



## European Technical Assessment **ETA 13/0240** of 29/05/2018

### General Part

**Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011:**

VTT Expert Services Ltd

**Trade name of the construction product**

Q-haus

**Product family to which the construction product belongs**

Timber frame building kit

**Manufacturer**

Q-haus Baltic OÜ  
Osmussaare 8  
EE- 13811 Tallinn  
Estonia

**Manufacturing plant**

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**This European Technical Assessment contains**

13 pages including 1 Annex which forms an integral part of this assessment.  
Separate Annex 2 and Annex 3.

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

ETAG 007, Edition November 2012, used as European Assessment Document (EAD)

**This ETA replaces**

ETA 13/0240 issued on 30/04/2013

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## Specific Part

### 1 Technical description of the product

Q-haus buildings are predesigned timber frame prefabricated wooden large element houses. Parts of the houses can be volumetric units based on large element structures. Wall elements have mineral wool insulation covered with wind barrier board outside and moisture resistant chipboard and gypsum plasterboard inside. Ceiling elements have mineral wool insulation covered with moisture resistant chipboard panels inside. Ventilated roof elements have timber rafters assembled with punched metal plate fasteners, mineral wool insulation, wind barrier, moisture resistant chipboard inside and covered with bituminous felt at the factory. Nailed roof trusses are assembled with punched metal plate fasteners at the factory. Windows and doors, external cladding, internal linings and technical service installations are assembled at the factory. Performance of the windows and external doors is according to a separate CE-marking of their own and not further dealt with within this ETA.

Volumetric units are ready made with finishing and equipment installed. The ETA does not cover external cladding or internal surface, finishes, and supplementary components like stairs and balconies or technical service installations like electrical installations or plumbing. These products are specified case by case and their performance have to be verified specifically as parts of the works in each case. Further, timber treated against fungi and biological wood degrading agents is not part of this kit.

The basic design of the assembled components as well as the material and component specifications are shown in Annexes 1 and 2. Detailed design specifications including connections between the components and assembly are shown in the supporting document Annex 3: Q-haus building kit. Supplement to ETA 13/0240. Annex 3 is a formal part of the ETA and the valid version of the document is the latest version filed by VTT Expert Services.

The minimum content of the delivery comprises at least all timber and board parts for walls, floor and ceiling with the necessary fixings and connectors of load bearing parts. Thermal insulation is always part of the kit. Windows and doors are optional as well as external cladding. In addition, roofing and roof underlay may be delivered. The extension of the delivery varies according to the option chosen by the customer and country of destination

More detailed information of the standard components, materials and dimensions are given in Annex 1. Typical solutions are presented in Annex 2, supporting drawings.

### 2 Specification of the intended uses in accordance with the applicable EAD

#### Intended uses

The Q-haus building kits are mainly intended for used as residential buildings, but also school and kindergarten buildings, hostels, motels etc. are possible.

The kits are suitable for low rise or multistorey houses, with vertical and horizontal separations between housing units. The modules may also be used for non-residential buildings where the performance requirements are more or less the same as for residential houses.

The building kits are suitable for various climatic conditions. For timber frame parts as suspended base floors, roofs and parts with internal insulation and vapour barrier the moisture flow shall be from inside out for the most time of the year. Vapour barrier can be replaced by an air control layer, if the climatic conditions provide for that e.g. if the house were cooled during the summer time.

The wood components are not treated for use in areas with termite attacks. For such an application, chemical treatment may be done according to the rules valid on the building site. These kinds of treatment are not a part of this assessment.

### 2.1.1 Working life and durability

The provisions made in this European Technical Assessment are based on an assumed intended working life of the building kit of 50 years for the load-bearing structure and non-accessible components and materials, and 25 years for repairable or replaceable components and materials like claddings, roofing materials, exterior trims, and integrated components like windows and doors provided the kit is subject to appropriate use and maintenance.<sup>1</sup>

When properly assembled, the product will stay against the effects of weather during the intended working life. Some components as window and door sealing shall be maintained and replaced when needed, according to the recommendations given in the maintenance guide provided by the manufacturer.

When the kit is erected, a thoroughly ventilated air gap, at least 22 mm, shall be provided behind the possible external timber cladding. The guidance given by the manufacturer with regard to ventilation of the attic shall be followed.

The external wall elements persist against the effect of weather if it has the possibility to dry out between the wet periods (hazard class 3 as defined in EN 335-1).

Chemical treatment of timber parts may be needed in regions where there is a risk of insect attack. All protective treatments shall be made on the building site according to the local provisions. The treatment chemical shall be classified by the chemical manufacturer according to standard EN 599-2 being suitable in hazard class 3, as defined in standard EN 335-1, with indication of additional biological efficacy required, to conform to local conditions.

The fasteners used in the building kit fulfil the requirements for service class 3 as defined in EN 1995-1-1.

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<sup>1</sup> This means that it is expected that when this working life has elapsed, the real working life may be, in normal use conditions, considerably longer without major degradation affecting the essential requirements of the works. The indications given as to the working life of a building kit cannot be interpreted as a guarantee given by the producer or the assessment body. They should only be regarded as a means for the specifiers to choose the appropriate criteria for building kits in relation to the expected, economically reasonable working life of the works.

### 2.1.2 Design

A specification of relevant requirements concerning structural design, fire safety, noise protection and energy saving including ventilation provisions shall be elaborated for each delivery as a basis for the production of a kit.

Design of the works comprises the structural design (see 2, ER1) and, when required, also calculations regarding resistance to fire class (REI) and a heat loss calculation or energy calculation of the building.

This European technical assessment is based on the assumption that all plans needed have been made correctly according to the regulations valid on the building site.

### 2.1.3 Substructure

The kits are intended to be placed on all types of substructure such as concrete slab on ground, basement made of blocks of lightweight aggregate concrete, or pillars. This ETA does not comprise the substructure of the building.

A plan drawing with the dimensions and schematic details of the substructure are delivered by the manufacturer. The substructure shall be individually designed according to the local building regulations to fit the building site. The tolerances of the finished substructure shall be horizontal  $\pm x$  10 mm and vertical  $\pm 5$  mm and-  $y \pm 2$  mm per 2m (dimensions and levels). The level of the substructure with regard to the surrounding soil shall be chosen so, that there is no adverse effect on the durability of the construction, which depends on the local conditions.

### 2.1.4 Execution of construction works

It is the responsibility of the manufacturer to ensure that proper information for the use of the building kit is enclosed to each delivery, including general guidance on the basis of this ETA and the specific installation instructions and construction details. With regard to the assumed working life regular maintenance is necessary. The manufacturer shall provide with written documents which contain descriptions about type and frequency of the maintenance.

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

### 2.1.5 Identification

Components of the kit are defined in Annex 1. The components and materials are identified as being of a generic type or giving a brand name and specified in the manufacturer's Contents of delivery list. The component under a given brand name may be changed by the manufacturer to another with corresponding performance.

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

Table 1. Basic requirements for construction works and essential characteristics

Basic requirement and essential characteristics	Performance
<b>BWR 1. Mechanical resistance and stability</b>	
Resistance of walls, floor and roof structures and their connections against vertical and horizontal loads	Clause 3.1, design calculations
Resistance against seismic actions	No performance assessed
Aspects of serviceability Deflections of the load-bearing constructions Stiffness against floor vibration	Clause 3.1, part of design calculations
<b>BWR 2. Safety in case of fire</b>	
Reaction to fire of materials and components	Annex 1
Resistance to fire	Clause 3.2
External fire performance of roof covering	Clause 3.2
<b>BWR 3. Hygiene, health and the environment</b>	
Vapour permeability and moisture resistance	Clause 3.3 and Annex 2
Watertightness	Clause 3.3 and Annex 1
Content, emission and/or release of dangerous substances	Clause 3.3
<b>BWR 4. Safety and accessibility in use</b>	
Slipperiness of floors	No performance assessed
Impact resistance	Clause 3.4
<b>BWR 5. Protection against noise</b>	
Airborne sound insulation of walls, floors and roof structures	No performance assessed
Impact sound insulation of floors	No performance assessed
Sound absorption	No performance assessed
<b>BWR 6. Energy economy and heat retention</b>	
Thermal resistance	Clause 3.5
Air permeability	Clause 3.5
Thermal inertia	No performance assessed
<b>BWR 7. Sustainable use of natural resources</b>	
Sustainable use of natural resources	No performance assessed

### **3.1 Mechanical resistance and stability, BWR 1**

The load-bearing structures of the kit are planned individually according to the regulations valid on the place of use with design documentation made by the manufacturer or reference to such documentation by a third party.<sup>2</sup>

#### 3.1.1 Characteristic resistance of anchorage

Anchorage of the building to the foundations is dealt with as a part of design of works. The roofing constructions will be anchored with the walls by nailing, screws, ordinary nailing plates or angle brackets specified by the manufacturer. The type and characteristic resistance of the anchorage depends of the amount of fasteners according to the specific design of the kit.

#### 3.1.2 Aspects of serviceability / Floor stiffness

Serviceability of a building kit is understood as the ability of the horizontal load bearing structures to resist loads without unacceptable deformation. Under ER 1, the capacity of the load-bearing constructions is verified also in the serviceability limit states<sup>3</sup>.

In absence of other local regulations the deflection of the roof constructions is limited to be 1/200 of the span width and the deflection of the self-supporting floor constructions to 1/300 of the span width.

Stiffness against floor vibrations will be taken into account when required by the customer or the local regulations.

### **3.2 Safety in case of fire, BWR 2**

#### 3.2.1 Reaction to fire

The classification of the main materials with regard to reaction to fire is given in Annex 1. For roofing, reaction to fire is NPD.<sup>4</sup>

#### 3.2.2 Resistance to fire

Resistance to fire is considered according EN 1995-1-2 as part of the design calculations.

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<sup>2</sup> The performance notably of structural behaviour of a construction product is expressed by referring to the respective production documentation or structural design calculations. The relevant documents shall be attached to the declaration of performance.

<sup>3</sup> The concept serviceability limit states is defined in Eurocode, basis of structural design, EN 1990.

<sup>4</sup> Reaction of fire of the roofing shall meet the requirements set in the place of use.

Table 2. Resistance to fire classes for some standard wall constructions

<b>Structure</b>	<b>Name of the element</b>	<b>R</b>	<b>EI</b>
External wall	EW-1-1 glass wool	30	-
	EW-1-2 rock wool	-	60
	EW-1 -3	60	-
	EW-1-4(wet room)	30	-
	M-EW-2-1	30	-
Intermediate wall	SW-1-2 rock wool	60	-
	SW-1-1	30	-
Suspended floor	FE-1-2	30	-
	FE-3-2	60	-
Intermediate wall	IW-1-1	30	-
	IW-1-2	60	-
	IW-1-3(wet room)	30	-
	IW-3-1	-	30
	IW-3-3(wet room)	-	30

These classes provide for the materials to be according materials listed in Annex 1. In addition, the support conditions of the walls and the details shall correspond to the evaluated ones, as described in the relevant classification reports.

Resistance to fire is usually considered as a part of the design of the works and achieved so that compartment walls made of other materials than timber frame such as brickwork, concrete or gypsum plasterboard are used. These walls are not included to the building kit according to this approval.

### 3.2.3 External fire performance of roof coverings

Roof tiles (concrete or clay) and corrugated steel sheet roofing (thickness at least 0,4 mm) are considered to fulfil all requirements. The provisions for this are that the mass of any organic coating does not exceed 200 g/m<sup>2</sup>.<sup>5</sup> For pural coated steel roof sheets the external fire performance of roof covering is B<sub>ROOF</sub> (t2). For bituminous roofing materials the external fire performance of roof covering is B<sub>ROOF</sub> (t2).

## 3.3 Hygiene, health and environment, BWR 3

### 3.3.1 Vapour permeability and moisture resistance

Vapour permeability and moisture resistance of the external envelope have been assessed to fulfil the common requirements for such climatic conditions, where the tendency of moisture flow is from inside out for the most time of the year, as in Northern part of Europe.

<sup>5</sup> Some member states may have national provisions regarding the reaction to fire performance of the roof underlay, which shall be taken into account.

If the kit will be used in a building that is intended to be cooled during summertime, the function of the envelope shall be separately assessed with regard to moisture diffusion and condensation as a part of the design of works.

### 3.3.2 Watertightness

#### *External envelope*

Watertightness of the external envelope has been assessed to fulfil the common requirements. The ventilation gap behind the facade will prohibit water to penetrate into the wind barrier.

#### *Internal surfaces*

The long term performance of the kit provides that proper waterproofing of internal surfaces of floors and walls in wet areas is used. Tiles cannot be considered to be a sufficient waterproofing. E.g. a liquid applied waterproofing system with properties of water tightness of 100 mm (14 d), crack bridging capacity and durability against alkali exposure shall be used under the tiles. Penetrations, corners and wall-floor joints shall be reinforced and protected carefully. The vapour barrier shall be removed behind the waterproofing.

Waterproofing of internal surfaces is not a part of the kit.

### 3.3.3 Dangerous substances

The manufacturer has not given information that Q-haus timber frame building kit would contain any harmful or dangerous substances except of formaldehyde.

The formaldehyde potential class of the glued laminated timber is classified to be E1 in accordance with EN 14080. The formaldehyde potential class of the wood-based wind barrier board is classified to be E1 in accordance with EN 13986.

With regard to other dangerous substances NPD.

In addition to the specific clauses relating to dangerous substances contained in this European Technical Assessment, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the EU Construction Products Directive, these requirements need also to be complied with, when and where they apply.

## **3.4 Safety in use**

### 3.4.1 Impact resistance

A wall or floor covered with wooden boards, fibre cement panels, OSB boards or chipboards bear the impact caused by falling humans without structural damage. Impact resistance of walls and ceilings covered by gypsum plasterboard is assessed on the basis of experience to be adequate for the normal use of the kit.



### 3.5 Energy economy and heat retention, BWR 6

#### 3.5.1 Thermal resistance

The thermal transmission coefficient U of walls with timber frame structure, suspended floors, roofs and the other corresponding parts of the building kit will be chosen according to the place of the works. The corrected thermal transmittance values  $U_c$  for components of external envelope of Q-haus is as given below.

Table 3. Thermal transmission coefficient  $U_c$  for some standard constructions.

<b>U-value of wall EW-1-1</b>	Wall type 2	Wall type 4	Wall type 6
Rafters frame columns spaced 600 mm	Thickness of insulation (145+45) mm	Thickness of insulation (195+45) mm	Thickness of insulation (245+45) mm
$\lambda_{\text{design}} = 0,035 \text{ W/(mK)}$	0,24	0,19	0,16
<b>U-value of floor FE-5-2</b>			
	Floor type 4	Floor type 5	Floor type 6
Beams spaced 400 mm	Thickness of insulation (50+95) mm	Thickness of insulation (150+150) mm	Thickness of insulation (200+160) mm
$\lambda_{\text{design}} = 0,037 \text{ W/(mK)}$	0,22	0,19	0,16
<b>U-value of roof R-1-3</b>			
	Roof type 2	Roof type 4	Roof type 6
Beams spaced 600 mm	Thickness of insulation 245 mm	Thickness of insulation 340 mm	Thickness of insulation 490 mm
$\lambda_{\text{design}} = 0,037 \text{ W/(mK)}$	0,22	0,17	0,12

#### 3.5.2 Air permeability

Air permeability is assessed to fulfil common requirements in conditions where the wind speed exceeds 25 m/s only occasionally. The air tightness of the components is provided by the vapour barrier made of building plastics. The joints of the vapour barrier and between the components are made such, that an overall air tightness is achieved. The main principle is that the joints are clamped between stiff layers.

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

According to the Decision 1999/455/EC of the European Commission<sup>6</sup>, the system of assessment and verification of constancy of performance (see Annex V to the regulation (EU) No 305/2011) is System 1.

<sup>6</sup> Official Journal of the European Communities L 178/56-57 of 14.7.1999

**5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD.**

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at VTT Expert Services Ltd.

Issued in Espoo on May 29, 2018  
by VTT Expert Services Ltd

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# ANNEX 1

## DESCRIPTION AND PERFORMANCE OF Q-HAUS BUILDING KITS

### 1 Contents of this Annex

This Annex presents the main components and materials. Section drawings are presented in Annex 2. Typical solutions for the construction details are presented in Annex 3, Supporting drawings.

#### 1.1 Materials

The following materials may be part of the kit or they are necessary for the proper function of the kit. Only properties to be indicated in the CE-marking have been mentioned.

Material function	Material type	Material specification
Timber frame	Structural timber, EN 14081-1, e.g., Puidukoda, AS Rait, Lotus Timber OÜ	C18, C24, C30 D-s2, d0
Timber stud		
Timber beams		
Roof trusses and frames	EN 14250, e.g. Puidukoda, AS Rait	
Beams and columns	Glulam, 14080:2013 / DIN 1052	GL 24, GL 28, GL 32 D-s2, d0
Load bearing boards	OSB 3-board, EN 13986, EN 300 e.g. Kronospan	E 1
Footsill	Impregnated timber <sup>7</sup> , e.g. Tanalith	NPD
Mechanical fasteners	Nails, e.g. Essve ring shank nails, several sizes, EN 14592, f > 600 N/mm <sup>2</sup>	NPD
	Screws 8mm - 12 mm EN 14592, fu > 500 N/mm <sup>2</sup> , Essve	NPD
	Screws 3,9mm - 4,2	NPD
Fixings and other metal parts	Nailing plates, angle brackets, bracings and anchors, e.g. Essve, Senco, Lahti Levy	According to the manuals of the component manufacturer
	Sliding fixings, screw feet, stiffening rods and tubes, other special fixings	According to the specifications of the kit manufacturer
External cladding	Timber panel, EN 14915, e.g., Puidukoda, AS Rait, Lotus Timber OÜ	D-s2, d0
	Fibre cement flat sheet EN 12467, e.g. Cembrit RAW, Cembrit Multiforce	NT A3 I A2-s1, d0
Roofing	Concrete roof tiles EN 490, e.g. Monier	B <sub>ROOF</sub>
	Corrugated steel roofing, EN 505, EN 508-1,2,3, e.g. Ruukki	B <sub>ROOF</sub>
	Bituminous roof shingles EN 544, e.g. Icopal	B <sub>ROOF</sub> (t2)
Roof underlay	Flexible sheets for waterproofing EN 13859-1, e.g. Divoroll Universal 2S, Spanflex Fleese, Monier	E or D-s1, d2 s <sub>d</sub> = 0,035m

<sup>7</sup> Treatment shall be made with agents that fulfill the local regulations according to the provisions valid on the building site.

	Bituminous roofing (Underlayer Technoelast K-MS 170/4000) EN 13707, e.g. TecnoNicol	B <sub>ROOF</sub> (t2)
	21-22 mm particleboard Durelis type P5, EN 13986, formaldehyde class E1 e.g. N.V. Spano, Unilin Panels	D-s2, d0
Thermal Insulation	Mineral wool, EN 13162, e.g. Paroc extra	A1 $\lambda_d \leq 0,036 \text{ W/(m K)}$
	Glass wool, EN 13162, e.g. Isover KT 37, KL35, KL 33	A1 $0,033 < \lambda_d < 0,037 \text{ W/(mK)}$
Wind barrier and sound insulation	Wood-based panel, HB.H, EN 13986, e.g. Hunton Silencio Thermo	E
	Gypsum board GTS9 EN 520 e.g. Saint-Gobain	A2-s1, d0 $s_d = 0,2 \times 10^{-6} \text{ m}$
	Monier DIVOWIND EN 13501-1 e.g. Monier OÜ	E $s_d = 0,03 \text{ m}$
	Particle board EN 13986 Durelis P5 e.g. N.V. Spano, Unilin Panels	D-s2, d0 Formaldehyde class E1 $s_d = 0,6- 0,75 \text{ m}$
	OSB 3-board 12 mm, EN 13986, EN 300 e.g. Kronopol Ltd.	D-s2, d0 Formaldehyde class E1 $s_d = 0,36-2,55 \text{ m}$
	Glasroc GHS9 Storm, EN 15283-1 e.g. Saint-Gobain	A2-s1, d0 $s_d = 0,2 \times 10^{-6} \text{ m}$
	Glass wool board ISOVER FLO30 MW-EN13162-T3-MU1, e.g. Saint-Gobain	A2-s1, d0; E <sub>FL</sub> $L_{n,w} \leq 53 \text{ dB}$ $R'_w \geq 56 \text{ dB}$
Water vapour barrier	Polyethene foil 0,2 mm, EN 13984 e.g. UAB Umaras	Formaldehyde class F $s_d > 85 \text{ m}$ Durability against ageing Pass
	Vapour control layer Isover Vario Duplex 0,22, EN 13984 e.g. Saint-Gobain	Formaldehyde class E $s_d = 0,3 - 5 \text{ m}$
Internal lining	Particle board 10 mm, EN 1398, Durelis P5 e.g. N.V. Spano, Unilin Panels	D-s2, d0 Formaldehyde class E1
	Gypsum plaster board (12,5 mm) type A according to EN 520, e.g. Saint-Gobain	A2-s1, d0
	Gypsum plaster board (15 mm) type F according to EN 520, e.g. Saint-Gobain	A2-s1, d0
	Fibre gypsum board, EN 15283-1 e.g. Saint-Gobain Glasroc GHOE 13 Ocean	A2-s1, d0
Windows and doors	EN 14351-1	
Flooring	Soft wood flooring, EN 13990	D <sub>FL</sub> -s1
		NPD
Gaskets and related materials	Sill sealer, Paroc XSS 015/ XSS 002, e.g. Paroc Group Oy / Paroc AB	NPD
	Polyurethane mass, e.g. DL Chemicals NV	NPD

	Timber glue, e.g. Essve 925	NPD
	Extensible duct silencer for module joints, e.g. Lindab	NPD