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EUROPEAN TECHNICAL ASSESSMENT

ETA – 22/0730
of 18.12.2023.

I GENERAL PART

Technical Assessment Body issuing the ETA

ÉMI Építésügyi Minőségellenőrző Innovációs Nonprofit Kft.

Trade name of the construction product

LSH timber frame building kit

Product family to which the construction product belongs

Timber frame building kit

Manufacturer

LSH Készházak Zrt.
2461 Tárnok, Egyenlőség utca 43.

Manufacturing plant(s)

Plant 1
(as given in the Control Plan)

This European Technical Assessment contains

20 pages including Annexes A.1 to A.5 and a separate Annex B which form an integral part of this assessment

Annex B contains confidential information and is not included in the European Technical Assessment when that assessment is publicly available

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

European Assessment Document 340308-00-0203,
edition January 2019

The original official language of this European Technical Assessment is Hungarian. Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full (except the confidential Annex referred to above).

II SPECIFIC PARTS

1 TECHNICAL DESCRIPTION OF THE PRODUCT

1.1 General

LSH timber frame building kit consists of external load bearing walls, upper suspended floors below unheated lofts and roofs.

The materials and components of the timber frame building kit are specified in Annex A.1. Detailed material specifications are given in Annex A.2.

The essential construction details of the kit including the assembly details on site and the condition requirements for the installation of the kit are given in Annex B. Annex B is an auxiliary document and a formal part of this ETA.

Stairs, internal surface finishes, including floor finishes and surfaces in wet areas, roof coverings, service installations, complementary structures, including foundations or substructures, and doors and windows are not part of the kit.

This European Technical Assessment does not comprise the substructure of the building. The maximum required tolerances of the substructure dimensions are ± 5 mm. The maximum required tolerances of the substructure levelling are ± 5 mm.

Horizontal damp-proof sheets are required for protection against moisture from the substructure.

The kit is erected according to the details given in Annex B, based on the provided erection schedule and the procedure instructions by skilled and properly instructed personnel only.

Further information on package, transport and storage are laid down in the manufacturer technical documentation.

The identification parameters and reference to product specifications for identifying the materials and components which constitute the kit are given in Annexes A.1 and A.2.

1.2 External load bearing walls

Type **LSH-KF-1** external load bearing timber frame walls consist of vertical timber studs with a size of 50 x 150 mm, 75 x 150 mm, 100 x 150 mm or 150 x 150 mm. The maximum spacing between the vertical studs is 625 mm. The timber studs are fixed to a base purlin with the same cross section as the studs. The base purlin is fixed with wedge anchors to the substructure. Additional horizontal timber members connected with nails or screws with a size of 50 x 150 mm are used on the base purlin between the studs and above and under openings. The top of the wall frame is closed by horizontal timber members (purlins) with the same cross section as the studs. The timber studs are attached to the purlins with angle brackets. The maximum wall height is 3,00 m.

Between the timber frame structure pre-fabricated LSH wall panels are fixed by nails or screws. Both sides of the LSH wall panels have 12-12 mm thick OSB/3 board lining and filled with mineral wool (stone wool) with a thickness of 150 mm. The panel size is 2800 x 625 x 174 mm. On the inner side of the panel between the mineral wool and OSB/3 board lining there is a polyethylene foil vapour control layer overlapping the edges of the panel. The overlapped foil sections ensure the surface continuity of the foil, and they are folded out on the outer surface of the OSB/3 board and sealed with self-adhesive tape in a vapour-tight manner.

During the manufacturing of the panels, three pieces of OSB/3 spacer elements are placed along the longitudinal sides and one additional piece at the bottom of the panels in order to support the panels. The size of the spacer element is 22 x 150 x 400 mm. The spacer elements are fixed by screws to the OSB/3 boards. There is a clearance between the spacer and the panel side in order to provide space for the timber stud.

The internal side of the wall panel is covered with an optional inner wall lining which is not part of the kit.

The external side of the wall panel is covered with an EPS based external thermal insulation system with rendering (ETICS). The minimum EPS thickness of the applied ETICS system is 50 mm.

The layers of type **LSH-KF-2** external load-bearing walls are the same as the layers of type LSH-KF-1 walls, with the difference that on the inner side of the wall panels, there is an additional layer of 15 mm thick gypsum plasterboard (type DF) lining, and on the external side there is an additional layer of 15 mm thick gypsum fibre board lining.

The detailed layers of the wall types are given in Annex A.1.

1.3 Upper suspended floors below unheated lofts

Floor type **LSH-ZF-1** consists of timber joists with a size of 50 x 150 mm, 75 x 150 mm, 100 x 150 mm or 150 x 150 mm with a maximum spacing of 625 mm. The timber joists are fixed with screws to the top purlin. The maximum span is 6,0 m.

Between the timber joists pre-fabricated LSH slab panels are fixed by nails or screws. The design of LSH floor panels is identical to LSH wall panels described in clause 1.2.

To the bottom of the structure one layer of fire protective gypsum plasterboard (type DF) with a thickness of 12,5 mm is fixed with screws. Further layers and coverings are not part of the kit.

The layers of floor type **LSH-ZF-2** are the same as the layers of floor type LSH-ZF-1, with the difference that at the bottom of the structure two layers of fire protective gypsum plasterboard (type DF) with a thickness of 12,5 mm is fixed by screws.

The detailed layers of the floor types are given in Annex A.1.

1.4 Uninsulated roofs for empty lofts

Roof type **LSH-T** consists of timber rafters with a size of at least 50 x 150 mm and with a maximum spacing of 625 mm. The maximum span is 6,0 m.

On the external side breather membranes are laid on the top of the rafters and secured with counter battens. For roof tiles, battens perpendicular to the rafters are attached to the counter battens with a maximum spacing depending on the type of roofing. The counter battens and roof battens are fixed with screws or nails.

The roof tiles are not part of the kit.

Details of roof type are given in Annex A.1.

2 SPECIFICATION OF THE INTENDED USE(S) IN ACCORDANCE WITH THE APPLICABLE EUROPEAN ASSESSMENT DOCUMENT (HEREINAFTER EAD)

The timber frame building kit is intended to be used mainly for residential buildings. However, it can also be used for other types of buildings, such as offices, shops, restaurants and schools, provided that all relevant performance requirements are met.

Since watertightness of the external envelope has not been assessed, the intended use of the kits are limited to areas where heavy rain in combination with high wind conditions do not frequently occur, e. g. in high mountain areas and coastal areas.

The use of the kit in regions where termite attack can occur is impermissible without additional chemical treatment.

The provisions made in this European Technical Assessment are based on an assumed intended working life of the timber frame building kit for the intended use of

- 50 years for the load-bearing structure and for non-accessible components and materials,
- 25 years for repairable or replaceable components and materials, provided that the kit is subject to appropriate use and maintenance.

The indications given on the working life cannot be interpreted as a guarantee given by the producer or the Technical Assessment Body, but are to be regarded only as a means for choosing the appropriate product in relation to the expected, economically reasonable working life of the works.

Note: 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 procedure foreseen in the Member States for demonstrating compliance with the building regulations shall also be followed by the entity held responsible for this act. The European Technical Assessment does not amend this process in any way.

3 PERFORMANCE OF THE PRODUCT AND REFERENCES TO THE METHODS USED FOR ITS ASSESSMENT

Table 1

Basic Work Requirements (BWR)	Essential characteristic	Method of verification	Performance
BWR 1	Resistance, stiffness and stability of wall, floor and roof elements and their connections against vertical and horizontal loads	Clause 2.2.1 of EAD 340308-00-0203	Clause 3.1.1 of this ETA
	Shear resistance in plane direction against horizontal loads	Clause 2.2.2 of EAD 340308-00-0203	No performance assessed
	Compression resistance - log walls	Clause 2.2.3 of EAD 340308-00-0203	Not relevant
	Settling of construction - log walls	Clause 2.2.4 of EAD 340308-00-0203	Not relevant
	Corrosion protection of metal fasteners	Clause 2.2.5 of EAD 340308-00-0203	Clause 3.1.5 of this ETA
BWR 2	Reaction to fire of materials and components	Clause 2.2.6 of EAD 340308-00-0203	Clause 3.2.1 of this ETA
	Resistance to fire	Clause 2.2.7 of EAD 340308-00-0203	Clause 3.2.2 of this ETA
	External fire performance of roof covering	Clause 2.2.8 of EAD 340308-00-0203	No performance assessed
BWR 3	Water vapour resistance	Clause 2.2.9 of EAD 340308-00-0203	Clause 3.3.1 of this ETA
	Watertightness - external envelope	Clause 2.2.10.1 of EAD 340308-00-0203	No performance assessed
	Watertightness - internal surfaces	Clause 2.2.10.2 of EAD 340308-00-0203	No performance assessed
	Durability class/use class	Clause 2.2.11 of EAD 340308-00-0203	Clause 3.3.3 of this ETA
	Content, emission and/or release of dangerous substances	Clause 2.2.12 of EAD 340308-00-0203	No performance assessed
BWR 4	Impact resistance	Clause 2.2.13 of EAD 340308-00-0203	No performance assessed
BWR 5	Airborne sound insulation of walls, floors and roof structures	Clause 2.2.14 of EAD 340308-00-0203	No performance assessed
	Impact sound insulation of floors	Clause 2.2.15 of EAD 340308-00-0203	No performance assessed
	Sound absorption	Clause 2.2.16 of EAD 340308-00-0203	No performance assessed
BWR 6	Thermal resistance	Clause 2.2.17 of EAD 340308-00-0203	Clause 3.6.1 of this ETA
	Air permeability	Clause 2.2.18 of EAD 340308-00-0203	No performance assessed
	Thermal inertia	Clause 2.2.19 of EAD 340308-00-0203	No performance assessed

3.1 Mechanical resistance and stability (BWR 1)

3.1.1 Resistance, stiffness and stability of wall, floor and roof elements and their connections against vertical and horizontal loads

The components of the kit, which are necessary for the mechanical resistance, stiffness and stability, are listed in Annex A.1 and are described with regard to their materials and their geometry. Detailed material specifications are given in Annex A.2.

For timber frame walls, the standard parts of the structural elements are defined by their cross sections, spacing and sheeting (see section 1, Annex A.1 and A.2).

For floor and roof structures, the standard load bearing components are defined by their cross sections, spacing and maximum span (see section 1, Annex A.1 and A.2).

Mechanical resistance and stability of each load-bearing component as well as the joints between these components are to be determined on the basis of this exact description. During the calculation the respective requirements of the Member States shall be taken into account.

Mechanical resistance and stability of the joints between the structures and the anchorage to the substructure are to be checked in accordance with EN 1990 and EN 1995-1-1 on a case-by-case basis considering the data given in Annex A.2 and Annex B.

No special verification of structural resistance related to seismic actions has been determined.

3.1.2 Shear resistance in plane direction against horizontal loads

No performance assessed.

3.1.3 Compression resistance - log walls

Not relevant.

3.1.4 Settling of construction - log walls

Not relevant.

3.1.5 Corrosion protection of metal fasteners

Service classes for different building elements in accordance with EN 1995-1-1 for metal fasteners used in the kit is given in Annex A.5.

Metal fasteners applied in the kit have a hot-dip galvanized coating with a surface mass at least 275 g/m².

3.2 Safety in case of fire (BWR 2)

3.2.1 Reaction to fire of materials and components

Reaction to fire classifications of the components in the kit in accordance with EN 13501-1 and delegated regulation (EU) 2016/364 are given in Annex A.2. Those materials which are deemed to satisfy all requirements for the performance characteristic and those materials which can be classified without the need for further testing in accordance with Commission Decisions are listed in Annex A.2 with reference to the related decision.

3.2.2 Resistance to fire

Resistance to fire of the elements have been assessed by calculation in accordance with EN 1995-1-2 and classified to EN 13501-2. The results are given in Annex A.3.

3.2.3 External fire performance of roof covering

No performance assessed.
Roof coverings are not part of the kit.

3.3 Hygiene, health and the environment (BWR 3)

3.3.1 Water vapour resistance

Vapour permeability and moisture resistance of the upper suspended floor structures has been assessed on the basis of calculations in accordance with EN ISO 13788. For both surface and interstitial condensation, the calculations show that the upper suspended floor structures are adequate for the intended use in case of humidity flow (diffusion) from inside towards outside, taking into account an internal humidity class of 4 to EN ISO 13788 and Middle-European external conditions.

The continuity of the polyethylene foil vapour control membrane at the connections of the LSH-prefabricated panels is ensured by overlapping the membrane and sealing it with self-adhesive sealing tape.

If the kit is used under different conditions, a separate assessment needs to be carried out in accordance with EN ISO 13788 using the material properties listed in Annex A.2 as a part of the design of works.

No performance has been assessed for the walls.

3.3.2 Watertightness

3.3.2.1 External envelope

No performance assessed.

3.3.2.2 Internal surfaces

No performance assessed.
Internal surfaces in wet areas are not part of the kit.

3.3.3. Durability class/use class

The timber species used in the kit is in natural durability class 4 and class S in relation to fungus attack and insect attack respectively in accordance with EN 350.

The adequacy of the hazard classes/use classes according to EN 335 for wood and wood-based products used in the kit is given in Annex A.5.

The use of the kit in regions where termite attack can occur is impermissible without additional chemical treatment.

In principle, the components are executed without chemical treatment. The roof battens and load-bearing structures exposed to direct weathering (e.g. rafters in an empty loft) may be chemically treated. Any chemical treatment that may be used shall follow national and European provisions (e.g. Biocide Directive).

3.3.4 Content and/or release of dangerous substances

No performance assessed.

3.4 Safety and accessibility in use (BWR 4)

3.4.1 Impact resistance

No performance assessed.

3.5 Protection against noise (BWR 5)

3.5.1 Airborne sound insulation of walls, floors and roof structures

No performance assessed.

3.5.2 Impact sound insulation of floors

No performance assessed.

3.5.3 Sound absorption

No performance assessed.

3.6 Energy economy and heat retention (BWR 6)

3.6.1 Thermal resistance

The total thermal resistance (R_T) and thermal transmittance (U) values of the different external building envelopes have been calculated in accordance with EN ISO 6946 and are given in Annex A.4.

3.6.2 Air permeability

No performance assessed.

3.6.3 Thermal inertia

No performance assessed.

3.7 Sustainable use of natural resources (BWR 7)

There is no relevant performance assessed regarding this essential requirement.

4 ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE (HEREINAFTER AVCP) SYSTEM APPLIED, WITH REFERENCE TO ITS LEGAL BASE

According to the decision 99/455/EC of the European Commission (Official Journal of the European Communities N° L178, 14.07.1999.), AVCP system of 1 is applied (see Annex V to Regulation (EU) 305/2011).

5 TECHNICAL DETAILS NECESSARY FOR THE IMPLEMENTATION OF THE AVCP SYSTEM, AS PROVIDED FOR IN THE APPLICABLE EAD

5.1 Tasks of the manufacturer

5.1.1 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. This production control system ensures that the product is in conformity with the European Technical Assessment.

The manufacturer shall only use materials stated in the technical documentation¹ of this European Technical Assessment.

In the framework of factory production control the manufacturer carries out controls in accordance with the control plan² which is fixed with this European Technical Assessment.

Details of the extent, nature and frequency of controls to be performed within the factory production control correspond to this control plan which is part of the technical documentation of this European Technical Assessment.

The results of factory production control are recorded in checklists signed by the person responsible and are evaluated. The records shall be presented to the notified product certification body involved in continuous surveillance.

¹ Technical documentation of this European Technical Assessment is deposited at ÉMI Nonprofit Kft. and it will be provided for the notified certification body involved in the procedure regarding the assessment and verification of constancy of performance of the product.

² Control plan is deposited at ÉMI Nonprofit Kft. and it will be provided for the notified certification body involved in the procedure regarding the assessment and verification of constancy of performance of the product.

5.1.2 Further testing of samples taken at the factory

No further tests are required in addition to those laid down in the control plan.

5.2 Tasks of the notified product certification body

5.2.1 Assessment of the performance of the construction product

Notified bodies undertaking tasks under System 1 shall consider the European Technical Assessment issued for the construction product in question as the assessment of the performance of the product. Notified bodies shall therefore not undertake the tasks referred to in point 1.2.(b)(i) in Annex V of Regulation (EU) No 305/2011.

5.2.2 Initial inspection of the manufacturing plant and of factory production control

The notified product certification body shall ascertain that, in accordance with the control plan, the manufacturing plant, in particular personnel and equipment, and the factory production control are suitable to ensure a continuous and orderly manufacturing of the kit according to the specifications given in clause 3 and in the Annexes of this European Technical Assessment.

5.2.3 Continuous surveillance, assessment and evaluation of factory production control

The notified product certification body shall visit the factory at least twice a year for surveillance of the manufacturer. However, this may be reduced to once a year if the manufacturer has proven good product quality over a long period of time.

It has to be verified that the system of factory production control and the specified manufacturing process are maintained taking into account the control plan.

Continuous surveillance and assessment of factory production control have to be performed according to the control plan.

Issued in Szentendre on 18.12.2023.

by

ÉMI Építésügyi Minőségellenőrző Innovációs Nonprofit Kft.



Zoltan Budavári

head of technical assessment office



ANNEXES

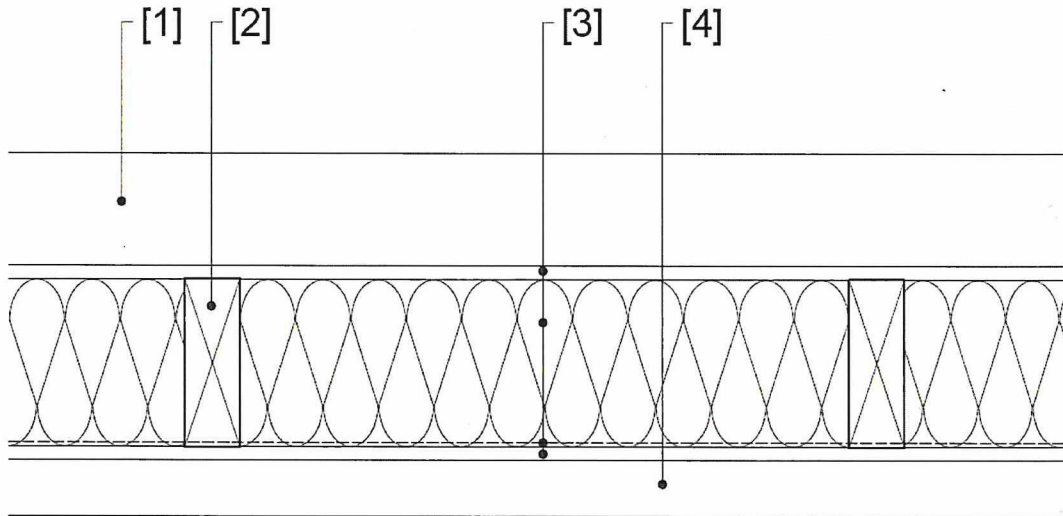
ANNEX A.1: Construction elements and their layers of LSH timber frame building kit

ANNEX A.2: Specification of components

ANNEX A.3: Resistance to fire performance

ANNEX A.4: Thermal resistance and U-values

ANNEX A.5: Use classes and service classes for timber and metal components

LSH-KF-1 – External load bearing wall


horizontal section

Components of the construction:

No.	Thickness, size (mm)	Material ⁽¹⁾	Spacing (mm)
1	min. 50	external thermal insulation system with rendering (ETICS) with EPS	-
2	150	50x150 / 75x150 / 100x150 / 150x150 mm timber stud, with LSH wall panel between the studs	max. 625
3		LSH wall panel:	
3.1	12	OSB/3 board	-
3.2	150	mineral wool (with min. 26 kg/m ³ density)	-
3.3	0,25	vapour control layer	-
3.4	12	OSB/3 board	-
4	-	internal wall lining (not part of the kit)	-

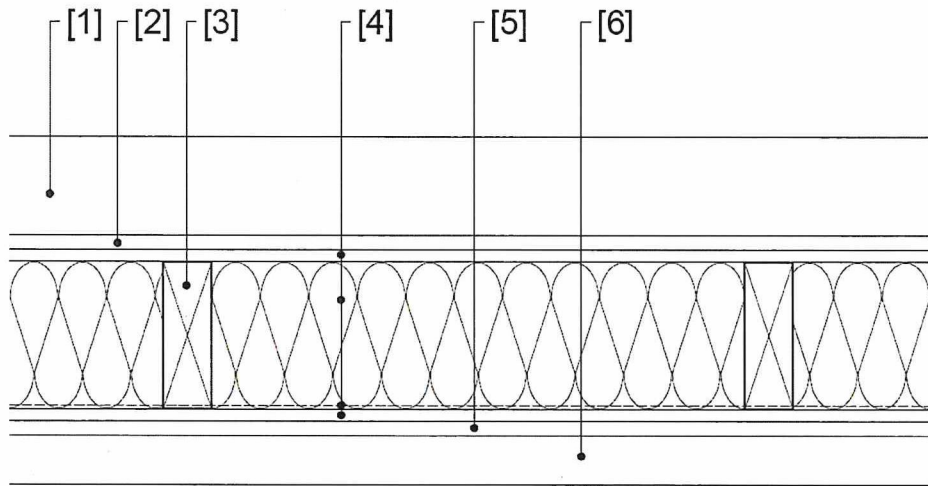
Fasteners:

No.	Material	Fastener	Spacing (mm)
2	timber stud	4x50 mm wood thread screw (SF PZ RM SAR 4x50)	max. 130
3.1, 3.4	OSB/3 board	2,5x90 mm nail	max. 150

⁽¹⁾ Detailed specifications are given in Annex A.2.

LSH timber frame building kit

Annex A.1

LSH-KF-2 – External load bearing wall


horizontal section

Components of the construction:

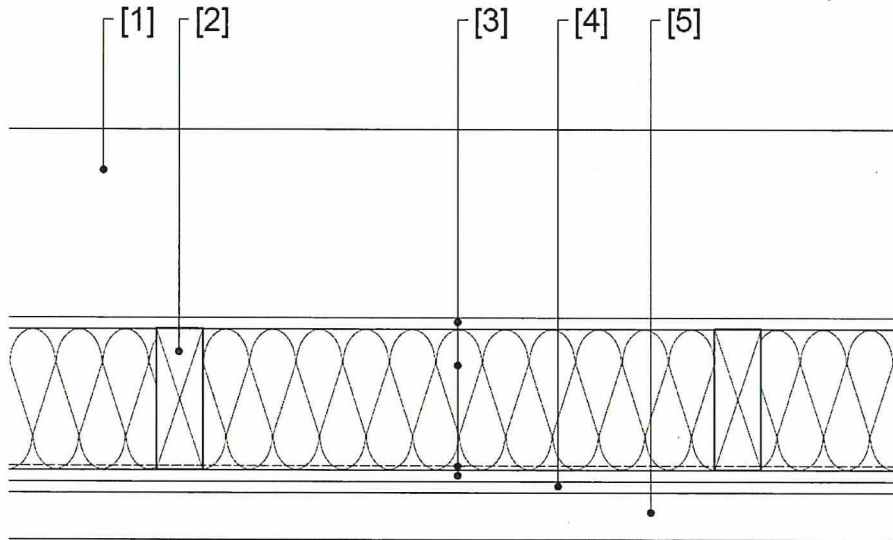
No.	Thickness, size (mm)	Material ⁽¹⁾	Spacing (mm)
1	min. 50	external thermal insulation system with rendering (ETICS) with EPS	-
2	1x15	gypsum fibreboard	-
3	150	50x150 / 75x150 / 100x150 / 150x150 mm timber stud, with LSH wall panel between the studs	max. 625
4		LSH wall panel:	
4.1	12	OSB/3 board	-
4.2	150	mineral wool (with min. 26 kg/m ³ density)	-
4.3	0,25	vapour control layer	-
4.4	12	OSB/3 board	-
5	1x15	gypsum plasterboard, type DF	-
6	-	internal wall lining (not part of the kit)	-

Fasteners:

No.	Material	Fastener	Spacing (mm)
2	gypsum fibreboard	4,2x65 mm plasterboard screw with wood thread	max. 150
3	timber stud	4x50 mm wood thread screw (SF PZ RM SAR 4x50)	max. 130
4.1, 4.4	OSB/3 board	2,5x90 mm nail	max. 150
5	gypsum plasterboard	4,2x65 mm plasterboard screw with wood thread	max. 150

⁽¹⁾ Detailed specifications are given in Annex A.2.

LSH timber frame building kit
Annex A.1

LSH-ZF-1 – Upper suspended floors below unheated lofts


vertical section

Components of the construction:

No.	Thickness, size (mm)	Material ⁽¹⁾	Spacing (mm)
1	-	unheated lofts	-
2	150	50x150 / 75x150 / 100x150 / 150x150 mm timber joist, with LSH slab panel between the joists	max. 625
3		LSH slab panel:	
3.1	12	OSB/3 board	-
3.2	150	mineral wool (with min. 26 kg/m ³ density)	-
3.3	0,25	vapour control layer	-
3.4	12	OSB/3 board	-
4	1x12,5	gypsum plasterboard, type DF	-
5	-	internal lining (not part of the kit)	-

Fasteners:

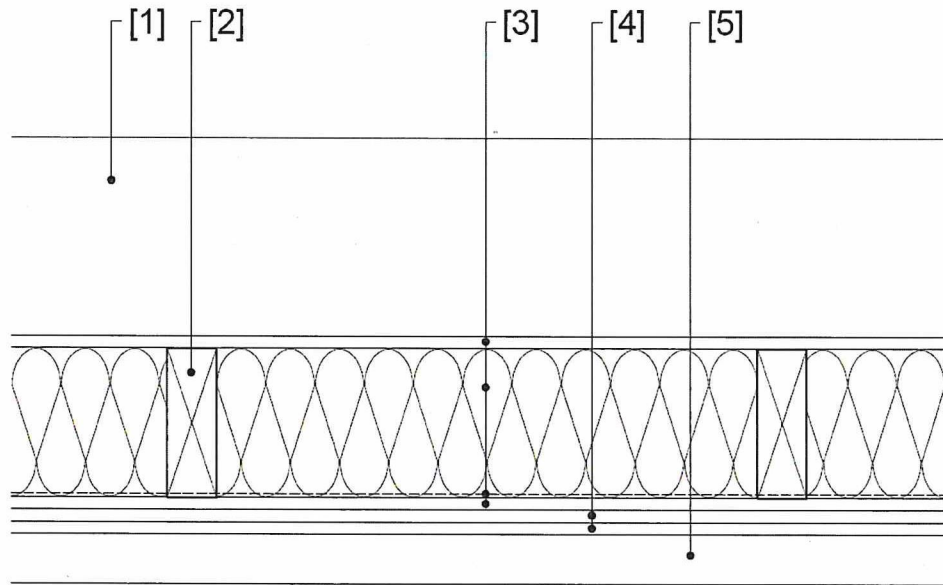
No.	Material	Fastener	Spacing (mm)
2	timber joist	4x50 mm wood thread screw (SF PZ RM SAR 4x50)	max. 130
3.1, 3.4	OSB/3 board	2,5x90 mm nail	max. 150
4	gypsum plasterboard	4,2x65 mm plasterboard screw with wood thread	max. 150

⁽¹⁾ Detailed specifications are given in Annex A.2.

LSH timber frame building kit

Annex A.1

LSH-ZF-2 – Upper suspended floors below unheated lofts



vertical section

Components of the construction:

No.	Thickness, size (mm)	Material ⁽¹⁾	Spacing (mm)
1	-	unheated lofts	-
2	150	50x150 / 75x150 / 100x150 / 150x150 mm timber joist, with LSH slab panel between the joists	max. 625
3		LSH slab panel:	
3.1	12	OSB/3 board	-
3.2	150	mineral wool (with min. 26 kg/m ³ density)	-
3.3	0,25	vapour control layer	-
3.4	12	OSB/3 board	-
4	2x12,5	gypsum plasterboard, type DF	-
5	-	internal lining (not part of the kit)	-

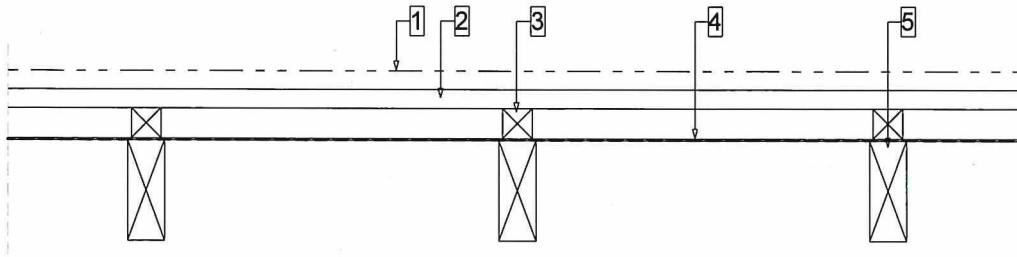
Fasteners:

No.	Material	Fastener	Spacing (mm)
2	timber joist	4x50 mm wood thread screw (SF PZ RM SAR 4x50)	max. 130
3.1, 3.4	OSB/3 board	2,5x90 mm nail	max. 150
4	gypsum plasterboard	4,2x65 mm plasterboard screw with wood thread	max. 150

⁽¹⁾ Detailed specifications are given in Annex A.2.

LSH timber frame building kit	Annex A.1
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LSH-T Uninsulated roof for empty loft



section perpendicular to the roof fall line

Components of the construction:

No.	Thickness, size (mm)	Material ⁽¹⁾	Spacing (mm)
1		roof tile (not part of the kit)	
2	50x30	timber batten	depending on the roof tile
3	50x50	timber counter batten	max. 625
4	0,2	breather membrane	-
5	min. 50x150	timber rafter	max. 625

Fasteners:

No.	Material	Fastener	Spacing (mm)
2	50x30 timber batten	4x70 mm nail	max 625
3	50x50 timber counter batten	5x120 mm galvanised screw with countersunk head	-
5	50x150 timber rafter	according to calculation	-

⁽¹⁾ Detailed specifications are given in Annex A.2.

LSH timber frame building kit	Annex A.1
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Component / material	Technical specification	ρ (kg/m ³)	λ (W/mK)	Vapour resistance (dry)	c (kJ/kgK)	Reaction to fire class	
Structural timber components	EN 14081-1+A1 C16 to EN 338	414	0,13	$\mu = 50$	-	D-s2,d0	2003/43/EC ⁽¹⁾
OSB board	OSB/3 to EN 13986 EN 300	≥ 600	0,13	$\mu = 200$	-	D-s2,d0	EN 13986 2003/43/EC ⁽¹⁾
Gypsum plasterboard	Type DF to EN 520	> 800	0,25	$\mu = 6 - 10$	-	A2-s1,d0	EN 520 2003/43/EC ⁽¹⁾
Gypsum fibre board	ETA based on EAD 070006-00- 0504	> 1100	$\leq 0,30$	$\mu = 21$	-	A2-s1,d0	ETA ⁽³⁾
Mineral wool – Stone wool (MW) (in the frame structure)	EN 13162	≥ 26	0,037	$\mu = 1$	-	A1	96/603/EC ⁽²⁾
Polystyrene EPS (ETICS)	EN 13163	-	0,042	NPD ⁽⁴⁾	-	E	EN 13163
Vapour control layer PE	EN 13984	-	-	$S_d > 110$ m	-	E	EN 13984
Breather membrane (roof)	EN 13859-1	-	-	$S_d \leq 0,3$ m	-	E	EN 13859-1
ETICS-EPS	ETA based on EAD 040089-00- 0404			-		B-s2, d0 (system) E (ESP)	ETA ⁽³⁾
1) Amended by Commission Decisions 2003/593/EC, 2006/673/EC and 2007/348/EC 2) Amended by Commission Decisions 2000/605/EC and 2003/424/EC 3) ETA Number is given in the control plan 4) No performance determined							

LSH timber frame building kit	Annex A.2
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Resistance to fire:

EXTERNAL fire exposure

Structure	Timber cross section / spacing (mm)	Finish exposed to fire	Thermal insulation	Resistance to fire [REI] (min)	Residual effective timber cross section (mm)	Maximum allowed load over self-weight ^[1]
LSH-KF-1	50 x 150 / 625 75 x 150 / 625 100 x 150 / 625 150 x 150 / 625	1 layer 12 mm thick OSB/3 board	Mineral wool 150 mm	REI 15 ^{[2], [3]}	50 x 133,5 75 x 133,5 100 x 133,5 150 x 133,5	-
LSH-KF-2	50 x 150 / 625 75 x 150 / 625 100 x 150 / 625 150 x 150 / 625	1 layer 15 mm thick Gypsum fibreboard + 1 layer 12 mm thick OSB/3 board	Mineral wool 150 mm	REI 30 ^[4]	full timber cross sections can be considered	-

^[1] Where maximum allowed load is not given, it shall be calculated considering the residual effective timber cross section in accordance with EN 1995-1-2 (the resistance to fire class indicated represent the starting time of charring of the protected timber member).

^[2] When exposed to external fire, the remaining effective cross-sections of the load-bearing wall studs are the following with respect to the original cross-sections in ascending order: 50 x 133,5 mm, 75 x 133,5 mm, 100 x 133,5 mm, and 150 x 133,5 mm.

^[3] The fire protection of the structure is provided by 1 layer of OSB/3 sheets mounted on the outer side of the timber studs. The given value refers to structures made with a lining without interruption, penetration, or cut-out (e.g. socket, junction box, etc.).

^[4] The fire protection of the structure is provided by 1 layer of gypsum fibreboard and 1 layer of OSB/3 board mounted on the outer side of the timber studs. The given value refers to structures made with a lining without interruption, penetration, or cut-out (e.g. socket, junction box, etc.). The maximum allowed load of the structure for REI30 shall be calculated considering the full timber cross section in accordance with EN 1995-1-2.

LSH timber frame building kit	Annex A.3
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INTERNAL fire exposure

Structure	Timber cross section / spacing (mm)	Finish exposed to fire	Thermal insulation	Resistance to fire [REI] (min)	Residual effective timber cross section (mm)	Maximum allowed load over self-weight ^[1]
LSH-KF-1	50 x 150 / 625 75 x 150 / 625 100 x 150 / 625 150 x 150 / 625	1 layer 12 mm thick OSB/3 board	Mineral wool 150 mm	REI 15 ^{[2], [3]}	50 x 133,5 75 x 133,5 100 x 133,5 150 x 133,5	-
LSH-KF-2	50 x 150 / 625 75 x 150 / 625 100 x 150 / 625 150 x 150 / 625	1 layer 15 mm thick Gypsum plasterboard (type DF) + 1 layer 12 mm thick OSB/3 board	Mineral wool 150 mm	REI 30 ^[4]	full timber cross sections can be considered	-
LSH-ZF-1	50 x 150 / 625 75 x 150 / 625 100 x 150 / 625 150 x 150 / 625	1 layer 12,5 mm thick Gypsum plasterboard (type DF) + 1 layer 12 mm thick OSB/3 board	Mineral wool 150 mm	REI 15 ^[5]	full timber cross sections can be considered	-
LSH-ZF-2	50 x 150 / 625 75 x 150 / 625 100 x 150 / 625 150 x 150 / 625	2 layers 12,5 mm thick Gypsum plasterboard (type DF) + 1 layer 12 mm thick OSB/3 board	Mineral wool 150 mm	REI 30 ^[6]	full timber cross sections can be considered	-

^[1] Where maximum allowed load is not given, it shall be calculated considering the residual effective timber cross section in accordance with EN 1995-1-2 (the resistance to fire class indicated represent the starting time of charring of the protected timber member).

^[2] When exposed to internal fire, the remaining effective cross-sections of the load-bearing wall studs are the following with respect to the original cross-sections in ascending order: 50 x 133,5 mm, 75 x 133,5 mm, 100 x 133,5 mm, and 150 x 133,5 mm.

^[3] The fire protection of the structure is provided by 1 layer of OSB/3 sheets mounted on the inner side of the timber studs. The given value refers to structures made with a lining without interruption, penetration, or cut-out (e.g. socket, junction box, etc.).

^[4] The fire protection of the structure is provided by 1 layer of DF type gypsum plasterboard and 1 layer of OSB/3 board mounted on the inner side of the timber studs. The given value refers to structures made with a lining without interruption, penetration, or cut-out (e.g. socket, junction box, etc.). The maximum allowed load of the structure for REI30 shall be calculated considering the full timber cross section in accordance with EN 1995-1-2.

^[5] The fire protection of the structure is provided by 1 layer of DF type gypsum plasterboard and 1 layer of OSB/3 board mounted on the bottom of the timber joist. The given value refers to structures made with a lining without interruption, penetration, or cut-out (e.g. socket, junction box, etc.). The maximum allowed load of the structure for REI30 shall be calculated considering the full timber cross section in accordance with EN 1995-1-2.

^[6] The fire protection of the structure is provided by 2 layers of DF type gypsum plasterboard and 1 layer of OSB/3 board mounted on the bottom of the timber joist. The given value refers to structures made with a lining without interruption, penetration, or cut-out (e.g. socket, junction box, etc.). The maximum allowed load of the structure for REI30 shall be calculated considering the full timber cross section in accordance with EN 1995-1-2.

LSH timber frame building kit	Annex A.3
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Thermal resistances and U-values of external structures

Structure	Stud or joist size (mm)	Stud or joist spacing (mm)	Total thermal resistance ^[1] R_T (m ² K/W)	U-value (W/m ² K)
LSH-KF-1 ^{[2], [3]}				
	50/150	625	4,81	0,21
	75/150	625	4,58	0,22
	100/150	625	4,38	0,23
	150/150	625	4,05	0,25
LSH-KF-2 ^{[2], [3]}				
	50/150	625	4,93	0,20
	75/150	625	4,71	0,21
	100/150	625	4,51	0,22
	150/150	625	4,18	0,24
LSH-ZF-1 ^[3]				
	50/150	625	3,84	0,26
	75/150	625	3,62	0,28
	100/150	625	3,42	0,29
	150/150	625	3,09	0,32
LSH-ZF-2 ^[3]				
	50/150	625	3,90	0,26
	75/150	625	3,67	0,27
	100/150	625	3,48	0,29
	150/150	625	3,15	0,32

^[1] Calculated with R_{si} values of 0,13 m²K/W for walls and 0,10 m²K/W for floors and R_{se} values of 0,04 m²K/W for walls and floors. For upper suspended floors an R_U value of 0,2 m²K/W has been considered due to the roof space in accordance with Table 3 of EN ISO 6946

^[2] Performances calculated with external thermal insulation system with rendering (ETICS). No mechanical fasteners have been taken into account for fixing of the external thermal insulation for walls. If mechanical fasteners are used, a correction needs to be made in accordance with Annex D of EN ISO 6946 depending on the number and type of the fasteners.

^[3] The thermal bridge effect caused by the spacers of the LSH panels are taken into account at the calculation (57,14% of the total height of the panel is a band which has no spacer, and 42,86% is a band which has spacer)

LSH timber frame building kit	Annex A.4
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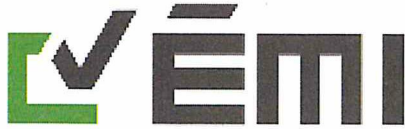
Table A.5.1 Hazard class / use class in accordance with EN 335

Type component	Hazard class / Use class
Load bearing structural timber frame for walls, floors, roof	1
OSB/3 board covering floors below unheated lofts	2
OSB/3 board covering floors from inside	1
OSB/3 board covering walls	1

Table A.5.2 Service class in accordance with EN 1995-1-1 for metal fasteners (for load bearing structures)

Type of component	Service class
Fixings for walls and floors (excluding upper sides)	1
Fixings for roofs and upper side of floors	2

LSH timber frame building kit	Annex A.5
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ANNEX B

ETA – 22/0730
of 18.12.2023.

I GENERAL PART

Technical Assessment Body issuing the ETA

ÉMI Építésügyi Minőségellenőrző Innovációs Nonprofit Kft.

Trade name of the construction product

LSH timber frame building kit

Product family to which the construction product belongs

Timber frame building kit

Manufacturer

LSH Készházak Zrt.
2461 Tárnok, Egyenlőség utca 43.
Hungary

Manufacturing plant(s)

Plant 1
(as given in the Control Plan)

Annex B contains 7 pages

The original official language of this Annex B is Hungarian. Translations of this Annex B in other languages shall fully correspond to the original issued document and should be identified as such

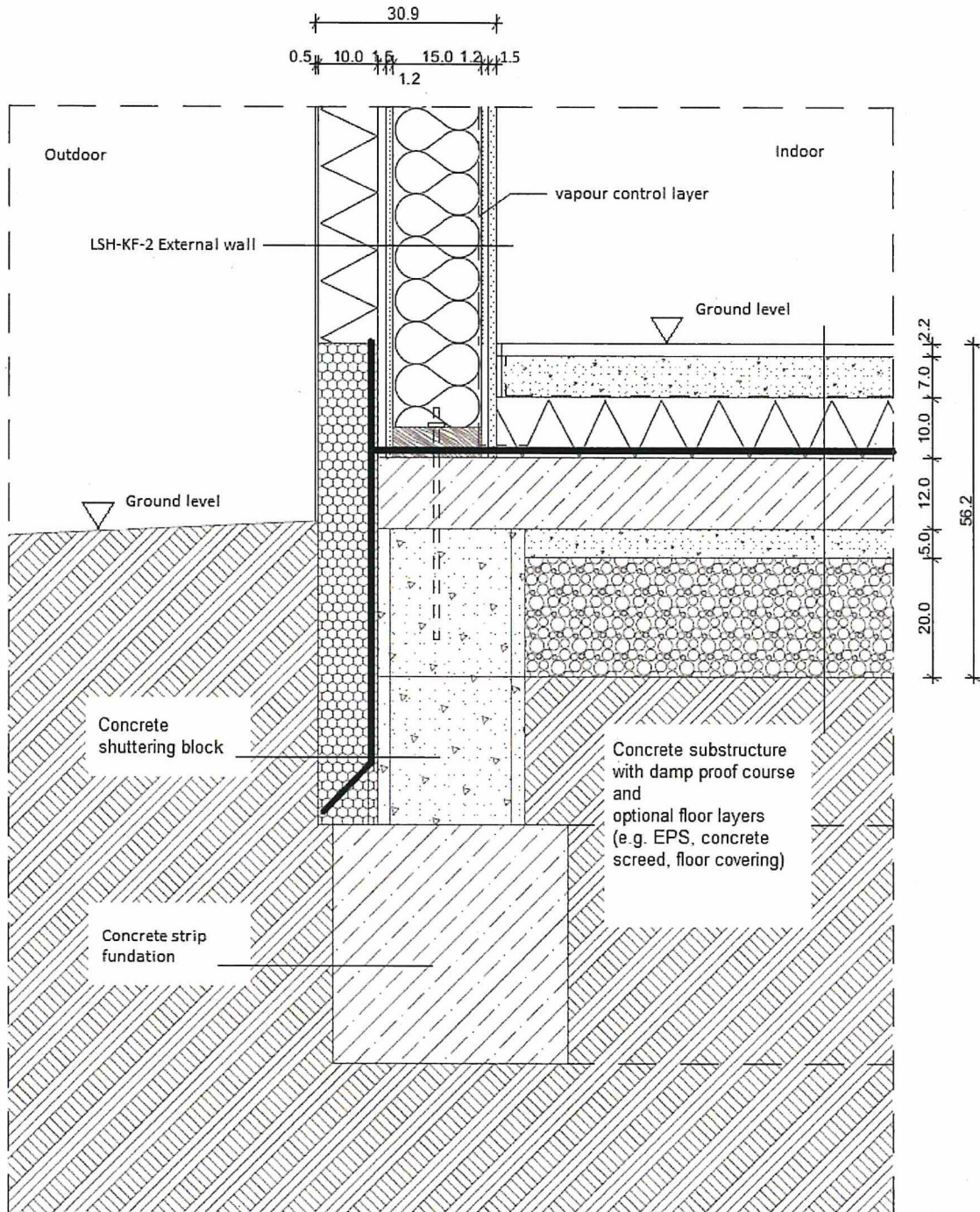
Project number: E1-M211X-25057-2022

Bizonylat azonosító: KBiA-XX-05.1-20160808_ETA új_EN

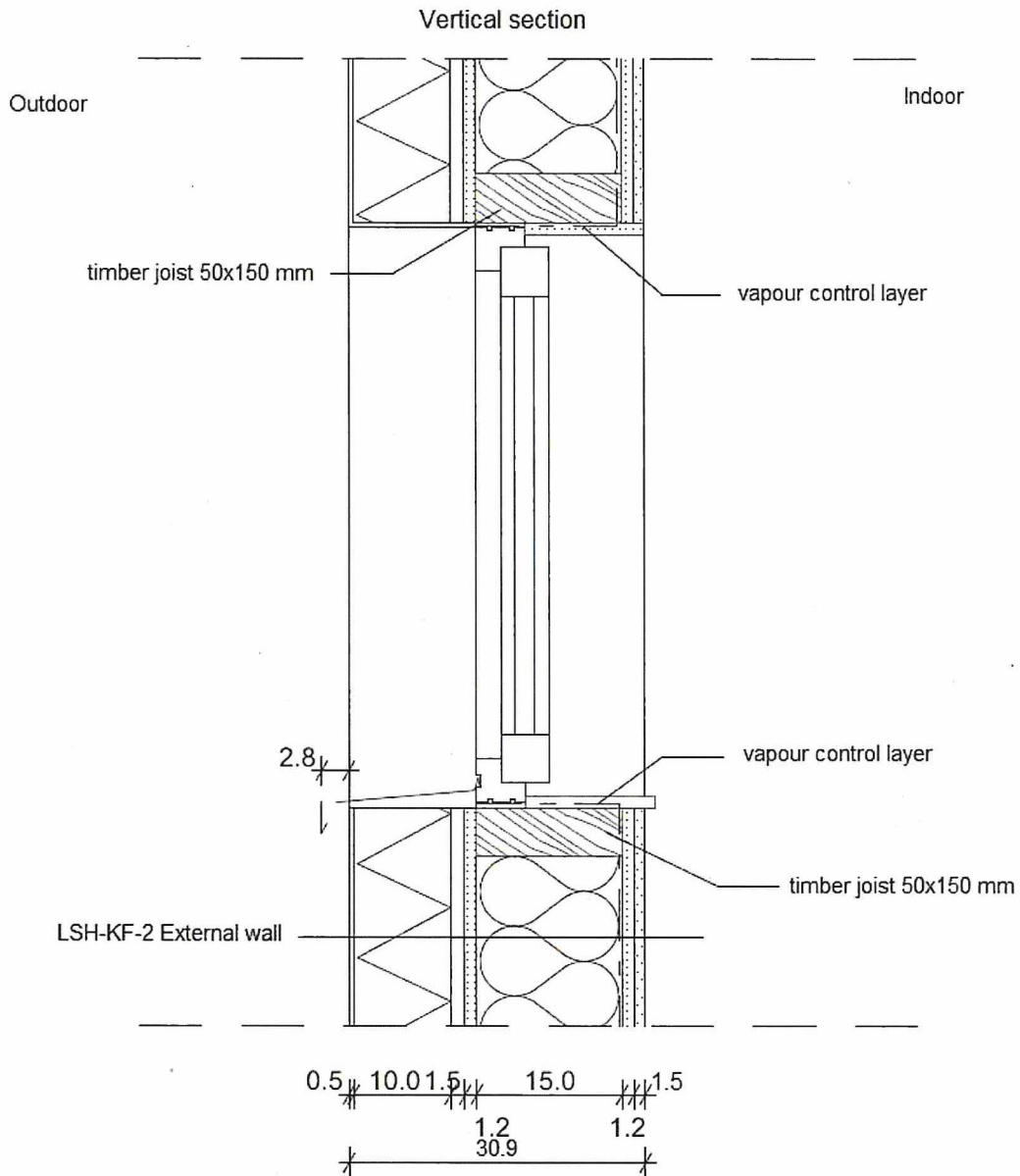
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External Wall – Plinth wall detail	3
External Wall – Door and Window detail	4
External Wall – Upper suspended floor below unheated lofts joint	5
Spacer elements in the LSH panel	6
LSH panel – timber frame detail	7

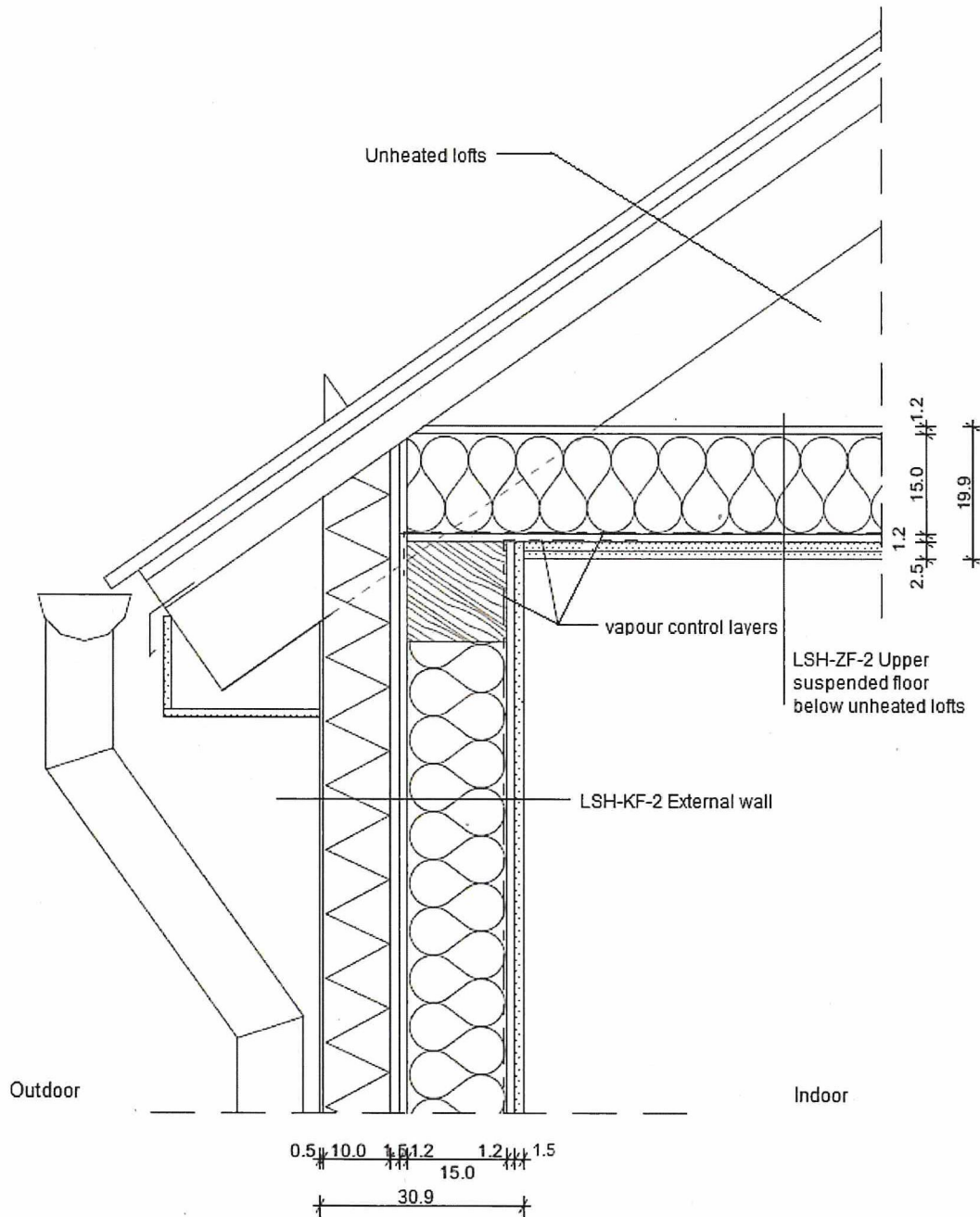
External Wall – Plinth wall detail



External Wall - Door and Window detail

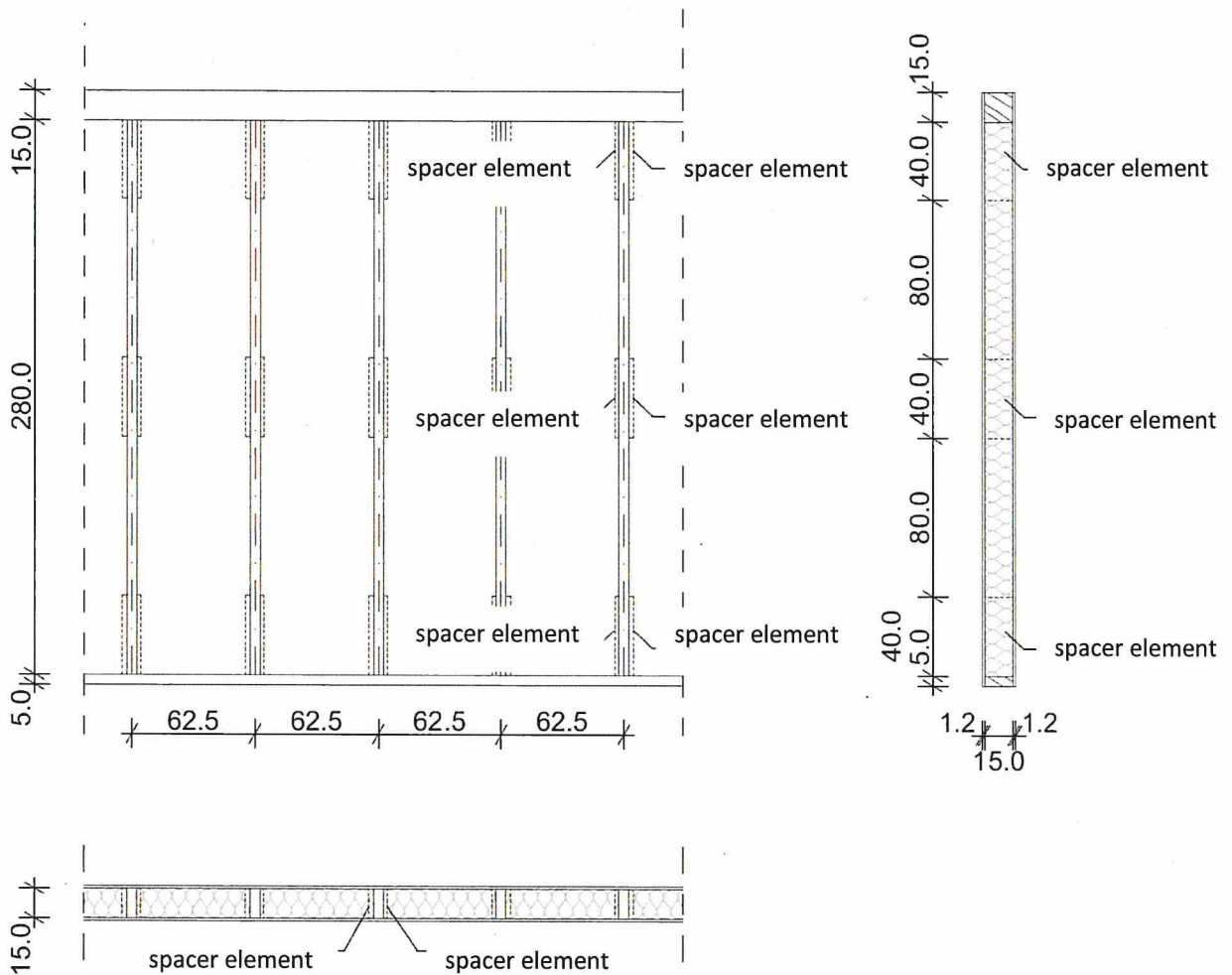


External Wall - Upper suspended floor below unheated lofts joint

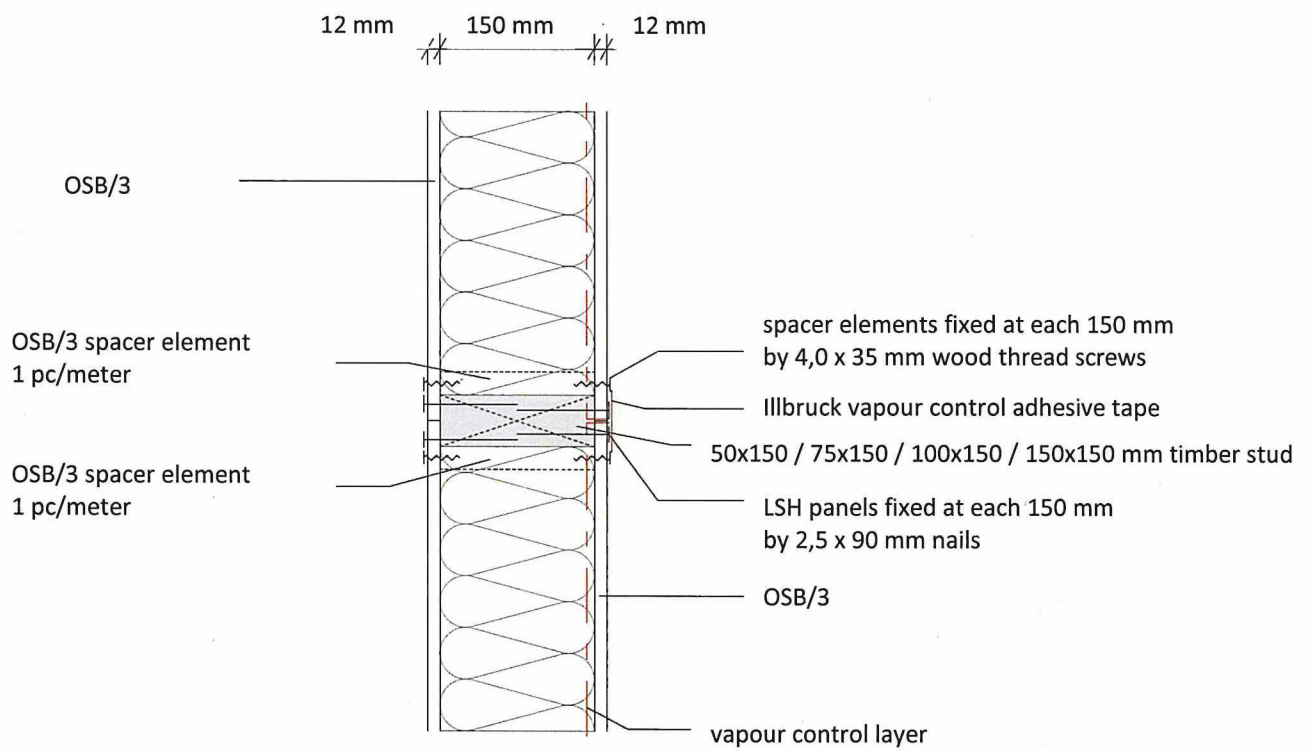


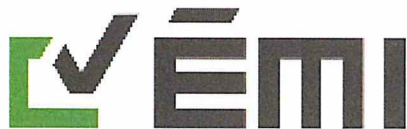
Spacer elements in the LSH panel

dimension of spacer elements: 22x150x400 mm



LSH panel – timber frame detail





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Evaluation Report

for the assessment of

ETA – 22/0730

Technical Assessment Body preparing the Evaluation Report

ÉMI Építésügyi Minőségellenőrző Innovációs Nonprofit Kft.

Trade name of the construction product

LSH timber frame building kit

Product family to which the construction product belongs

Timber frame building kit

Manufacturer

LSH Készházak Zrt.
2461 Tárnok, Egyenlőség utca 43.
Hungary

Manufacturing plant(s)

Plant 1
(as given in the Control Plan)

This Evaluation Report contains

7 pages

This Evaluation Report is prepared in accordance with regulation (EU) No 305/2011, on the basis of

European Assessment Document 340308-00-0203,
edition January 2019

Date of completion of the Evaluation Report

16.11.2023.

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1 Technical description of the product

See ETA, clause 1.

2 Specification of the intended use(s) in accordance with the applicable European Assessment Document**2.1 Intended use**

See ETA, clause 2.

2.2 Assumed working life

See ETA, clause 2.

3 Performance of the product and reference methods used for its assessment**3.1 Mechanical resistance and stability (BWR 1)****3.1.1 Resistance, stiffness and stability of wall and floor elements and their connections against vertical and horizontal loads**

For the load-bearing elements such as external wall structures, upper suspended floors below unheated lofts and roofs, geometrical data of the components and elements and their properties related to mechanical resistance and stability have been indicated according to Clause 2.2.1 of EAD 340308-00-0203. Geometrical data and material properties concerned are described in the ETA, Annex A.1 and Annex A.2.

For timber frame walls, the standard parts of the structural elements are defined by their cross sections, spacing and sheeting (see section 1, Annex A.1 and A.2 of the ETA).

For floors and roofs the standard load bearing components are defined by their cross sections, spacing and maximum span (see section 1, Annex A.1 and A.2 of the ETA).

No special verification of structural resistance related to seismic actions has been determined. If the kit is intended to be used in areas with seismic actions its behaviour in this respect should be considered and clarified case-by-case, taking into account national rules on works, if needed.

3.1.2 Shear resistance in plane direction against horizontal loads

No performance assessed.

3.1.3 Compression resistance - log walls

Not relevant.

3.1.4 Settling of construction - log walls

Not relevant.

3.1.5 Corrosion protection of metal fasteners

Corrosion protection of metal fasteners has been evaluated on the basis of coating thickness and type used according to Clause 2.2.5 of EAD 340308-00-0203. Metal fasteners applied in the kit have a hot-dip galvanized coating with a surface mass at least 275 g/m² according to the manufacturer declaration of performance.

Service classes for different building elements in accordance with EN 1995-1-1 for metal fasteners used in the kit is given in Annex A.5 of the ETA.

3.2 Safety in case of fire (BWR 2)

3.2.1 Reaction to fire of materials and components

Reaction to fire classifications of the components in the kit in accordance with EN 13501-1 and delegated regulation (EU) 2016/364 are given in Annex A.2 of the ETA. Those materials which are deemed to satisfy all requirements for the performance characteristic and those materials which can be classified without the need for further testing in accordance with Commission Decisions are listed in Annex A.2. of the ETA with reference to the related decision.

3.2.2 Resistance to fire

Resistance to fire of the elements have been assessed by calculation in accordance with EN 1995-1-2 and classified to EN 13501-2. The details of the calculations can be found in calculation reports [1], [2], and the results are given in Annex A.3 of the ETA.

3.2.3 External fire performance of roof covering

No performance assessed.
Roof coverings are not part of the kit.

3.3 Hygiene, health and environment (BWR 3)

3.3.1 Vapour permeability

Vapour permeability and moisture resistance of the upper suspended floor structures has been assessed on the basis of calculations in accordance with EN ISO 13788, see calculation reports [3], [4], [5]. For both surface and interstitial condensations, the calculations show that the building envelopes are adequate for the intended use in case of humidity flow (diffusion) from inside towards outside, taking into account an internal humidity class of 4 to EN ISO 13788 and Middle-European external conditions.

During the assembly of the boundary structure created by the pre-fabricated panels, it is necessary to ensure the surface continuity by the overlaid polyethylene foil vapour control layer.

If the kit is used under different conditions, a separate assessment needs to be carried out in accordance with EN ISO 13788 using the material properties listed in Annex A.2 of the ETA as a part of the design of works.

No performance has been assessed for the walls.

3.3.2 Watertightness

3.3.2.1 External envelope

No performance assessed.

3.3.2.2 Internal surfaces

No performance assessed.

Internal surfaces in wet areas are not part of the kit.

3.3.3. Durability class/use class

The timber species used in the kit is in natural durability class 4 and class S in relation to fungus attack and insect attack respectively in accordance with EN 350.

The adequacy of the hazard classes/use classes according to EN 335 for wood and wood-based products used in the kit is given in Annex A.5. of the ETA

The use of the kit in regions where termite attack can occur is impermissible without additional chemical treatment.

In principle, the components are executed without chemical treatment. The roof battens and load-bearing structures exposed to direct weathering (e.g. rafters in an empty loft) may be chemically treated. Any chemical treatment that may be used shall follow national and European provisions (e.g. Biocide Directive).

3.3.4 Content and/or release of dangerous substances

No performance assessed.

3.4 Safety and accessibility in use (BWR 4)

3.4.1 Impact resistance

No performance assessed.

3.5 Protection against noise (BR 5)

3.5.1 Airborne sound insulation of walls, floors and roof structures

No performance assessed.

3.5.2 Impact sound insulation of floors

No performance assessed.

3.5.3 Sound absorption

No performance assessed.

3.6 Energy economy and heat retention (BWR 6)

3.6.1 Thermal resistance

The total thermal resistance (R_T) and thermal transmittance (U) values of the different external building envelopes have been calculated in accordance with EN ISO 6946. The details of the calculations can be found in calculation reports [3], [4], [5], and the results are given in the ETA, Annex A.4.

3.6.2 Air permeability

No performance assessed.

3.6.3 Thermal inertia

No performance assessed.

3.7 Sustainable use of natural resources (BWR 7)

There is no relevant performance assessed regarding this essential requirement.

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

See ETA, Clause 4.

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

See ETA, Clause 5.

6 Reference documents

- [1] Calculation report on the resistance to fire performance of „LSH” timber frame building kit, no. É1-M225X-23913-2021/T, 02.02.2022 (8 pages), ÉMI Nonprofit Llc.
- [2] Calculation report on the resistance to fire performance of „LSH” timber frame building kit, no. É2-M211X-25390-2022/T, 09.09.2022 (8 pages), ÉMI Nonprofit Llc.
- [3] Calculation report on thermal resistance (R_T), thermal transmittance (U), vapour permeability and moisture resistance of external structures of „LSH” timber frame building kit, no. É1-M225X-23913-2021/H, 09.02.2022 (14 pages), ÉMI Nonprofit Llc.
- [4] Calculation report on thermal resistance (R_T), thermal transmittance (U), vapour permeability and moisture resistance of external structures of „LSH” timber frame building kit, no. É2-M211X-25390-2022/H, 14.09.2022 (14 pages), ÉMI Nonprofit Llc.
- [5] Calculation report on thermal resistance (R_T), thermal transmittance (U), vapour permeability and moisture resistance of external structures of „LSH” timber frame building kit, no. E1-M211X-25057-2022/H, 31.05.2023 (4 pages), ÉMI Nonprofit Llc.