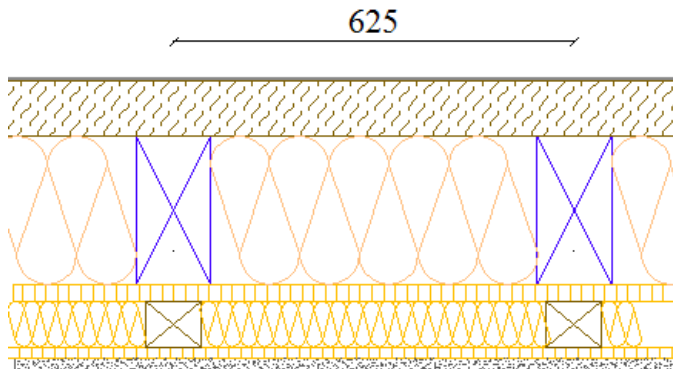
External wall claddings:

10a	Adhesive mortar	2	ETA-10/0426	according to ETA-10/0426
10b	Polystyrene EPS EN 13163-T2-L2-W2-S2-P4-DS(70,-)2-DS(N)2	80	EN 13163	E
10c	Reinforcing mortar	2-3	ETA-10/0426	according to ETA-10/0426
10d	Top coat	3	ETA-10/0426	according to ETA-10/0426

Fasteners

Components	Type	Spacing [mm]		Description
		Edge	Middle	
Gypsum plasterboard to wood-based panel	Screws TN35/212	≤ 250	≤ 250	P. 33
Wood-based panel to batten	Staples 155/45 CSG	≤ 75	≤ 150	P. 33
Batten to studs	Ring nails 3.1/120	≤ 250	≤ 250	P. 33
Wood-based panel to studs	Staples 155/45 CSG	≤ 75	≤ 150	P. 33

External wall DOH & BIO (Horizontal section)



Components (from bottom to top)

Nr.	Product	Dimensions [mm]	EN ETA	Reaction to fire
1	Gypsum plasterboard* (paper weight > 220 g/m ² ≤ 320 g/m ²)**	12.5	EN 520	B-s1, d0 (2006/673/EC)
2.1	Wood-based panel	12	EN 13986	D-s2, d0 (2007/348/EC)
2.2	Gypsum fibre board	12.5	ETA-03/0050	A 2-s1, d0
3	Mineral fibre insulation 035 MW-EN 13162-T2-AF.5	50	EN 13162	A1 (96/603/EC, supplemented by 2000/605/EC)
4	Batten C24	50/60	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
5.1	Wood-based panel	18	EN 13986	D-s2, d0 (2007/348/EC)
5.2	Gypsum fibre board	12.5	ETA-03/0050	A2-s1, d0
6.1 DOH	Mineral fibre insulation 040 MW-EN 13162 T2-WS-WL(P)	160	EN 13162	A1 (96/603/EC, supplemented by 2000/605/EC)
6.2 BIO	Wood fibre insulation 040	160	EN 13171	EN 13501-1
6.3	Cellulose 038	160	ETA-06/0076	B-s2, d0
7	Timber studs C24	80/160	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
	Top chord C24	80/160	as above	D-s2, d0 (2003/593/EC)
	Bottom chord C24	80/160	as above	D-s2, d0 (2003/593/EC)

External wall claddings:

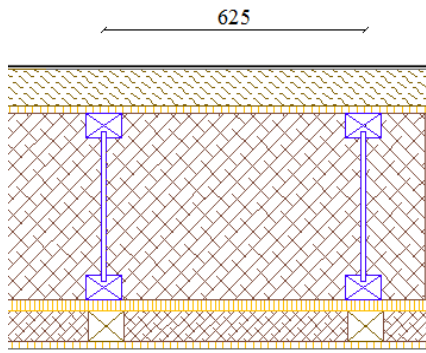
8a	Staples	110		
8b	Wooden fibre insulating board	60	EN 13171	EN 13501-1
8c	Reinforcement INTHERMO HDF with fabric mash	4-7	***	according to Z-33.47-668
8d	Top coat INTHERMO HFD	3	***	according to Z-33.47-668

*** see German approval Z-33.47-668

Fasteners

Components	Type	Spacing [mm]		Description
		Edge	Middle	
Gypsum plasterboard to wood-based panel	Screws TN35/212	≤ 250	≤ 250	P. 33
Wood-based panel to batten	Staples 155/45 CSG	≤ 75	≤ 150	P. 33
Batten to studs	Ring nails 3.1/120	≤ 250	≤ 250	P. 33
Wood-based panel to studs	Staples 155/45 CSG	≤ 75	≤ 150	P. 33

External wall BIO Passiv (Horizontal section)



Components (from bottom to top)

Nr.	Product	Dimensions [mm]	EN ETA	Reaction to fire
1	Gypsum plasterboard* (paper weight > 220 g/m ² ≤ 320 g/m ²)**	12.5	EN 520	B-s1, d0 (2006/673/EC)
2.1	Wood-based panel	12	EN 13986	D-s2, d0 (2007/348/EC)
2.2	Gypsum fibre board	12.5	ETA-03/0050	A2-s1, d0
3	Mineral fibre insulation 035 MW-EN 13162-T2-AF.5	50	EN 13162	A1 (96/603/EC, supplemented by 2000/605/EC)
4	Batten C24	50/60	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
5.1	Wood-based panel	18	EN 13986	D-s2, d0 (2007/348/EC)
5.2	Gypsum fibre board	12.5	ETA-03/0050	A 2-s1, d0
6.1	Wood fibre insulation 040	300	EN 13171	EN 13501-1
6.2	Cellulose 038	300	ETA-06/0076	B-s2, d0
7	STEICOjoist	300	ETA-06/0238	D-s2, d0 (2003/593/EC)
8	Wood-based panel	12	EN 13986	D-s2, d0 (2007/348/EC)

External wall claddings:

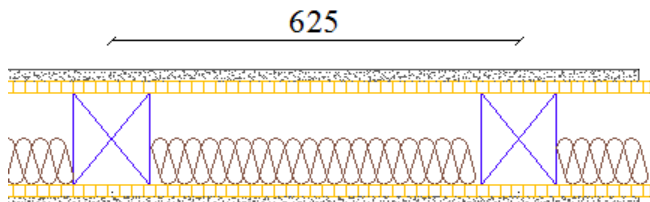
9a	Staples	110		
9b	Wooden fibre insulating board	60	EN 13171	EN 13501-1
9c	Reinforcement INTHERMO HDF with fabric mash	4-7	***	according to Z-33.47-668
9d	Top coat INTHERMO HFD	3	***	according to Z-33.47-668

Fasteners

Components	Type	Spacing [mm]		Description
		Edge	Middle	
Gypsum plasterboard to wood-based panel	Screws TN35/212	≤ 250	≤ 250	P. 33
Wood-based panel to battens	Staples 155/45 CSG	≤ 75	≤ 150	P. 33
Batten to timber studs	Ring nails 3,1/120	≤ 250	≤ 250	P. 33
Wood-based panel to timber studs	Staples 155/45 CSG	≤ 75	≤ 150	P. 33

Elements of internal walls

Elements of internal walls OPTIMA & DOH & BIO (Horizontal section)



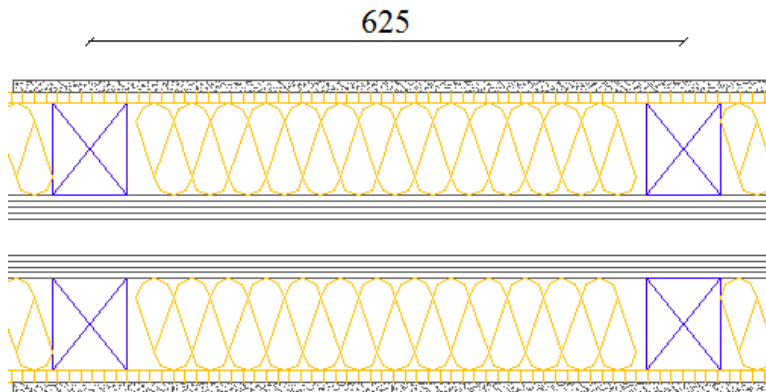
Components (from bottom to top)

Nr.	Product	Dimensions [mm]	EN ETA	Reaction to fire
1	Gypsum plasterboard* (paper weight > 220 g/m ² ≤ 320 g/m ²)**	12.5	EN 520	B-s1, d0 (2006/673/EC)
2.1	Wood-based panel	12	EN 13986	D-s2, d0 (2007/348/EC)
2.2	Gypsum fibre board	12.5	ETA 03/0050	A2-s1, d0
3.1 OPTIMA	Mineral fibre insulation 035 MW-EN 13162-T2-AF.5	50	EN 13162	A1 (96/603/EC, supplemented by 2000/605/EC)
3.2 DOH	Mineral fibre insulation 040 MW-EN 13162 T2-WS-WL(P)	50	EN 13162	A1 (96/603/EC, supplemented by 2000/605/EC)
3.3 BIO	Wood fibre insulation 040	50	EN 13171	EN 13501-1
3.4	Cellulose 038	50	ETA-06/0076	B-s2, d0
4	Timber studs C24	80/100	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
	Top chord C24	80/100	as above	D-s2, d0 (2003/593/EC)
	Bottom chord C24	80/100	as above	D-s2, d0 (2003/593/EC)
5.1	Wood-based panel	12	EN 13986	D-s2, d0 (2007/348/EC)
5.2	Gypsum fibre board	12.5	ETA-03/0050	A2-s1, d0
6	Gypsum plasterboard* (> 220 g/m ² ≤ 320 g/m ²)**	12.5	EN 520	B-s1, d0 (2006/673/EC)

Fasteners

Components	Type	Spacing [mm]		Description
		Edge	Middle	
Wood-based panel to studs	Staples 155/45 CSG	≤ 75	≤ 150	P. 33
Gypsum plasterboard to wood-based panel	Screws TN35/212	≤ 250	≤ 250	P. 33

Fire protection wall REI 60/90 (Horizontal section)



Components (from bottom to top)

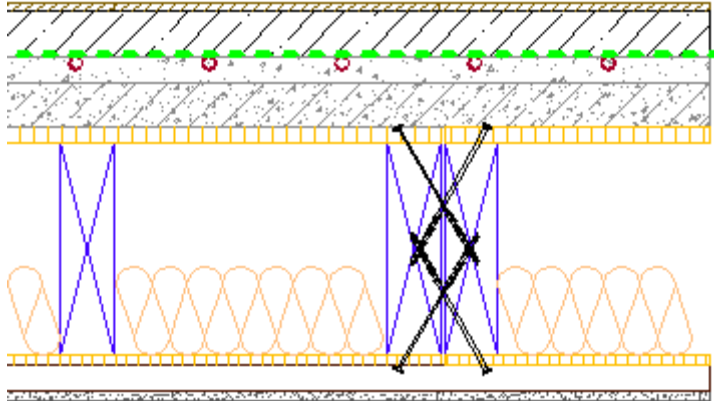
Nr.	Product	Dimensions [mm]	EN ETA	Reaction to fire
1	Gypsum plasterboard* (paper weight > 220 g/m ² ≤ 320 g/m ²)**	12.5	EN 520	B-s1, d0 (2006/673/EC)
2.1	Wood-based panel	12	EN 13986	D-s2, d0 (2007/348/EC)
2.2	Gypsum fibre board	12.5	ETA-03/0050	A2-s1, d0
3	Mineral fibre insulation 040 MW-EN 13162 T2-WS-WL(P)	160	EN 13162	A1 (96/603/EC, supplemented by 2000/605/EC)
4	Timber studs C24	80/100	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
	Top chord C24	80/100	as above	D-s2, d0 (2003/593/EC)
	Bottom chord C24	80/100	as above	D-s2, d0 (2003/593/EC)
5	Gypsum fibre board	12.5	ETA-03/0050	A2-s1, d0
6	Gypsum fibre board	12.5	ETA-03/0050	A2-s1, d0

Fasteners

Components	Type	Spacing [mm]		Description
		Edge	Middle	
Gypsum fibre board to timber studs	Staples 155/45 CSG	≤ 75	≤ 150	P. 33
Wood-based panel to timber studs	Staples 155/45 CSG	≤ 75	≤ 150	P. 33
Gypsum plasterboard to wood-based panel	Screws TN35/212	≤ 250	≤ 250	P. 33

Ceiling elements

Ceiling OPTIMA & DOH & BIO Type 1



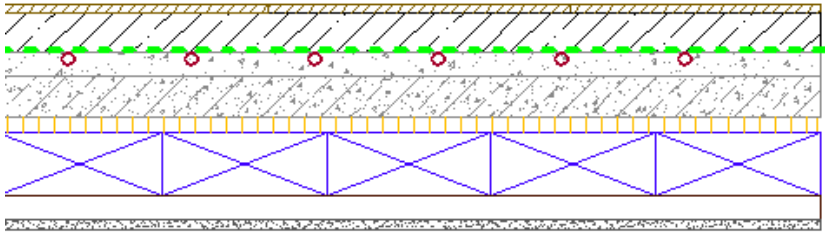
Components (from bottom to top)

Nr.	Product	Dimensions [mm]	EN ETA	Reaction to fire
1	Gypsum plasterboard* (paper weight > 220 g/m ² ≤ 320 g/m ²)**	12.5	EN 520	B-s1, d0 (2006/673/EC)
2	Batten C24	48/28, 60/28	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
3	Wood-based panel	12	EN 13986	D-s2, d0 (2007/348/EC)
4.1 OPTIMA	Mineral fibre insulation 035 MW-EN 13162-T2-AF.5	50	EN 13162	A1 (96/603/EC, supplemented by 2000/605/EC)
4.2 DOH	Mineral fibre insulation 040 MW-EN 13162 T2-WS-WL(P)	50	EN 13162	A1 (96/603/EC, supplemented by 2000/605/EC)
4.3 BIO	Wood fibre insulation 040	50	EN 13171	EN 13501-1
4.4	Cellulose 038	50	ETA-06/0076	B-s2, d0
5	Timber beam C24	60/240	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
6	Wood-based panel	18	EN 13986	D-s2, d0 (2007/348/EC)
7	Impact sound insulation, on site	40	EN 13162	
8	Thermal insulation, on site	40	EN 13162	
9	Cement screed, on site	60	-	
10	Final floor covering, on site		-	

Fasteners

Components	Type	Spacing [mm]		Description
		Edge	Middle	
Gypsum plasterboard to batten	Screws TN35/212	≤ 250	≤ 250	P. 33
Batten to wood-based panel	Nails 2.8/70	≤ 250	≤ 250	P. 33
Wood-based panel to beam	Staples 155/45 CSG	≤ 75	≤ 150	P. 33

Ceiling Type 2



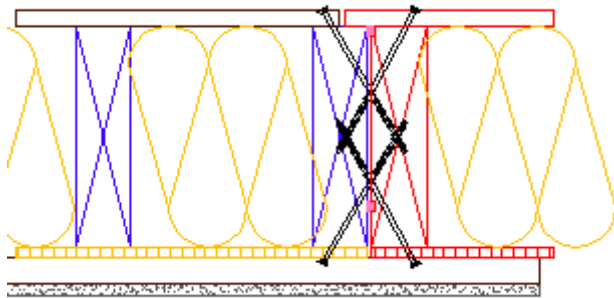
Components (from bottom to top)

Nr.	Product	Dimensions [mm]	EN ETA	Reaction to fire
1	Gypsum plasterboard* (paper weight > 220 g/m ² ≤ 320 g/m ²)**	12.5	EN 520	B-s1, d0 (2006/673/EC)
2	Batten C24	48/28, 60/28	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
3	Ceiling board C24	200/acc. to statics	EN 338 EN 14081	D-s2, d0 (2007/348/EC)
4	Wood-based panel	18	EN 13986	D-s2, d0 (2007/348/EC)
5	Impact sound insulation, on site	40	EN 13162	
6	Thermal insulation, on site	40	EN 13162	
7	Cement screed, on site	60	-	
8	Final floor covering, on site	-	-	

Fasteners

Components	Type	Spacing [mm]		Description
		Edge	Middle	
Gypsum plasterboard to batten	Screws TN35/212	≤ 250	≤ 250	P. 33
Batten to ceiling board	Nails 2.8/70	≤ 250	≤ 250	P. 33
Wood-based panel to ceiling board	Staples 76/64 CSG	≤ 75	≤ 150	P. 33

Ceiling under not developed attic OPTIMA & DOH & BIO



Components (from bottom to top)

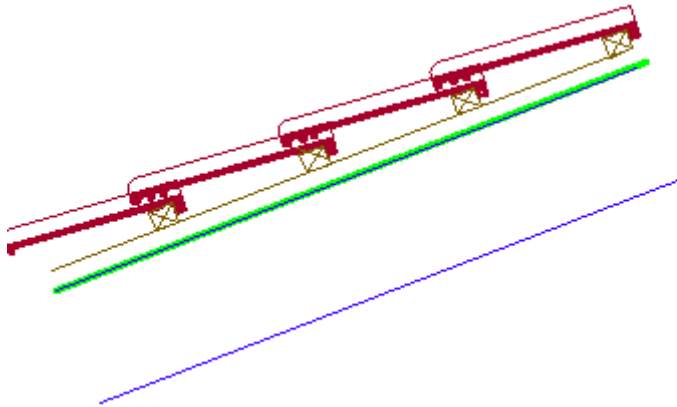
Nr.	Product	Dimensions [mm]	EN ETA	Reaction to fire
1	Gypsum plasterboard* (paper weight > 220 g/m ² ≤ 320 g/m ²)**	12.5	EN 520	B-s1, d0 (2006/673/EC)
2	Batten C24	48/28, 60/28	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
3	Wood-based panel	12	EN 13986	D-s2, d0 (2007/348/EC)
4.1 OPTIMA	Mineral fibre insulation 035 MW-EN 13162-T2-AF.5	240	EN 13162	A1 (96/603/EC, supplemented by 2000/605/EC)
4.2 DOH	Mineral fibre insulation 040 MW-EN 13162 T2-WS-WL(P)	240	EN 13162	A1 (96/603/EC, supplemented by 2000/605/EC)
4.3 BIO	Wood fibre insulation 040	240	EN 13171	EN 13501-1
4.4	Cellulose 038	240	ETA-06/0076	B-s2, d0
5	Timber beam C24	60/240	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
6	Wooden board	22	as above	D-s2, d0 (2003/593/EC)
7 optional	Gypsum fibre board	10	ETA-03/0050	B-s1, d0 (2006/673/EC)

Fasteners

Components	Type	Spacing [mm]		Description
		Edge	Middle	
Gypsum plasterboard to batten	Screws TN35/212	≤ 250	≤ 250	P. 33
Batten to wood-based panel	Nails 2,8/70	≤ 250	≤ 250	P. 33
Wood-based panel to beam	Staples 76/64 CSG	≤ 150	≤ 150	P. 33
Wooden board to beam	Staples 76/64 CSG	≤ 75	≤ 100	P. 33
Gypsum fibre board to beam	Staples 155/45 CSG	≤ 75	≤ 150	P. 33

Roof elements

Roof OPTIMA & DOH & BIO (not developed)



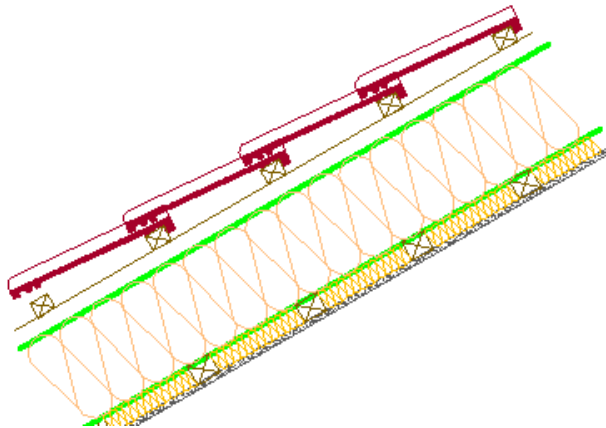
Components (from bottom to top)

Nr.	Product	Dimensions [mm]	EN ETA	Reaction to fire
1	Rafter C24	80/240	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
2	PE foil as sarking membran, diffusion open	0.20	EN 13859-1	
3	Counter batten	40/50	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
4	Roof batten	40/50	as above	D-s2, d0 (2003/593/EC)
5	Roof cladding, on site	-		

Fasteners

Components	Type	Spacing [mm]		Description
		Edge	Middle	
Counter batten to rafter	Nails 4.2/120			P. 33
Roof batten to counter batten	Nails 3.1/90			P. 33

Roof OPTIMA & DOH & BIO Type 1



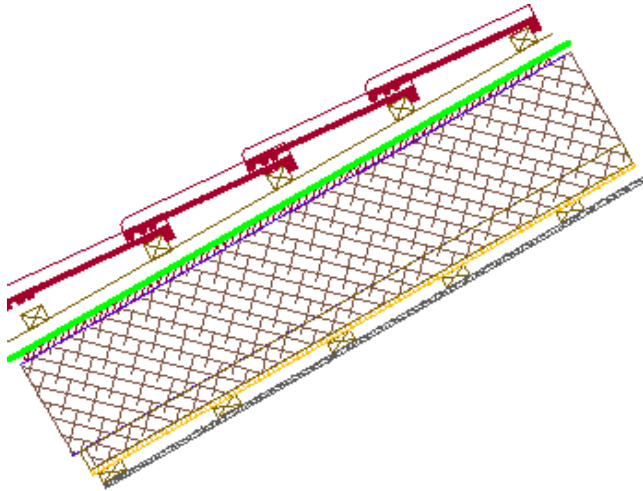
Components (from bottom to top)

Nr.	Product	Dimensions [mm]	EN ETA	Reaction to fire
1	Gypsum plasterboard > 220 g/m ² ≤ 320 g/m ² **	12.5	EN 520	B-s1, d0 (2006/673/EC)
2.1 OPTIMA	Mineral fibre insulation 035 MW-EN 13162-T2-AF.5	50	EN 13162	A1 (96/603/EC, supplemented by 2000/605/EC)
2.2 DOH	Mineral fibre insulation 040 MW-EN 13162 T2-WS-WL(P)	50	EN 13162	A1 (96/603/EC, supplemented by 2000/605/EC)
2.3 BIO	Wood fibre insulation 040	50	EN 13171	EN 13501-1
2.4	Cellulose 038	50	ETA-06/0076	B-s2, d0
3	Batten C24	50/60	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
4	Vapour permeable barrier	0.2	EN ISO 12572	no performance determined
5	Rafter C24	80/240	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
6.1 OPTIMA	Mineral fibre insulation 035 MW-EN 13162-T2-AF.5	240	EN 13162	A1 (96/603/EC, supplemented by 2000/605/EC)
6.2 DOH	Mineral fibre insulation 040 MW-EN 13162 T2-WS-WL(P)	240	EN 13162	A1 (96/603/EC, supplemented by 2000/605/EC)
6.3 BIO	Wood fibre insulation 040	240	EN 13171	EN 13501-1
6.4	Cellulose 038	240	ETA-06/0076	B-s2, d0
7	PE foil as sarking membran, diffusion open	0.20	EN 13859-1	
8	Counter batten	40/50	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
9	Roof batten	40/50	as above	D-s2, d0 (2003/593/EC)
10	Roof cladding, on site	-		

Fasteners

Components	Type	Spacing [mm]		Description
		Edge	Middle	
Gypsum plasterboard to batten	Screws TN35/212	≤ 250	≤ 250	P. 33
Batten to rafter	Nails 3.1/90			P. 33
Counter batten to rafter	Nails 4.2/120			P. 33
Roof batten to counter batten	Nails 3.1/90			P. 33

Roof elements BIO Type 2



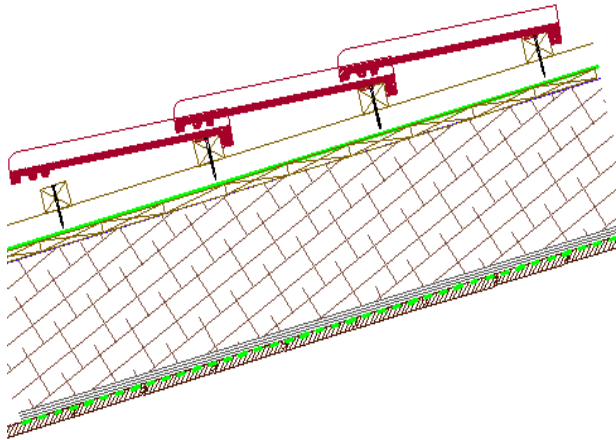
Components (from bottom to top)

Nr.	Product	Dimensions [mm]	EN ETA	Reaction to fire
1	Gypsum plasterboard > 220 g/m ² ≤ 320 g/m ² **	12.5	EN 520	B-s1, d0 (2006/673/EC)
2	Batten	28/60	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
3	Wood-based panel	12	EN 13986	D-s2,d0 (2007/348/EC)
4.1	Wood fibre insulation 040	50	EN 13171	EN 13501-1
4.2	Cellulose 038	50	ETA-06/0076	B-s2, d0
5	Batten C24	50/60	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
6.1	Wood fibre insulation 040	240	EN 13171	EN 13501-1
6.2	Cellulose 038	240	ETA-06/0076	B-s2, d0
7	Rafter C24	80/240	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
8	Wooden board	22	as above	D-s2, d0 (2003/593/EC)
9	PE foil as sarking membran, diffusion open	0,20	EN 13859-1	
10	Counter batten	40/50	EN 338 EN 14081	D-s2, 0 (2003/593/EC)
10	Roof batten	40/50	as above	D-s2,d0 (2003/593/EC)
11	Roof cladding, on site			

Fasteners

Components	Type	Spacing [mm]		Description
		Edge	Middle	
Gypsum plasterboard to batten	Screws TN35/212	≤ 250	≤ 250	P. 33
Batten to wood-based panel	Nails 2.8/70			P. 33
Batten to rafter	Staples 76/64 CSG			P. 33
Wooden board to rafter	Staples 76/64 CSG			P. 33
Counter batten to rafter	Nails 4.2/120			P. 33
Roof batten to counter batten	Nails 3.1/90			P. 33

Roof BIO, Type 3



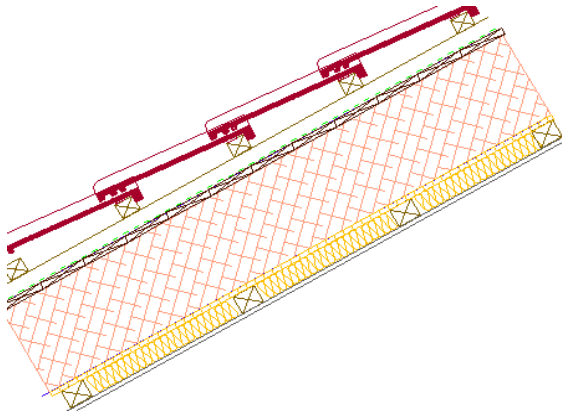
Components (from bottom to top)

Nr.	Product	Dimensions [mm]	EN ETA	Reaction to fire
1	Cladding (Wooden board with tongue & groove)	22	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
2	Vapour permeable barrier	0.2	EN ISO 12572	no performance determined
3	Gypsum fibre board	12.5	ETA-03/0050	A2-s1, d0
4	Wood fibre insulation 040	240	EN 13171	EN 13501-1
5	Cellulose 038	240	ETA-06/0076	B-s2, d0
6	Rafter C24	80/240	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
7	Wooden board	22	as above	D-s2, d0 (2003/593/EC)
8	PE foil as sarking membrane, diffusion open	0.20	EN 13859-1	
9	Counter batten	40/50	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
10	Roof batten	40/50	as above	D-s2, d0 (2003/593/EC)
11	Roof cladding, on site			

Fasteners

Components	Type	Spacing [mm]		Description
		Edge	Middle	
Siding T&G to gypsum fibre board	Staples 76/64 CSG			P. 33
Gypsum fibre board to rafter	Staples 76/64 CSG			P. 33
Wooden board	Nails 2.8/70			P. 33
Counter batten to rafter	Nails 4.2/120			P. 33
Roof batten to counter batten	Nails 3.1/90			P. 33

Roof Vita nova



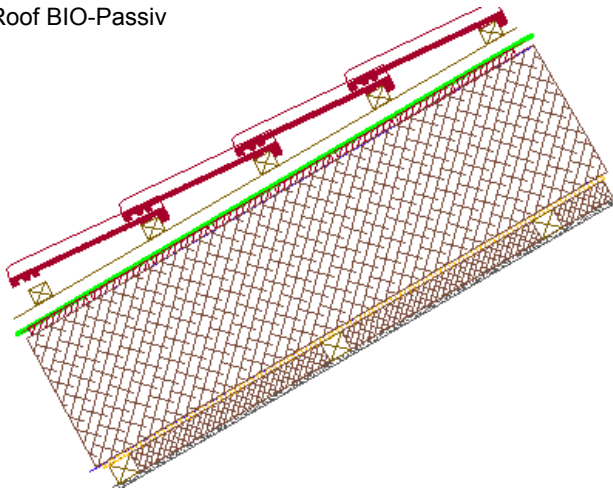
Components (from bottom to top)

Nr.	Product	Dimensions [mm]	EN ETA	Reaction to fire
1	Gypsum plasterboard > 220 g/m ² ≤ 320 g/m ² **	12.5	EN 520	B-s1, d0 (2006/673/EC)
2	Mineral fibre insulation 035 MW-EN 13162-T2-AF.5	50	EN 13162	A1 (96/603/EC, supplemented by 2000/605/EC)
3	Batten C24	50/60	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
4	Wood-based panel	12	EN 13986	D-s2, d0 (2007/348/EC)
5	Rafter C24	80/240	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
6.1	Wood fibre insulation 040	240	EN 13171	EN 13501-1
6.2	Cellulose 038	240	ETA-06/0076	B-s2, d0
7	Wooden board	22	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
8	PE foil as sarking membrane, diffusion open	0.20	EN 13859-1	
9	Counter batten	40/50	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
10	Roof batten	40/50	as above	D-s2, d0 (2003/593/EC)
11	Roof cladding, on site			

Fasteners

Components	Type	Spacing [mm]		Description
		Edge	Middle	
Gypsum plasterboard to batten	Screws TN35/212	≤ 250	≤ 250	P. 33
Batten to wood-based panel	Nails 2.8/70			P. 33
Wood-based panel to rafter	Staples 76/64 CSG			P. 33
Wooden board to rafter	Staples 76/64 CSG			P. 33
Counter batten to rafter	Nails 4.2/120			P. 33
Roof batten to counter batten	Nails 3.1/90			P. 33

Roof BIO-Passiv



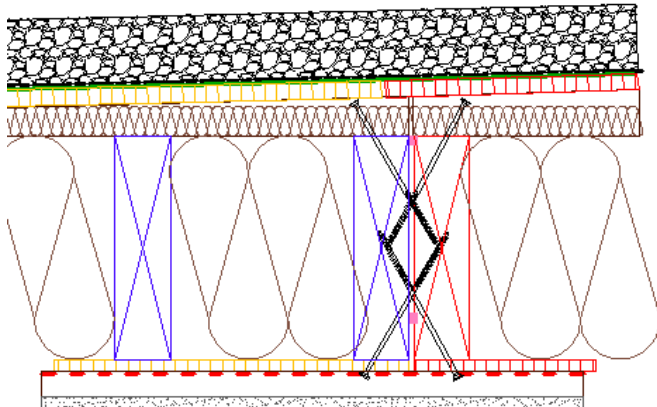
Components (from bottom to top)

Nr.	Product	Dimensions [mm]	EN ETA	Reaction to fire
1	Gypsum plasterboard*(Paper weight) > 220 g/m ² ≤ 320 g/m ² **	12.5	EN 520	B-s1, d0 (2006/673/EC)
2.1	Mineral fibre insulation 035 MW-EN 13162-T2-AF.5	50	EN 13162	A1 (96/603/EC, supplemented by 2000/605/EC)
2.2	Cellulose 038	50	ETA-06/0076	B-s2, d0
3	Batten C24	50/60	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
4	Wood-based panel	12	EN 13986	D-s2,d0 (2007/348/EC)
5	STEICOjoist	360	ETA-06/0238	D-s2, d0 (2003/593/EC)
6.1	Wood fibre insulation 040	360	EN 13171	EN 13501-1
6.2	Cellulose 038	360	ETA-06/0076	B-s2, d0
7	Wooden board	22	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
8	PE foil as sarking membrane, diffusion open	0.20	EN 13859-1	
9	counter batten	40/50	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
10	Roof batten	40/50	as above	D-s2, d0 (2003/593/EC)
11	Roof cladding, on site			

Fasteners

Components	Type	Spacing [mm]		Description
		Edge	Middle	
Gypsum plasterboard to batten	Screws TN35/212	≤ 250	≤ 250	P. 33
Batten to wood-based panel	Nails 2.8/70			P. 33
Wood-based panel to roof I-rafter	Staples 76/64 CSG			P. 33
Wooden board to roof I-rafter	Staples 76/64 CSG			P. 33
Counter batten to roof I-rafter	Nails 4.2/120			P. 33
Roof batten to counter batten	Nails 3.1/90			P. 33

Flat roof with ceiling beams



Components (from bottom to top)

Nr.	Product	Dimensions [mm]	EN ETA	Reaction to fire
1	Gypsum plasterboard* (Paper weight) > 220 g/m ² ≤ 320 g/m ² **	12.5	EN 520	B-s1, d0 (2006/673/EC)
2	Batten C24	48/28, 60/28	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
3	Vapour barrier with aluminium foil	0.4	EN 13970	EN 13501-1; class E
4	Wood-based panel	12	EN 13986	D-s2, d0 (2007/348/EC) no performance determined
5.1 OPTIMA	Mineral fibre insulation 035 MW-EN 13162-T2-AF.5	240	EN 13162	A1 (96/603/EC, supplemented by 2000/605/EC)
5.2 DOH	Mineral fibre insulation 040 MW-EN 13162 T2-WS-WL(P)	240	EN 13162	A1 (96/603/EC, supplemented by 2000/605/EC)
5.3 BIO	Wood fibre insulation 040	240	EN 13171	EN 13501-1
5.4	Cellulose 038	240	ETA-06/0076	B-s2, d0
6	Batten with pitch C24	60/240	EN 338 EN 14081	D-s2, d0 (2003/593/EC)
7	Timber beam C24	20-60		
8	Wood-based panel	12	EN 13986	D-s2, d0 (2007/348/EC)
9	Water spout, on site			
10	Geotextile, on site			
11	Gravel, on site	50-70		

Fasteners

Components	Type	Spacing [mm]		Description
		Edge	Middle	
Gypsum plasterboard to batten	Screws TN35/212	≤ 250	≤ 250	P. 33
Battens to wood-based panel	Nails 2.8/70	≤ 250	≤ 250	P. 33
Wood-based panel to beam	Staples 76/64 CSG	≤ 150	≤ 150	P. 33
Wooden board to beam	Staples 76/64 CSG	≤ 75	≤ 100	P. 33

Example of the characteristics of a Wooden window

Air permeability according to EN 12207:	Class 4
Driving rain resistance according to EN 12208:	Class 7A
Wind resistance according to EN 12210:	Class C3/B3
Thermal transmittance coefficient of the frame according to EN 12412-2:	$U_f = 1.1 \text{ W}/(\text{m}^2\text{K})$
Thermal transmittance coefficient of the glass according to EN 673:	$U_g = 0.7 \text{ W}/(\text{m}^2\text{K})$
Thermal transmittance coefficient of the window acc to EN ISO 10077-1:	$U_w = 1.1 \text{ W}/(\text{m}^2\text{K})$
Degree of energy transmittance of the glass according to EN 410:	$g = 43 \%$

Example of the characteristics of a PVC window

Air permeability according to EN 12207:	Class 4
Driving rain resistance according to EN 12208:	Class 9A
Wind resistance according to EN 12210:	Class C3/B3
Thermal transmittance coefficient of the frame according to EN 12412-2:	$U_f = 1.1 \text{ W}/(\text{m}^2\text{K})$
Thermal transmittance coefficient of the glass according to EN 673:	$U_g = 0.7 \text{ W}/(\text{m}^2\text{K})$
Thermal transmittance coefficient of the window acc to EN ISO 10077-1:	$U_w = 0.93 \text{ W}/(\text{m}^2\text{K})$
Degree of energy transmittance of the glass according to EN 410:	$g = 43 \%$

Fasteners

For the fasteners used the minimum specifications for material or protection against corrosion according to EN 1995-1-1¹, clause 4.2 with Table 4.1, or national regulations at the building site are to be considered. Depending on the requirements at the place of use a higher corrosion protection may be requested and executed.

The manufacturing of the dowel-type fasteners is carried out according to EN 14592.

Staples

For all the staples the characteristic value of the withdrawal strength related to a staple shank is

$$f_{ax,k} = 40 \times 10^{-6} \rho_k^2 \text{ [N/mm}^2\text{]} \text{ (with } \rho_k = \text{characteristic value of raw density in kg/m}^3\text{)}.$$

The following staples in accordance to EN 14592 are made of galvanized round steel wire (zinc coating $\geq 50 \text{ g/m}^2$) with a tensile strength of $\geq 1000 \text{ [N/mm}^2\text{]}$ and have the following dimensions:

Type	shaft length	minimum length of coating	Back width	Wire diameter
	l_n [mm]	l_H [mm]	b_R [mm]	d_n [mm]
CSG 155/45	45	26	10.6	1.51
CSG 76/64	64	35	11.14	1.51
Haubold-staples with a diameter of 2 mm	≥ 70	40	27	2.0

Screws

The screws are made of phosphated steel round wire and have the following dimensions:

Diameter d_n x length l_n :

4.0 x 50; 5.0 x 60; 5.0 x 70; 5.0 x 80; 5.0 x 100; 6.0 x 100; 6.0 x 120; 6.0 x 140; 6.0 x 160; 6.0 x 180; 8.0 x 200; 8.0 x 240; 8.0 x 280; 8.0 x 320; 8.0 x 340; 8.0 x 360; 8.0 x 400

The characteristic value of the withdrawal strength is $f_{ax,k} = 70 \times 10^{-6} \rho_k^2 \text{ [N/mm}^2\text{]}$ (with ρ_k = characteristic value of density in kg / m^3).

Nails

The nails are made of round steel with a tensile strength of $600 \text{ [N/mm}^2\text{]}$ and have the following dimensions:

Diameter d_n x length l_n :

Smooth nails

3.8 x 120; 4.6 x 145; 3.8 x 100; 3.4 x 120; 5.0 x 140; 5.6 x 180; 6.0 x 260; 6.0 x 280; 6.0 x 330

Threaded nails

2.8 x 70; 3.1 x 90

The characteristic value of the withdrawal strength of the ring nails is $f_{ax,k} = 50 \times 10^{-6} \rho_k^2 \text{ [N/mm}^2\text{]}$ (with ρ_k = characteristic value of density).

¹ EN 1995-1-1:2004 + AC:2006 + A1:2008 Eurocode 5: Design of timber structures - Part 1-1 General - Common rules and rules for buildings

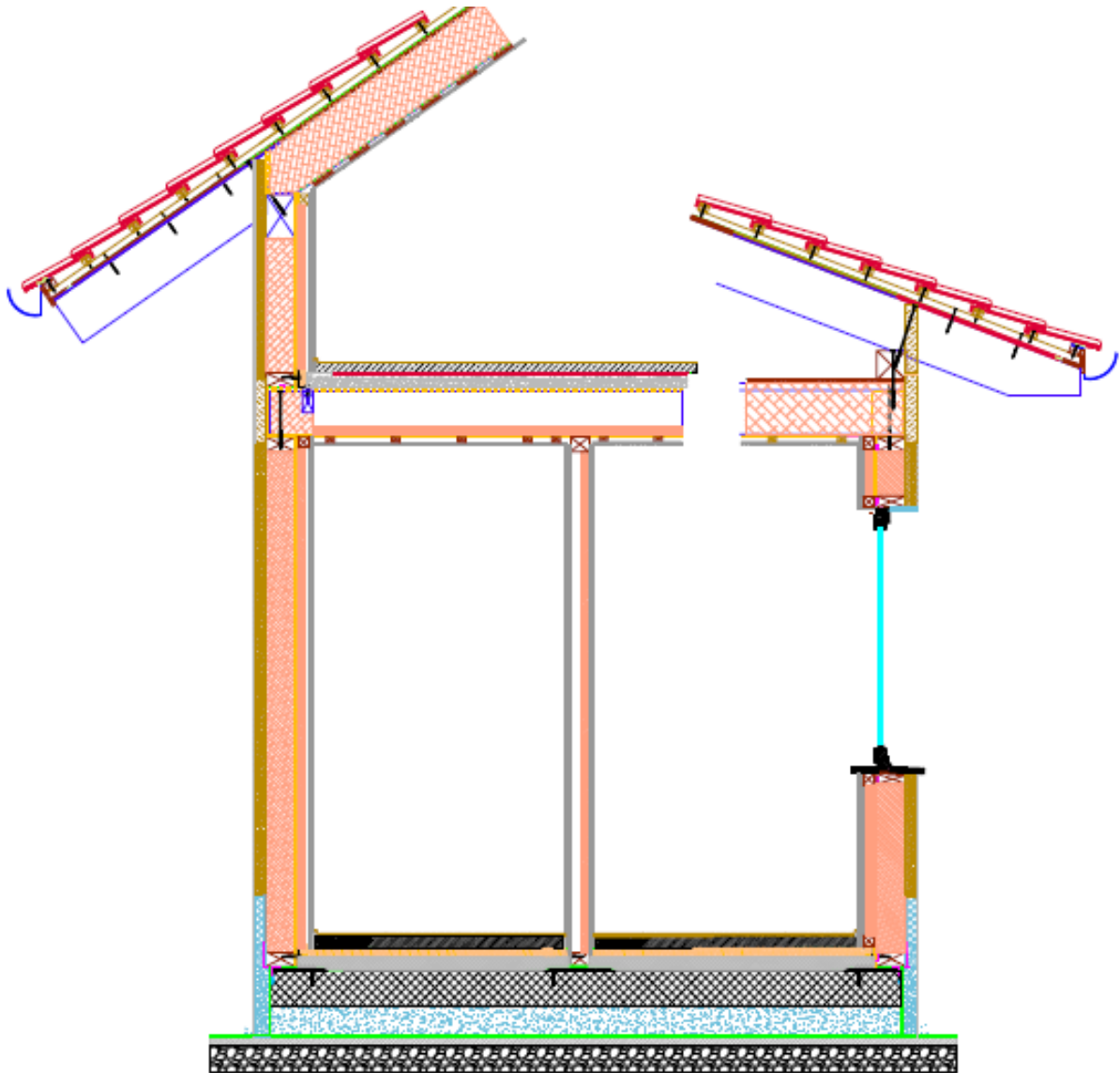
ANNEX B - CONSTRUCTION DETAILS

Timber frame building kits type OPTIMA, DOH, BIO
Kager-Hisa

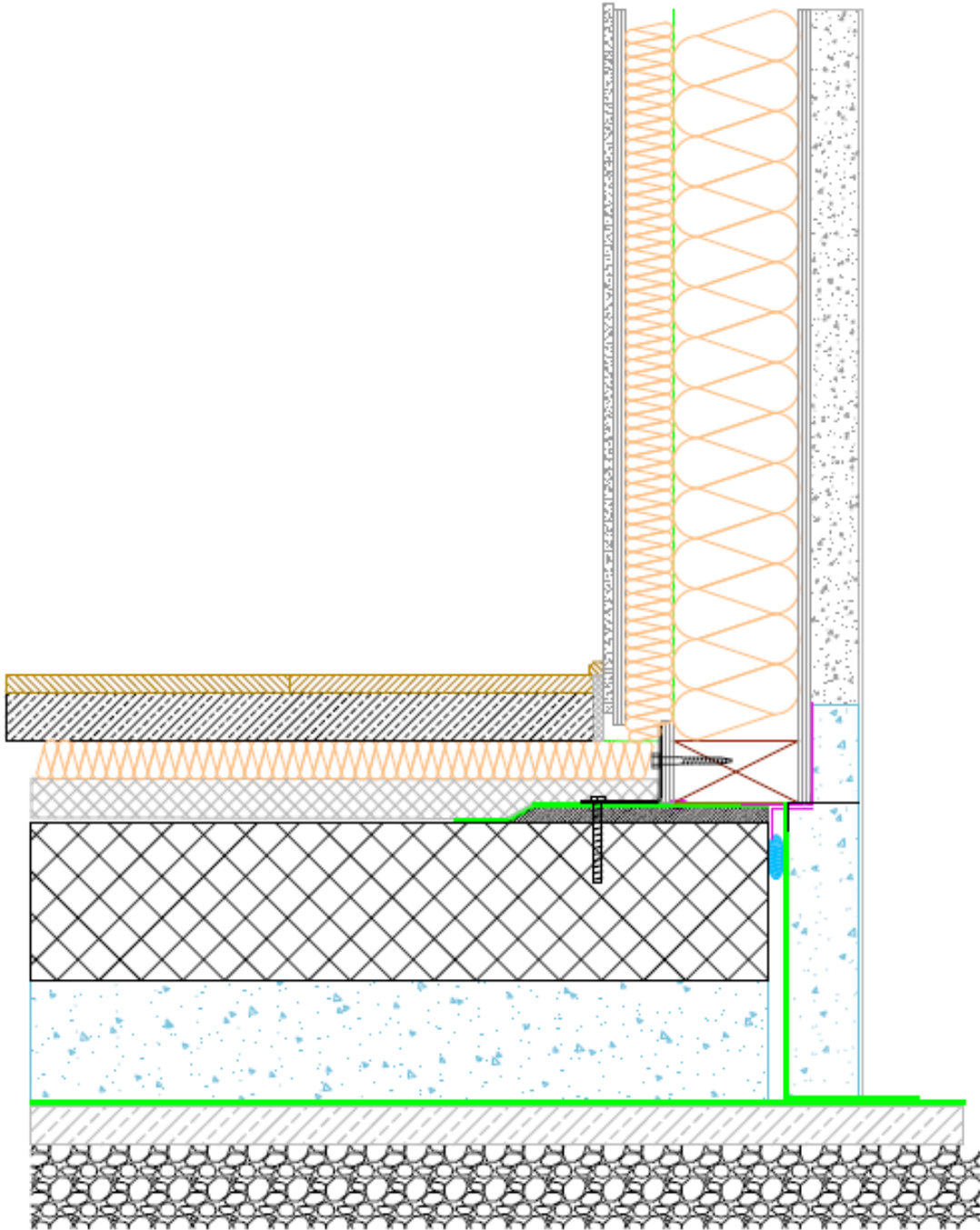
Table of contents	Page
Construction details	
Cross section of the building	35
Anchorage of the external wall to foundation	36
Anchorage of the internal wall to foundation	37
Connection external wall – ceiling	38
Connection external wall – ceiling	39
Connection roof – external wall	40
Wall connections	41
Connection internal wall – ceiling	42
Connection external wall – window	43
Gable and verge	44

This Annex made by the manufacturer contains section drawings of main construction parts. The construction details show a principle execution possibility. The connections shall be in accordance with the technical regulations.

Cross section of the building

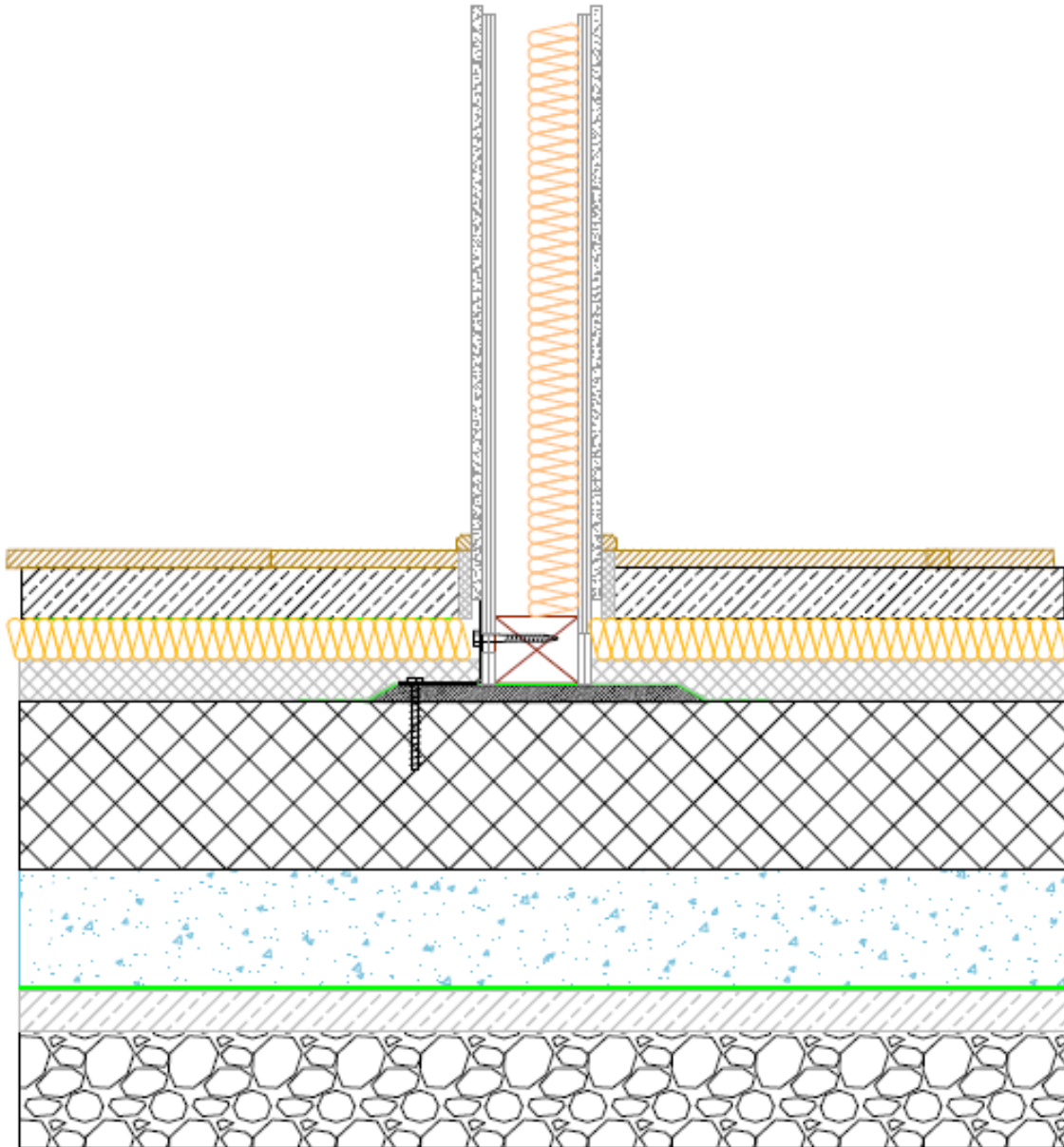


Anchorage of the external wall to foundation (vertical section)

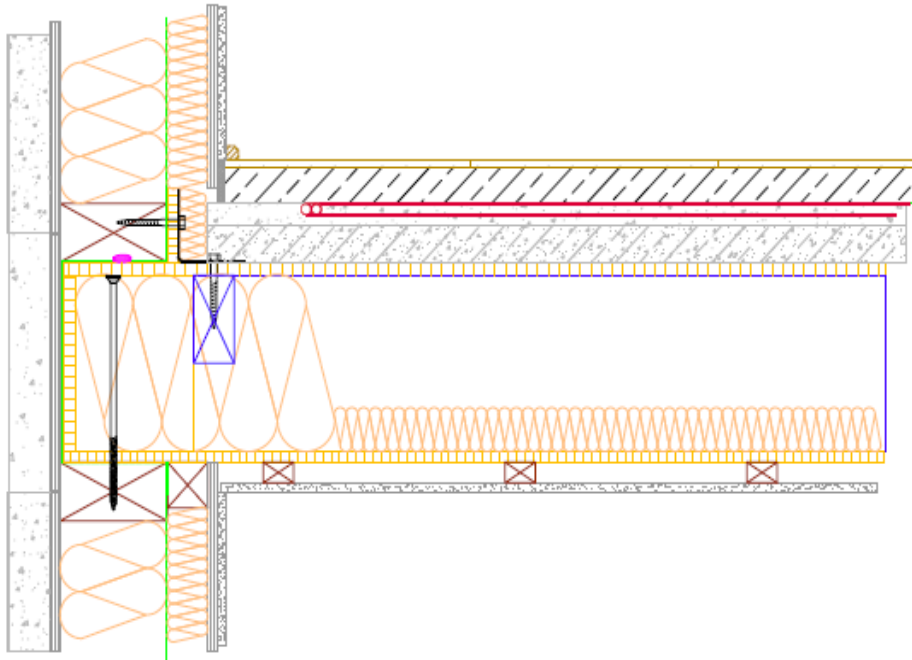


electronic copy of the eta by dibt: eta-13/0010

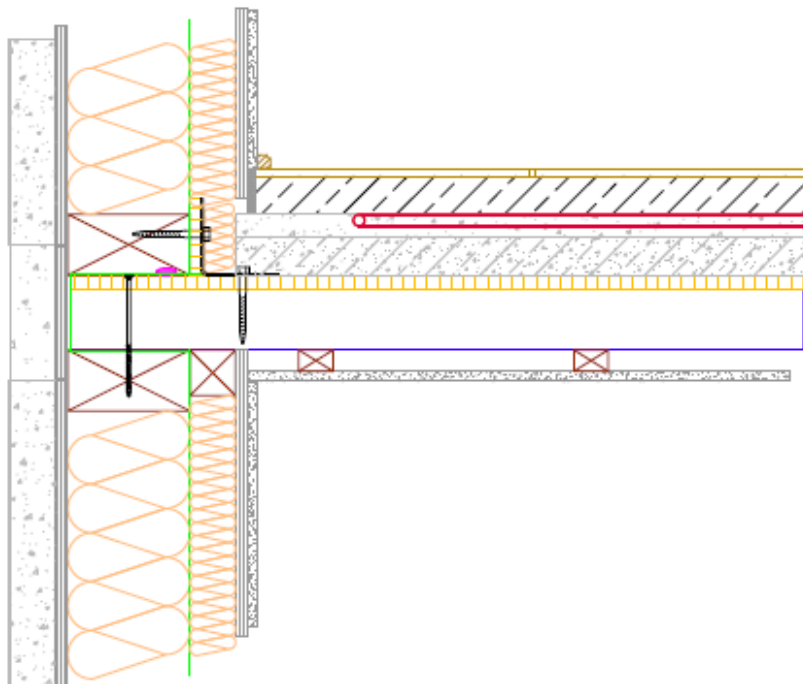
Anchorage of the internal wall to foundation (vertical section)



Connection external wall - ceiling



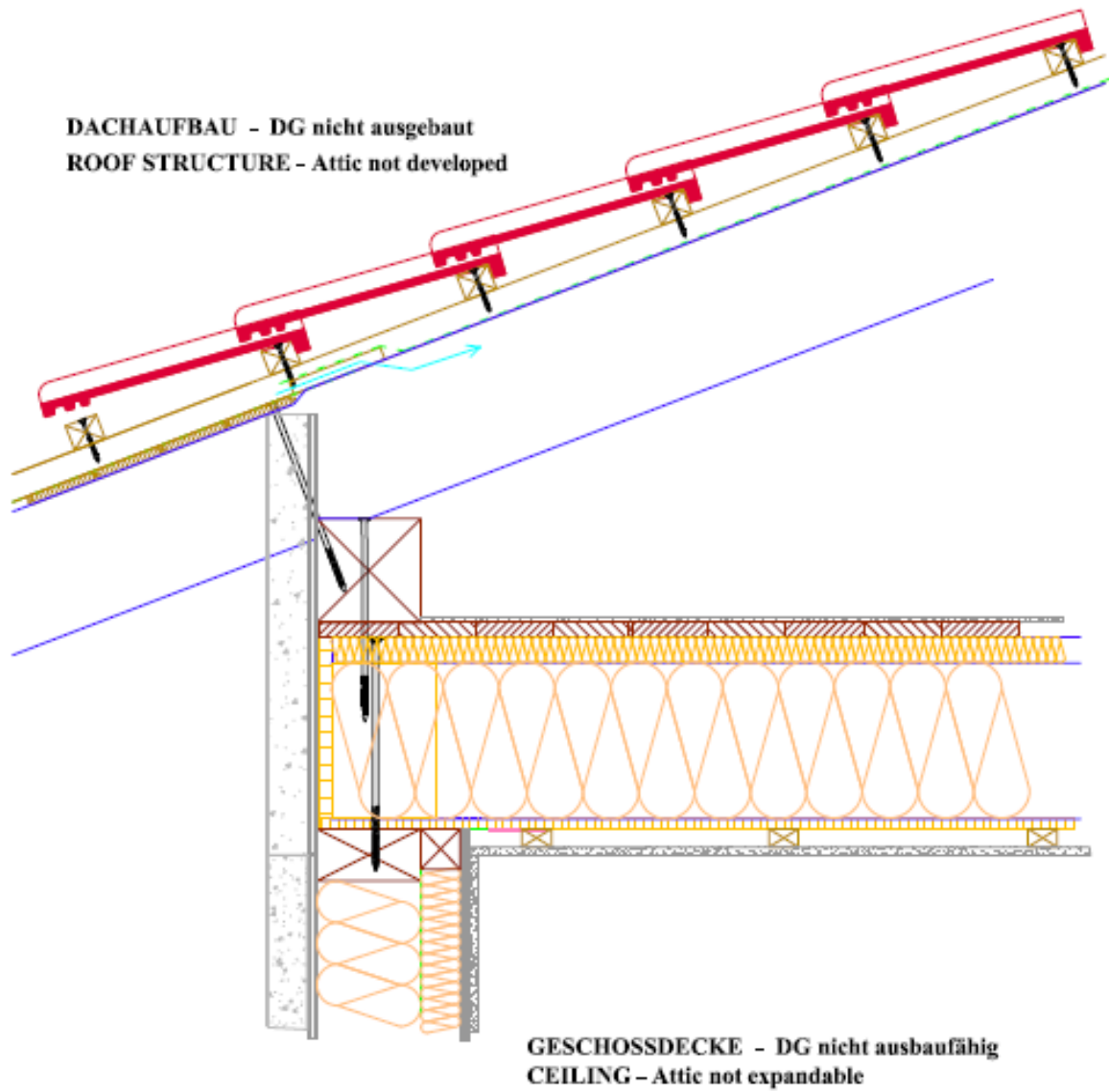
GESCHOSSDECKE DOH - Gipskarton - Untersicht
CEILING DOH - Gypsum plaster board - View from below



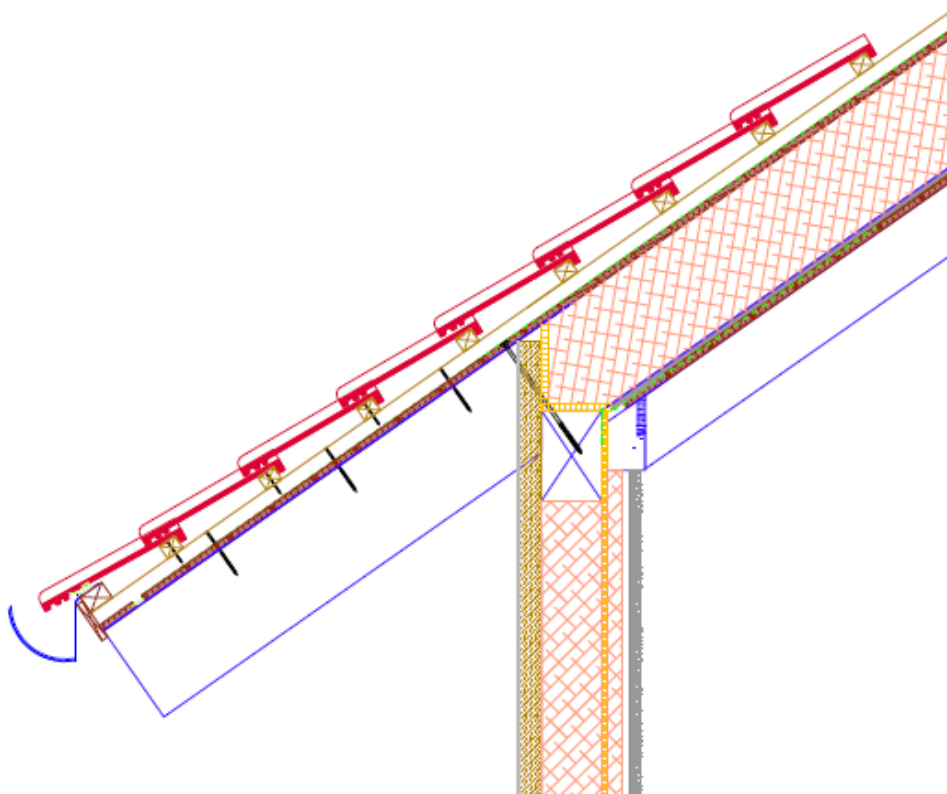
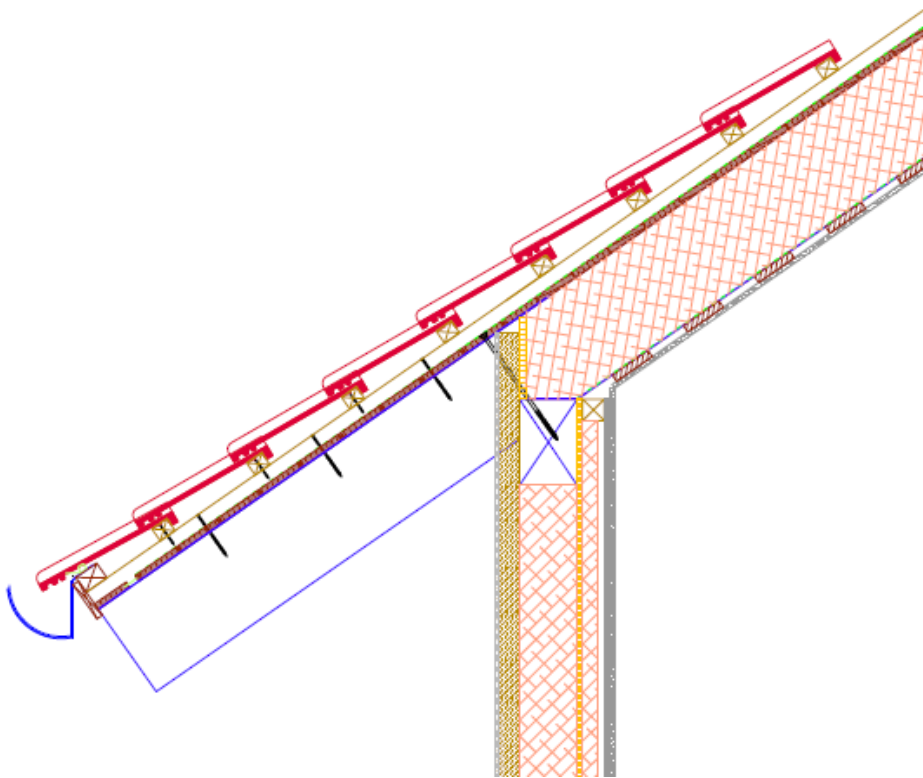
GESCHOSSDECKE DOH - Massive Deckenbohlen
CEILING DOH - Solid ceiling elements

.Anschluss Außenwand - Decke (gegen Dachboden)

Connection external wall - ceiling (to attic)



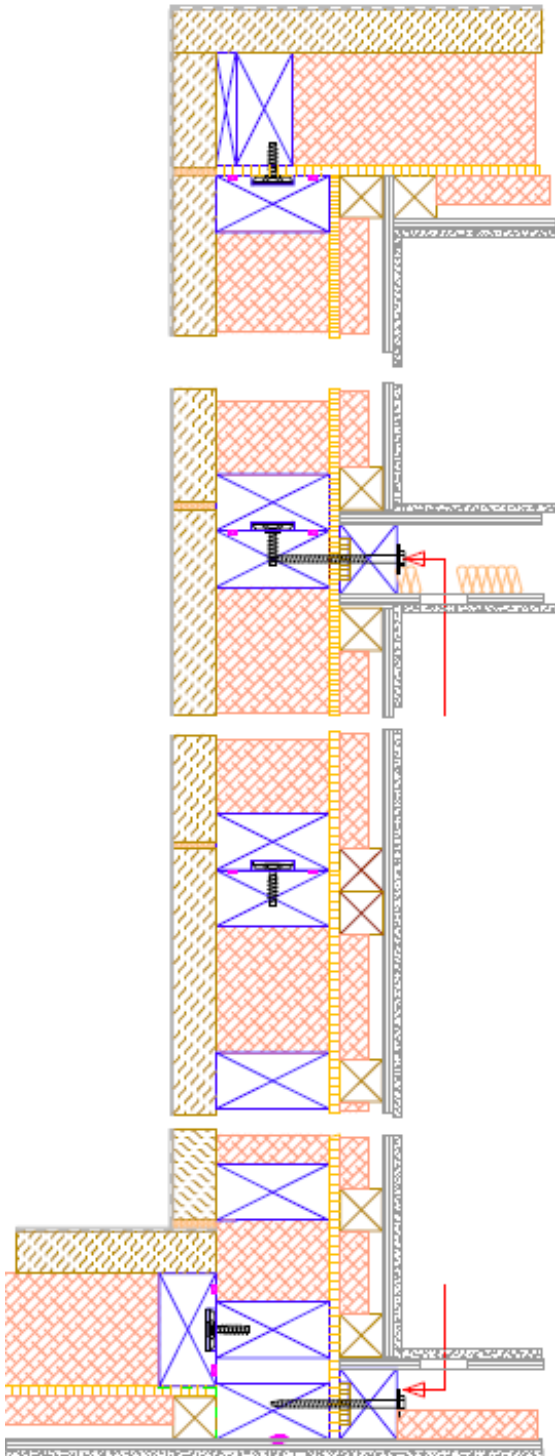
Connection roof – external wall



Wall connections

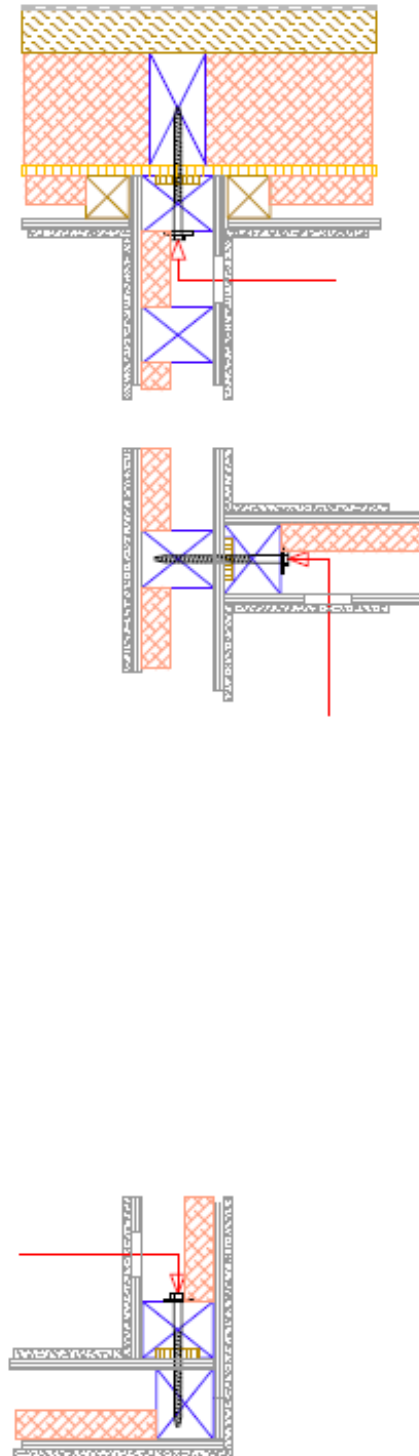
WANDANSCHLÜSSE

- AUSSENWANDECKE
- AUSSENWAND UND INNENWAND
- ZWEI AUSSENWÄNDE UND INNENWAND
- INNENWÄNDE

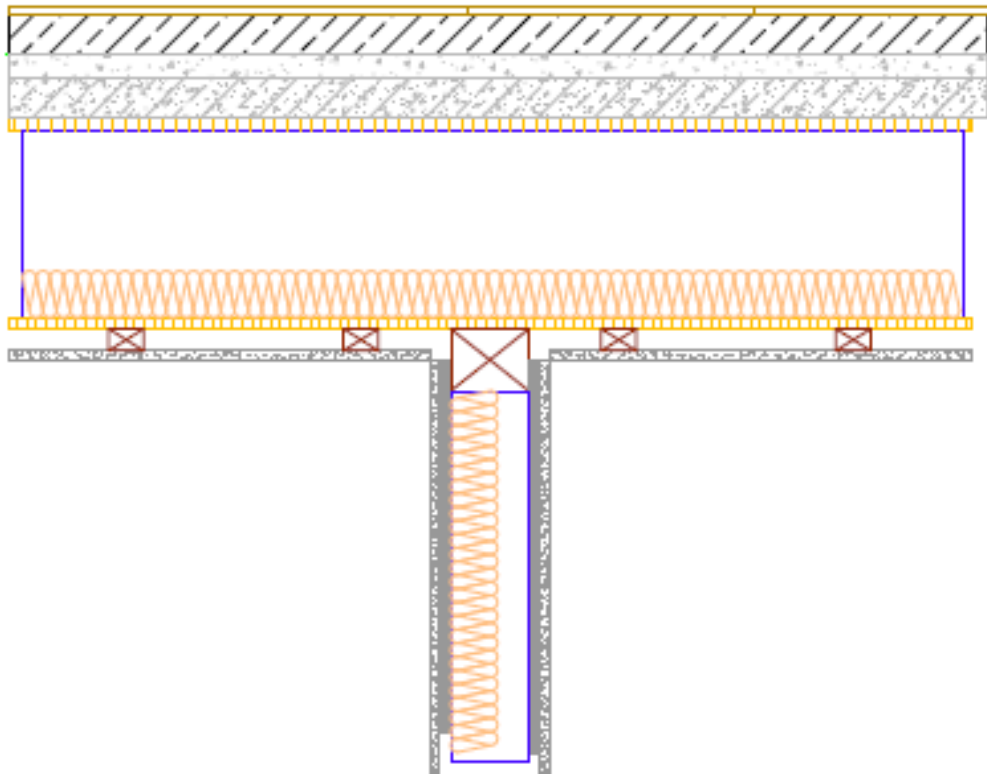


WALL CONNECTIONS

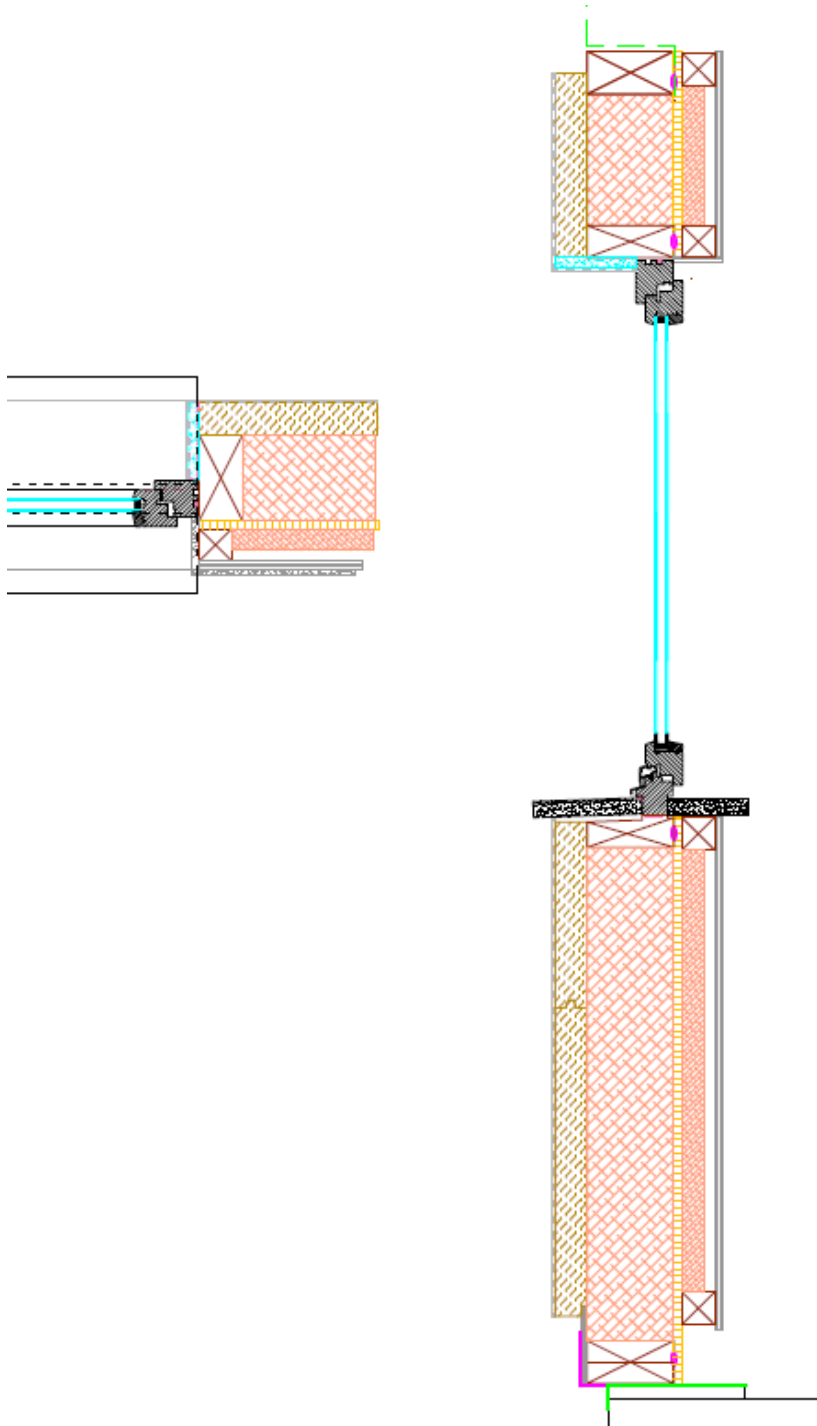
- EXTERNAL WALL EDGE
- EXTERNAL AND INTERNAL WALL
- 2 EXTERNAL WALLS AND INTERNAL WALL
- INTERNAL WALLS



Connection internal wall – ceiling



Connection external wall – window (vertical/horizontal section)



Gable and verge - vertical section

