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Rakennusalan tuotteita koskevan jäsen-  
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direktiivin 89/106/EEC mukaisesti ilmoitettu  
tuotehyväksyntälaitos

**EOTAN JÄSEN**

## **Eurooppalainen tekninen hyväksyntä**    **ETA-05/0119** **European Technical Approval**

**Kauppanimi:**  
Trade name

**Kontio hirsitalot, Kimara hirsitalot**  
Kontio loghouse, Kimara loghouse

**Hyväksynnän haltija:**  
Holder of approval:

**Kontiotuote Oy**  
Ranuantie 224  
FI-93100 PUDASJÄRVI  
Finland

**Tuotetyyppi ja sen käyttötarkoitus:**  
Generic type and use of construction  
product:

Hirsitalon rakennussarja  
Log building kit

**Voimassaoloaika:** Validity from/to  
**This version replaces:** Tämä korvaa

From June 19, 2013 to June 19, 2018  
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**Valmistuspaikka:**  
Manufacturing plants:

Kontiotuote Oy  
Ranuantie 223  
FI-93100 PUDASJÄRVI  
Finland

**Tämä hyväksyntä sisältää**  
This European Technical Approval  
contains  
sivuja/liitteitä

26 sivua sisältäen 1 liitteen + 2 erillistä liitettä

pages/annexes

26 pages including 1 annex + 2 separate annexes



Eurooppalainen tekninen hyväksyntäorganisaatio  
European Organisation for Technical Approvals

## I LEGAL BASIS AND GENERAL CONDITIONS

1. This European Technical Approval is issued by VTT Expert Services Ltd in accordance with:
  - Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products<sup>1</sup>, modified by Council Directive 93/68/EEC<sup>2</sup> and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council<sup>3</sup>;
  - Laki rakennustuotteiden hyväksynnästä (230/2003) luvut 3 ja 10, Ympäristöministeriön asetus rakennustuotteiden hyväksynnästä 3 § sekä Ympäristöministeriön 18.12.2009 antama valtuutus päätös (YM19/629/2009).
  - Common Procedural Rules for Requesting, Preparing and the Granting of European Technical Approvals set out in the Annex of Commission Decision 94/23/EC<sup>4</sup>;
  - Guidelines Nr 007 for European Technical Approval of Timber frame building kits and 012 Log building kits
2. VTT Expert Services Ltd 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.
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6. The European Technical Approval is issued by the approval body in English. This version corresponds fully to the version circulated in EOTA. Translations in other languages have to be designated as such.

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<sup>1</sup> Official Journal of the European Communities N° L 40, 11.2.1989, p. 12

<sup>2</sup> Official Journal of the European Communities N° L 220, 30.8.1993, p. 1

<sup>3</sup> Official Journal of the European Union N° L 284, 31.10.2003, p. 1

<sup>4</sup> Official Journal of the European Communities N° L 17, 20.1.1994, p. 34

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## **II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL**

### **1 Definition of product and intended use**

#### **1.1 Definition of the construction product**

Kontio and Kimara log houses are predesigned log building kits prepared in the factory for each individual house, and delivered as a package to be assembled on site.

The kits covered by this ETA consist of the main building parts such as walls, suspended floors and roof structures described in the ETA. The main load-bearing construction of the houses is made of a log frame that may contain log columns in addition to horizontal logs. The log frame may contain metal parts as stiffening rods and tubes, screw feet as well as connectors and fixings. The walls of the building kit are mainly made of logs, but the kits may contain parts with timber frame construction or timber frame element and the walls may have additional insulation either inside or outside. The load-bearing horizontal constructions may be made of logs or other timber constructions.

The material and component specifications as well as description of the main options of the building kits are given in Annex 1. Construction types and building options are illustrated in Annex 2. Annex 3 gives the standard load-bearing constructions of the kit. Detailed design specifications including connections between the components and assembly are shown in the supporting document Annex 3: Kontio and Kimara log building kits. Supplement to ETA 05/0119. 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 Ltd.

The kits covered by this ETA may in addition to the log frame and the timber parts needed comprise also glulam constructions, roof trusses and frames, balconies, windows and doors, thermal insulation, air and moisture control layers, linings, claddings, roofing and fixings. Normally, the timber parts of load bearing constructions are prefabricated and only minor cutting or shaping is needed at the building site. Other timber materials may be delivered in falling lengths. The extension of the delivery varies according to the chosen option and country of destination.

Windows and doors may or may not be part of the kits.

Complementary parts like substructure, surface coverings, stairs, internal fittings, technical installations for water, heating, ventilation and electricity as well as other components necessary to form completed works are not a part of this approval. This includes also supplementary constructions like such load-bearing constructions and such compartment walls not specified in this ETA.

#### **1.2 Intended use**

The kits are intended mainly to be used as residential buildings. Other possible uses are as kindergartens, shops, hostels, restaurants and corresponding when the performance requirements are applicable. The number of storeys is in general one or two<sup>5</sup>.

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<sup>5</sup> The building (works) may have even more floors, in such cases the ground floor is often made of stone material.

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.

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. If the kit will be used in conditions with heavy wind and driving rain an external cladding with a ventilation gap behind shall be used or other measures related to the design of the works taken.

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 treatments are not a part of this approval.

The individual design of the building kit may be done with regard to seismic actions.

The provisions made in this European Technical Approval are based on an assumed intended working life of the house of 50 years<sup>6</sup>.

## 2 Characteristics of product and methods of verification

### ER 1 Mechanical resistance and stability

In general, the houses are delivered according to the "made to measure" principle. The load-bearing structures of the house are planned individually according to the regulations valid on the place of use. The roof structures and floor joists are planned according to the chosen house plan. The manufacturer provides with the design of the load bearing structures.

Structural design is made assuming the strength of the massive logs to be C22 and laminated logs to be C24. Massive logs C24 are possible if visually graded e.g. according INSTA 142. For standard delivery the building kit will be designed as specified in Annex 3. Intermediate values may be interpolated. Trussed rafters and the main load-bearing system as glulam beams will be designed case by case.

Thus, all Methods 1, 2 and 3 as referred to in Guidance paper L, Application and use of Eurocodes, 3.3.3 and 3.3.4 have been used.

In CE marking, either the design resistances or a reference to the design documents of the customer (order number) will be given.

#### *Characteristic resistance of walls*

The following characteristic resistances of the log wall against vertical load are based on test results.

One cross corner:  $F_{CC} = 0,6 \times b_{ef}$

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<sup>6</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 approval 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.

Wall between the cross corners  $F_w = L \times b_{ef}$ ,  $F_w \leq 4 \times b_{ef}$

$F_{CC}$  and  $F_w$  is the resistance of the wall in MN,  $b_{ef}$  is the effective thickness of the log wall in m and  $L$  is the length of the wall in m. For square logs,  $b_{ef}$  is 3/4 of the nominal thickness of the logs and for round logs,  $b_{ef}$  is 1/2 of the nominal thickness of the logs. The limitations for these equations are, that the height of the wall is not more 3 m, the length of the logs building up the cross corner is at least 0,6 m and the distance between the cross corners is not more than 8 m. The wall shall be stiffened and the logs fixed with wooden pegs according to the instructions of the manufacturer.

Four types of screw foot can be used to adjust for the settlement. The main load-bearing parts are a steel rod and quadratic steel plates according to the specification of the manufacturer. The fourth screw foot has also an additional load-bearing U steel to improve the resistance against compression perpendicular to the grain. The characteristic resistance of the screw feet is calculated case by case according to the material to be used, log, timber or glulam, with regard to the strength class used.

Type of the screw foot	L500	L450	L400	L451
steel rod thickness mm	30	20	30	30
steel plate size mm x mm	90 x 90	90 x 90	90 x 200	90 x 90 + U-steel
maximum length mm	200	150	200	200

#### *Characteristic resistance of anchorage*

When necessary, Kontio or Kimara log building is anchored into the ground by concrete steel rods (D = 6 mm spacing 1500 mm) or anchoring bolts (D = 16 mm, spacing specified in the foundation plan) or by nailing plate fixings. The anchorage is designed according to the specific requirements of the kits to be delivered.

The roofing constructions will be anchored with the walls by nailing plates or sliding fixings specified by the manufacturer. The characteristic resistance of the roofing anchorage depends of the amount and type of fasteners according to the specific design of the kit.

## **ER 2 Safety in case of fire**

### *Reaction to fire*

The classification of the main materials with regard to reaction to fire is given in Annex 1.

### *Resistance to fire*

For log walls, resistance to fire is given in the table below. This classification is based on full scale testing as specified in EN 13501-2. The walls were loaded with a uniformly distributed load 9,4 kN/m. The use of these values provides for the sealant materials to be the same as used in the test. In addition, the support conditions of the walls and the details shall correspond to the tested ones, as described in the relevant test and classification reports.

Type of wall	R	EI
Round log thickness $\geq 190$ mm, plastic foam sealing strip	90	90
Rectangular log thickness $\geq 95$ mm, plastic foam and glass wool sealing strip	45	30
Rectangular log thickness $\geq 95$ mm, plastic foam and glass wool sealing strip, additional insulation 100 mm glass wool and log panel 19 mm on the side of the fire.	60	60
Rectangular log thickness $\geq 180$ mm, glass wool sealing strip	120	90

Resistance to fire shall be considered as a part of the design of the works. When compartment walls made of other materials than logs such as brickwork, concrete or gypsum plasterboard are used, they are not included to the building kit according to this approval.

#### *External fire performance of roof coverings*

The external fire performance of roof covering is  $B_{ROOF}$  for roof tiles (concrete or clay) and for corrugated steel sheet roofing (thickness at least 0,4 mm). The provisions for this are that the mass of any organic coating does not exceed 200 g/m<sup>2</sup> or the PCS value will not exceed 4,0 MJ/m<sup>2</sup>.<sup>7</sup>

For bituminous roofing materials the external fire performance of roof covering is  $B_{ROOF}(t_2)$ .

### **ER 3 Hygiene, health and environment**

#### *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.

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. Vapour barrier can be replaced by an air control layer if the climatic conditions provide for that.

#### Log wall without any additional insulation and with external additional insulation and cladding

When the log wall has no insulation or an external insulation maximum 150 mm, there is no harm of water vapour in normal dwelling use. The wall structure of saunas and bathrooms will perform adequately provided that the rooms are dried and ventilated well after use. A shower in a bathroom shall be equipped with a shower enclosure.

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<sup>7</sup> Some member states may have national provisions regarding the reaction to fire performance of the roof underlay, which shall be taken into account.

#### Log wall with internal additional insulation

The thickness of the internal additional insulation shall not exceed 50 mm if no vapour control layer is used. If vapour control layer (0,2 mm polyethylene foil) is used, the internal additional insulation thickness may be 150 mm maximum in cold regions. It is essential for the durability of the construction that the durability of the vapour control layer is verified by an ageing test and it is properly jointed.

#### Parts with timber frame construction (wall components, floors, roofs)

For timber frame parts, the following applies:

Water vapour resistance of the inner vapour control layer of the construction is more than five times the one for the external layer. When polyurethane insulation is used, no separate vapour control layer is needed.

Under discontinuous roofing, a reinforced plastic foil type of roof underlay is used.

#### Effect of the glue line of the glued laminated log

The glue lines of the laminated logs do not have an influence on the moisture transport in the logs.

### *Watertightness*

#### Log wall without any additional insulation and with internal additional insulation

When mineral wool gasket is used, the watertightness of the external envelope is assessed to fulfil ordinary standard in circumstances, where heavy driving rain occurs only occasionally<sup>8</sup>.

Watertightness can be improved compared to mineral wool gasket e.g. if polyurethane or polypropylene gasket is used between the logs and in the corners.

Watertightness of the log corner type LH 180 x 170T Tiroli, corresponds to class 4A as defined for windows in standard EN 12208 when expanding polyurethane gasket Iso Membra SX/SXB was used in addition also when NMC Cellofoam tube gasket was used in the external grooves.

Watertightness of the log corner type LH 180 x 170T Normal, corresponds to class 1A as defined for windows in standard EN 12208 when polypropylene PP-Termo gasket was used in addition also in addition also when NMC Cellofoam tube gasket was used in the external grooves.

If the kit will be used in conditions with heavy driving rain it is recommended to use external timber cladding with a ventilation gap behind or to take other measures related to the design of the works.

#### Parts with timber frame construction and log walls with external additional insulation and cladding.

Watertightness of the external envelope has been assessed to fulfil the common requirements for such conditions, where driving rain occurs only occasionally.

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<sup>8</sup> Cfr. ER 6.



### Internal surfaces

Requirements concerning the waterproofing of internal surfaces refer to wet areas as bathrooms. Waterproofing of internal surfaces is not a part of the kit.

The long term performance of the kit provides that proper waterproofing of internal surfaces 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 (14d), 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.

In case of internal log wall, waterproofing cannot be installed. Therefore, a shower in a bathroom with log walls shall be equipped with a shower enclosure.

### Windows

Watertightness class of MSE windows is E(750) and of DK windows E(1200). Also NPD windows are possible.

### *Dangerous substances*

According to the written declaration of the manufacturer, Kontio and Kimara log building kits does not contain those harmful or dangerous substances listed in EOTA TR 34 dated July 2009.

The logs are treated at the factory against blue stain when required by the customer. The name of the treatment and the chemical composition is given together with the CE-marking.

No recycled wood has been used in the manufacturing of the building kit.

The formaldehyde potential class of the glued laminated timber and logs 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 Approval, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the EU Construction Products Directive, these requirements need also to be complied with, when and where they apply.

## **ER 4          Safety in use**

### *Slipperiness of floor finishes*

This approval does not comprise the surface material of the floor, as surface treatment of a board floor, parquet or floor tiling.

*Impact resistance*

A log wall and a wall covered with log panels bear the impact caused by falling humans without structural damage. Impact resistance of walls covered by gypsum plasterboard is assessed on the basis of experience to be adequate for the normal use of the kit.

*Risk of falling*

This approval of a building kit does not comprise the stairs that may be needed for the building<sup>9</sup>. The barriers that are part of the building kit will be planned (height, openings railing load) according to the specific requirements valid on the building site.

For windows, doors and other comparable glass surfaces the safety regulations valid on the building site with regard to the thickness of the glass and the fracture mode will be followed.

**ER 5 Protection against noise**

The acoustical planning of the Kontio and Kimara log house is a part of the design of the works. For log walls, the NPD option is valid. The kit does not contain separating floors with determined acoustic performance.<sup>10</sup> The acoustic performance of windows and doors is given in Annex 1.

**ER 6 Energy economy and heat retention**

*Thermal resistance*

When necessary, a heat loss calculation or energy calculation of the building (works) is made. Compensation is primary made so, that windows with low U-value are used or the thermal insulation of ceiling or roof is made thicker.

The design value of thermal conductivity of the logs to be used in calculations is  $\lambda = 0,12$  W/(mK). The thermal transmittance may be calculated according to the mean thickness of the round logs and according to the nominal thickness of the laminated or planed logs. With additional insulation the thermal transmittance may be adjusted between 0,18 - 0,49 W/(m<sup>2</sup>K).

The thermal transmittance of walls with timber frame structure, suspended floors, roofs and the other corresponding parts of the building kit will be chosen according to the location of the works. In general, the thermal transmittance of walls with timber frame structure is 0,16 - 0,47 W/(m<sup>2</sup>K) and the one of suspended floors is 0,11 - 0,28 W/(m<sup>2</sup>K).

In the following table is presented U-values in W/(m<sup>2</sup>K) for some log walls made of square logs with additional insulation. The insulation material to be used has a design value of thermal conductivity  $\lambda_{\text{Design}} = 0,037 - 0,041$  W/(mK).

Thickness of log (mm)	Thickness of additional insulation mm			
	0	45	95	140
	U-values in W/(m <sup>2</sup> K)			
95	1,04	0,46	0,30	0,22

<sup>9</sup> Stairs will be manufactured individually and if they are prefabricated, they shall bear a CE-marking on their own when obligatory.

<sup>10</sup> In several Member States there are no requirements set within one dwelling.

120	0,85	0,42	0,28	0,21
135	0,77	0,40	0,27	0,21
180	0,60	0,35	0,25	0,19
205	0,53	0,32	0,24	0,19

In the following table is presented U-values in W/(m<sup>2</sup>K) for some roof constructions. The insulation material to be used has a design value of thermal conductivity  $\lambda_{\text{Design}} = 0,037 - 0,041$  W/(mK).

U-value W/(m <sup>2</sup> K)	Thickness of insulation mm							
	150	200	250	300	350	400	450	500
	0,27	0,21	0,17	0,14	0,12	0,11	0,09	0,08

The thermal transmittance of doors and windows is given in Annex 1.

#### *Air permeability*

When Impregnated expanding Polyurethane gasket Iso-Membra SX/SXB gasket is used in case of log corner type LH 180 x 170T Tiroli and Polypropylene PP-Termo gasket in case of log corner type LH 180 x 170T normal air permeability is assessed to fulfil common requirements in conditions where the wind speed exceeds 25 m/s only occasionally<sup>11</sup>. In air permeability tests the log wall with corner fulfilled the requirements for class 4 for windows. according to EN 12207. If higher standard is needed, a special gasket, such as polyurethane, can be used between the logs. If the kit will be used in conditions with heavy wind external cladding and wind barrier shall be used or other measures related to the design of the works taken.

To avoid harmful air leakage, the air conditioning of the building shall be planned so, that the intake of air occurs controlled.

The air tightness of the walls with timber frame structure, suspended floors, roofs and the other corresponding parts is provided by a vapour barrier made of building plastics or an air control layer made of building paper. The joints of the air control layer are made such, that an overall air tightness is achieved. The main principle is that the joints are clamped between stiff layers.

#### *Thermal inertia*

NPD. Data for thermal inertia calculation of the works will be provided by the manufacturer on request.

### **Aspects of durability, serviceability and identification**

#### *Aspects of durability*

When properly assembled, the product will stay against the effects of weather during the intended working life. Some components as weather strips of windows and doors and sealants

<sup>11</sup> The mean wind speed during 10 minutes. (See climatic data for Utö, [http://www.fmi.fi/saa/tilastot\\_22.html](http://www.fmi.fi/saa/tilastot_22.html))

round windows shall be maintained and replaced when needed, according to the recommendations given in the maintenance guide provided by the manufacturer.

When mineral wool or polyurethane gasket is used, the log wall persist the effects of weather even without any surface treatment, if it has the possibility to dry out between the wet periods (hazard class 3 as defined in EN 335-1). The initial moisture content (mean value) of the logs at the factory is  $22 \pm 4$  % for round logs,  $20 \pm 4$  % for planed (square) logs and  $16 \pm 2$  % for laminated logs. The works shall be designed so, that the logs are able to dry if they have been wetted by rain. The moisture content must not exceed 25 % for a longer period of time. Especially, if polyurethane gasket is used, the corners shall be designed so that water will not be trapped into the corner gasket.

The surface treatment shall be made according to the erection manual. The external log surface must not be treated with such a surface treatment, intended to be aesthetic or protective, that builds up a coating poorly permeable for water vapour.

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.

Durability can be improved if a special gasket, such as polyurethane, is used between the logs and in the corners. The choice is based on the local weather conditions or other provisions. If the kit will be used in conditions with heavy driving rain external timber cladding shall be used or other measures related to the design of the works taken to provide for adequate durability.

The structural fasteners used in the building kit fulfil the requirements for service class 3 as defined in EN 1995-1-1 (use class 3 as defined in EN 335-1).

#### *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. The verification of this is part of the structural design of the building kit described under ER 1, serviceability limit states consideration<sup>12</sup>. When no other local regulations exist, the deflection of roof constructions is limited to be 1/200 of the span width and the one of floor constructions is limited to be 1/300 of the span width.

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

#### *Aspects of serviceability / Settling of the construction*

Kontio and Kimara log constructions are mainly settling constructions. The amount of the settling is influenced by the way of installation and the final moisture content of the structures compared with the moisture content during installation. The expected settling is 30-60 mm/m for round logs, 20-40 mm/m for massive planed logs and 10-30 mm/m for laminated logs.

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<sup>12</sup> The concept serviceability limit states is defined in Eurocode, basis of structural design, EN 1990. Corresponding design criteria commonly exist in other design codes that may be the basis for fulfilling ER1.

Settling is taken into account in design of the structures. The designed settling allowance for e.g. windows and doors has to be followed and the settling must not be prohibited by any constructions even if they are not a part of the kit. The adjustments done due to the settling as the ones of the screwed feet and removal of possible adjustment bits shall be made as described in the erection manual.

If the erection manual is not followed and the log frame is left loose or the logs get wet during the building time the settling can increase even 5 mm/ log seam and the total settling may exceed the planned one.

### *Identification*

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

The separate components and materials are identified as being of a generic type or giving a brand name, as described in Annex 1 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 Evaluation and attestation of conformity and CE marking**

### **3.1 System of attestation of conformity**

According to the decision 99/455/EC of the European Commission<sup>13</sup> the system 1 of attestation of conformity applies.

This system of attestation of conformity is defined as follows:

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

(a) Tasks for the manufacturer:

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

(b) Tasks for the approved body:

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

### **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.

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<sup>13</sup> Official Journal 178, 14.07.1999

This production control system shall insure that the product is in conformity with this European technical approval.

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

The factory production control shall be in accordance with clause 8.2.1.1 of ETAG 012 and the "Control Plan of Kontio and Kimara log building kits January 8, 2013 relating to the European technical approval ETA - 05/119 issued on June 19, 2013 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 at VTT Expert Services Ltd<sup>14</sup>. The results of factory production control shall be recorded and evaluated in accordance with the provisions of the "Control Plan".

#### 3.2.1.2 Involving a notified body

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 log building kits in order to undertake the actions laid down in section 3.3. 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 or bodies involved.

#### 3.2.1.3 Testing of samples taken at the factory

The tests shall only be carried out on the final product or samples which are representative to the final product.

Testing is needed only with regard to the glued load-bearing constructions. The test methods shall correspond to the methods given in the harmonised product standard for glulam and the details of them are given in the control plan.

#### 3.2.1.4 Declaration of Conformity

When all the criteria of the Conformity Attestation are satisfied the manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of the European technical approval ETA - 05/119 issued on June 19, 2013.

### 3.2.2 Tasks of approved bodies

#### 3.2.2.1 Initial assessment of the product

The approved body (bodies) shall perform the

- initial type testing of the product,
- 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" of Kontio and Kimara log building kits relating to the European technical approval ETA - 05/119 June 19, 2013.

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<sup>14</sup> The "control plan" is a confidential part of the European technical approval and only handed over to the approved body or bodies involved in the procedure of attestation of conformity. See section 3.2.2.

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

The approved certification body involved by the manufacturer shall issue an EC certificate of conformity of the product 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 VTT Expert Services Ltd without delay.

### **3.3 CE-Marking**

The CE marking shall be affixed on the packages of the building kit parts or in accompanying commercial documents, e.g. the EC declaration of conformity. 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 product
- the number of the European technical approval,
- characteristics and performances of the product as listed in Annex 1 of this ETA<sup>15</sup>.

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

### **4.1 Manufacturing**

The European technical approval is issued for the product on the basis of agreed information, deposited by VTT Expert Services Ltd, which identifies the product 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 VTT Expert Services Ltd before the changes are introduced. VTT Expert Services Ltd 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.

The components of the Kontio and Kimara log building kit are assembled in the factory in accordance with the provisions of this ETA as identified during the inspection of the plant by the Technical Research Centre of Finland (VTT).

### **4.2 Installation**

A general manual<sup>16</sup> for the installation of the kit in the works is available from the manufacturer, and is assessed by the approval body. The manual covers all important aspects related to the site work, such as:

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<sup>15</sup> For the purposes of CE-marking, the table in Annex 1 shall be used or corresponding information given to indicate the performance profile of the kit to be delivered by ticking the chosen option.

- erection techniques and necessary equipment
- temporary bracing
- completion of joints between kit components (structural fixing, weather sealing etc.)
- fixing of any wind and seismic anchorage to the substructure and between building parts, if needed
- additional materials and components applied on the site that are a precondition for the kit to be fit for the intended use
- protection against weather during erection.

As a supplement to the general manual, a specific manual which contains special aspects related to each individual building project (e.g. special crane requirements, hoisting strap positions etc.) shall normally be prepared.

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 log building kit does not amend this process in any way.

### 4.3 Design and building regulations

Design of the works comprises the structural design (see 2, ER1) and, when necessary, also a heat loss calculation or energy calculation of the building. This European technical approval is based on the assumption that this and any other plans needed have been made correctly according to the regulations valid on the building site.

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.

### 4.4 Requirements set for the substructure

This European technical approval does not comprise the substructure of the building.

A plan drawing with the dimensions and schematic details of the substructure are delivered by the manufacturer. The substructure shall be individually designed according to the local building regulations to fit the building site. 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. A damp proof course shall be installed between the substructure and the wood based components according to the construction details in Annex 3. The tolerances of the finished substructure shall be according to the following table:

Dimension	Tolerance
Main dimensions in plane	-5, +10 mm
Location of intermediate walls	±10 mm
Diagonals, length < 5 m	±5 mm

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<sup>16</sup> Version dated March 3 2005. The manual may be subject for updating under the validity period of the ETA. It is the task of the Approved body responsible for the continuous surveillance, assessment and approval of the factory production control to check, that any updating is in conformity with this ETA.



Diagonals, length > 5 m	$\pm 10$ mm
Location of anchor bolts and column feet	$\pm 10$ mm
Level of the substructure	-5, +0 mm

## **5 Indications to the manufacturer**

### **5.1 Packaging, transport and storage**

The manufacturer's instructions regarding transport and storage shall be followed.

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

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

### **5.2 Use, maintenance and repair**

The manufacturer shall ensure that proper information for the use of the house kit is available at each delivery, including general guidance on the basis of this ETA and the specific installation plans and construction details mentioned in clause 4.

Before the installation the components of the house kit shall be controlled not to be damaged during transport or storage. Damaged components and materials shall be replaced by sound ones.

If there is a need to modify or repair the construction this may be done if allowed for in the installation plans mentioned in clause 4. In other case, modifications are allowed only by written consent by the manufacturer of the kit.

On behalf of VTT Expert Services Ltd

Espoo, June 19, 2013



Lina Markelin-Rantala  
Team Manager



Pertti Jokinen  
Assessor

## ANNEX 1 DESCRIPTION AND PERFORMANCE OF KONTIO AND KIMARA LOG BUILDING KITS

### 1 Contents of this Annex

This Annex presents more detailed information about the materials and components of Kontio and Kimara log building kits and describes the main options of the building kits.

This Annex also presents the standard windows and external doors, which may be included in the kit, specified according to EN 14351. Alternatively, other windows or external doors which are compatible with the requirements valid on the building site may be used. In that case the windows and doors are not a part of a building kit in accordance with this ETA (no performance determined, NPD). In the CE-marking, the options chosen shall be stated.

This approval of a building kit does not comprise the stairs that may be needed for the building even if they were delivered at the same time as the CE-marked building kit. Further, timber treated against fungi and biological wood degrading agents is not part of the kit.

Those performances are listed that may vary. When CE-marking is done, the last page of this Annex may be used to indicate the performance profile relevant for the eventual kit to be delivered to the customer so that the adequate option is marked.

### 2 Standard parts of the building kits

#### 2.1 Main parts of the building kits

The log frame can be made of massive round logs or planed (square) logs or of laminated logs made up by gluing. The thickness of the round logs is 150 - 230 mm and the one of planed or laminated logs 70 - 275 mm. The maximum length of the logs is usually 6,3 m without joints, but large laminated logs may be manufactured until 10,3 m. Kontio and Kimara log sizes are given in the following table. All the sizes given are nominal; minor deviations may be caused by manufacturing technology and fluctuations in moisture.

Round logs, massive		Planed logs, massive		Planed logs, laminated	
Thickness	Increase of height	Thickness	Increase of height	Thickness	Increase of height
150	130	95	162	95	162
170	150	120	162	135	162
210	170			180	162
				205	220
Round logs, laminated				135	263
230	176			205	263
				243	263
				275	263

All log types can be used in all building kit options (M1, M2, and M3 as defined in Annex 2).

Internal walls may be a part of the log frame or made as a timber frame construction. The frame of the walls are delivered as prefabricated timber parts. The thickness of the internal walls with timber frame construction varies usually between 90 - 275 mm depending on the internal lining chosen.

The building kits comprise both prefabricated and falling lengths timber parts for the suspended floor, intermediate floor and roofing constructions. For an ordinary transport with a lorry, if the height of a single part as of a roof truss exceeds 3,1 m or the length 14 m, the construction is made of smaller parts to be jointed with an assembly joint. For other transport methods, the maximum dimensions of the parts shall be individually checked. Mainly total thickness of floors varies between 100-245 mm and the total thickness of roofs between 225- 550 mm, roofing included, depending on whether the roof is insulated or not. The dimensions of the components vary according to the house plan.

### **3 Main options of the building kits**

#### **3.1 Construction type M1**

In this type, also the upper triangles of the gable walls are made of logs. The roof of the building will settle and slide, which has been taken into account in the design of the kits. The internal walls are made of load bearing log walls or a system of pillars and beams with adjustment for settling. The roof construction is made of beams or rafters.

The buildings may have an internal additional insulation or an external one with cladding when needed.

#### **3.2 Construction type M2**

In this type, the upper triangles of the gable walls are made of timber frame building construction. The roof of the building will settle evenly but not slide, which has been taken into account in the design of the kits. The internal walls in the first floor are made of load bearing log walls or a system of pillars and beams with adjustment for settling. The roof construction is made of beams or rafters.

The buildings may have an internal additional insulation or an external one with cladding when needed.

#### **3.3 Construction type M3**

In this type, the upper triangles of the gable walls are made of timber frame building construction. The roof of the building will settle evenly but not slide, which has been taken into account in the design of the kits. The internal walls in the first floor are made of load bearing log walls or a system of pillars and beams with adjustment for settling. The roof construction is made of nail plate trusses.

The buildings may have an internal additional insulation or an external one with cladding when needed.

#### **3.4 Illustrations of the building options**

The building options are illustrated in Annex 2.

### 3.5 Windows and external doors

Windows and external doors are tested according to the provisions stated in EN 14351-1, the properties are given in the following table according to that standard. The works may have roof windows; the properties of these shall comply with the local provisions.

Property				
WINDOW / DOOR TYPE	MSE	DK	Other	Door
ER1 Mechanical resistance and stability				
Resistance to wind (test pressure Pa)	3 (1200)	3 (1200)	NPD	NPD
Frame deflection	C	C	NPD	NPD
Resistance to snow load	-	-	NPD	NPD
ER2 Safety in case of fire				
Reaction to fire	-	-	NPD	NPD
External fire performance	-	-	NPD	NPD
ER3 Hygiene, health and environment				
Watertightness, non- shielded (test pressure Pa)	E (750)	E (1200)	NPD	NPD
Watertightness, shielded (test pressure Pa)	NPD	NPD	NPD	NPD
ER4 Safety in use				
Impact resistance, drop height mm	NPD	NPD	NPD	NPD
Glass thickness 6 mm or special glass <sup>17</sup>	yes/no	yes/no	NPD	NPD
Load-bearing capacity of safety devices	Not provided	Not provided	NPD	NPD
ER5 Protection against noise				
Weighted sound reduction index $R_w$ (C;Ctr) dB	39 (-1;-5)	34 (-2;-5)	NPD	NPD
ER6 Energy economy and heat retention				
Thermal transmittance $U_w$ W/(m <sup>2</sup> K) Argon filled selective glass	1,21	1,02	NPD	NPD
Solar factor g	NPD	NPD	NPD	NPD
Light transmittance $\tau_v$	NPD	NPD	NPD	NPD
Air permeability (max. test pressure Pa)	4	4	NPD	NPD

<sup>17</sup> Finnish regulations contain safety provisions for windows. 6 mm glass or safety glass shall be used when there is risk for falling through the window.

The thermal transmittance  $U_D$  of the doors is 1,00 W/(m<sup>2</sup> K) without glass and 1,3 W/(m<sup>2</sup> K) with glass, or better. If the door contains glazed parts the thickness of the glass is 4 or 6 mm according to the regulations applicable. The other properties of the doors are NPD.

### 3.6 Materials and components

Only properties to be indicated in the CE-marking have been mentioned.

Material or component function	Material or component type	Material or component specification <sup>18</sup>		
Load-bearing frame structures	Round logs Optionally treated against blue stain <sup>19</sup>	C22, C24		
		D-s2,d0		
	Planed logs	C22, C24		
		D-s2,d0		
	Laminated logs	C24		
		D-s2,d0		
Timber structures	Structural timber, EN 14081-1	C18	C24	C30
		D-s2,d0		
Roof trusses and frames	Structural timber and nail plates, EN 14250, nail plates e.g. Lahti-levy	C18	C24	C30
		D-s2,d0		
Beams and columns	Glulam, EN14080, e.g. Kestopalkki	GL32		
		D-s2,d0		
	PRT I-joist, Pyhännän rakennustuote	Strength values as specified in design		
		D-s2,d0		
External cladding	Timber panel, EN 14915	D-s2,d0		
Windows and doors	EN 14351-1	As defined under 3.5		
Wind barrier	Wood-based panel, SB.H, EN13986, e.g. Suomen Kuitulevy	E		
	DuPont Tyvek, EN13859, e.g. Rakonor	NPD		
Air control layer	Building paper, e.g. Rakonor	NPD		

<sup>18</sup> Only properties to be indicated in the CE-marking have been mentioned.

<sup>19</sup> The treatment chemical against blue stain is Tekno Aqua 1410 or a corresponding product, the name of which will be given together with the CE-marking.

Water vapour barrier	Polyethen foil 0,2 mm EN 13984, e.g. Raniplast	NPD
	Aluminum paper, e.g. Rakonor	NPD
Thermal insulation	Mineral wool, EN 13162, e.g. Isover	A1 $\lambda D < 0,037 \text{ W/(mK)}$
	Loose fill wood fibre insulation, e.g. Ekovilla	D-s2,d0 $\lambda D < 0,041 \text{ W/(mK)}$
	Polyurethane board, EN 13165, e.g. SPU Systems Oy	C-s2,d0 $\lambda D < 0,023 \text{ W/(mK)}$
Mechanical fasteners	Screws, 1,9mm – 12mm, e.g. Pameto	NPD
	Nails, 1,9mm – 5,5mm, e.g. Helsingin rauta Oy	NPD
Fixing and other parts	Nailing plates, bracings and anchors, e.g. Pistora	According to the manuals of the component manufacturer
	Kontio sliding fixings, Kontio screw feet, Kontio stiffening rods and tubes, other Kontio special fixings	According to the specifications of Kontiotuote Oy
Flooring	Timber planks, EN 14342	DFL –s1
Roofing	Concrete roof tiles EN 490, e.g. Benders	BROOF
	Corrugated steel roofing EN 505, EN 508-1,2,3, e.g. Weckman Steel Oy	BROOF
	Bituminous roof shingles EN 544, e.g. Icopal	BROOF(t2)
Roof underlay	Reinforced plastic foil EN 13859-1, e.g. Rakonor	NPD
Gaskets and related materials	Polypropylene gasket, e.g. Jyremark	NPD
	Cellular plastic footing gasket, e.g. NMC Termonova Oy	NPD
	Closed cell PE gasket, e.g. NMC Termonova Oy	NPD
	Tremco-illbruck gasket, polyurethane, Tremco illbruck produktion GmbH	NPD
	Impregnated joint sealing tape, e.g. Iso-Chemie GmbH	NPD

	Iso-Membra SX/SXB Impregnated expansive PUR tape; e.g.Flexotec	ETA-08/0249
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The following materials and components are not included in the delivery but they have been assessed with the building kit and, when relevant, they are necessary for the proper function of the kit:

Material or component function	Material or component type	Material or component specification <sup>20</sup>
Internal lining	Gypsum plasterboard, e.g. Knauf EN 520	B-s1,d0
Internal walls, partitions	Bricks	A1
Surface treatments and waterproofings	Liquid applicable products,e.g. Teknos	According to local provisions and the specifications of the waterproofing manufacturer

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<sup>20</sup> Only properties to be indicated in the CE-marking have been mentioned.



## 4 Identification of the kit

The CE-marking of every single delivery can be accompanied with the following table, where the options chosen will be marked. A sample of the marking is shown.

<b>WHOLE BUILDING KIT</b>						
<b>ER1 Mechanical resistance and stability</b>						
Name of the customer						
Order number						
Model						
Log type and thickness						
CE-marking method used						
		1	3a	3b		
Window type, U-value W/(m <sup>2</sup> K)						
(Mention window type, DK, MSE, MKE, TT, Other)						
Door type, U-value W/(m <sup>2</sup> K)						
(Mention door type, SD, Other)						
Reaction to fire, materials						
As specified in the materials' list						
<b>ER3 Hygiene, health and environment</b>			Name of any chemical treatment			
<b>EXTERNAL WALL</b>						
<b>ER2 Safety in case of fire</b>						
Resistance to fire, REI		R	45	60	90	120 NPD
		EI	30	60	90	NPD
<b>ER5 Protection against noise</b>						
Value dB						
Weighted apparent sound reduction index R <sub>w</sub>						
NPD						
<b>ER6 Energy economy and heat retention</b>						
Value W/(m <sup>2</sup> K)						
Thermal transmittance U <sub>c</sub>						NPD
<b>INTERNAL WALL</b>						
<b>ER2 Safety in case of fire</b>						
Resistance to fire, REI		R	45	60	90	120 NPD
		EI	30	60	90	NPD
<b>ER5 Protection against noise</b>						
Value dB						
Weighted apparent sound reduction index R' <sub>w</sub>						
NPD						
<b>SUSPENDED FLOOR</b>						
<b>ER2 Safety in case of fire</b>						
Resistance to fire						
NPD						
<b>ER5 Protection against noise</b>						
Value dB						
Weighted apparent sound reduction index R' <sub>w</sub>						
NPD						
Weighted normalised impact sound pressure level L <sub>n,w</sub>						
NPD						
<b>ER6 Energy economy and heat retention</b>						
Value W/(m <sup>2</sup> K)						
Thermal transmittance U <sub>c</sub>						NPD
<b>ROOF</b>						
<b>ER2 Safety in case of fire</b>						
Resistance to fire						
NPD						
External performance in fire, whole component						
Broof				Broof (t2)		
<b>ER6 Energy economy and heat retention</b>						
Value W/(m <sup>2</sup> K)						
Thermal transmittance U <sub>c</sub>						NPD

NPD = No Performance Determined

**5. Identification of the kit, *SAMPLE***

WHOLE BUILDING KIT						
<b>ER1 Mechanical resistance and stability</b>						
Name of the customer		Name				
Order number		H12345				
Model		Kontio				
Log type and thickness		Round 170 mm				
CE-marking method used		1	3a	3b ✓		
Window type, U-value W/(m <sup>2</sup> K)		MSE				
Door type, U-value W/(m <sup>2</sup> K)		NPD				
Reaction to fire, materials		As specified in the materials' list				
<b>ER3 Hygiene, health and environment</b>		Name of any chemical treatment				
EXTERNAL WALL						
<b>ER2 Safety in case of fire</b>						
Resistance to fire, REI		R	45	60	90	120 NPD ✓
		EI	30	60	90	NPD ✓
<b>ER5 Protection against noise</b>						
Weighted apparent sound reduction index R <sub>w</sub>		Value dB				
		NPD				
<b>ER6 Energy economy and heat retention</b>						
Thermal transmittance U <sub>c</sub>		0,80			NPD	
INTERNAL WALL						
<b>ER2 Safety in case of fire</b>						
Resistance to fire, REI		R	45	60	90	120 NPD ✓
		EI	30	60	90	NPD ✓
<b>ER5 Protection against noise</b>						
Weighted apparent sound reduction index R' <sub>w</sub>		Value dB				
		NPD				
SUSPENDED FLOOR						
<b>ER2 Safety in case of fire</b>						
Resistance to fire		NPD				
<b>ER5 Protection against noise</b>						
Weighted apparent sound reduction index R' <sub>w</sub>		Value dB				
		NPD				
Weighted normalised impact sound pressure level L <sub>n,w</sub>		NPD				
<b>ER6 Energy economy and heat retention</b>						
Thermal transmittance U <sub>c</sub>					NPD ✓	
ROOF						
<b>ER2 Safety in case of fire</b>						
Resistance to fire		NPD				
External performance in fire, whole component		Broof ✓			Broof (t2)	
<b>ER6 Energy economy and heat retention</b>						
Thermal transmittance U <sub>c</sub>		0,11			NPD	