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European Technical Assessment ETA-08/0178 of 26.10.2023

General Part

Technical Assessment Body issuing the European Technical Assessment	SINTEF AS by its institute SINTEF Community
Trade name of the construction product	Kodumaja Building modules
Product family to which the construction product belongs	34: Structural Timber Product Elements and Ancillaries Timber frame building kits
Manufacturer	Kodumaja AS Puidu 2 Tartu 50411 Estonia http://www.kodumaja.ee
Manufacturing plant(s)	KM Element OÜ Factory 1: Puidu 2, Tartu 50411, Estonia Factory 2: Betooni 2, Tartu 50411, Estonia
This European Technical Assessment contains	54 pages including 2 Annexes 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 disseminated
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	EAD 340308-00-0203 Timber Building Kits
This version replaces	ETA 08/0178, version 2, issued on 07/09/2015

1. Technical description of the product

The purpose of this assessment of Kodumaja AS is to obtain a European Technical Assessment (ETA) for building kits of prefabricated building modules with the following trade name: “Kodumaja Building modules”. The kit is recognized as a construction product within the product area “Building Kits, Units, and Prefabricated Elements” – product area code (PAC) 34, according to the Construction Product Regulation (EU) No 305/2011 (CPR). Henceforth within the document, the kit shall be referred to as, “Kodumaja Building modules”.

The Kodumaja building modules are kits made of prefabricated building modules with timber frame structures in floors, walls and roof. The basic design of wall, floor and roof constructions, including the detailed design specifications (connections between components / elements and assembly details) are presented in Annex A1 and Annex B[1]. The material and component specifications are given in Annex A2, Table A2-1 of this ETA.

Module size is custom made for each delivery, but maximum dimensions are 5.3 m width, 3.8 m height and 14.5 m length.

This assessment covers the standard design of the module structures ie. external and internal walls, floors and roofs, including external envelope with timber cladding and fibre cement boards, the wet rooms, and the connections between several modules installed together as a building.

The assessment does not cover foundations of the building, external or internal surface finishes, windows, doors, roofing materials such as roof tiles, supplementary components like stairs, balconies etc., or technical service installations for water, heating and ventilation systems.
These products are specified case by case, and their performance have to be verified specifically as parts of the works in each case.

The modules shall be installed according to the relevant construction details in Annex B, together with a special installation manual worked out by the manufacturer for each individual works. The installation manual shall cover all installation aspects for the modules, including erection systems and equipment, temporary bracing, permanent anchoring to foundations and between modules, weather protection during installation, materials and components which are necessary supplements to the modules as well as standard assembly joints and special joint designs for individual modules.

The modules shall be fully protected from weather exposure and mechanical damage during storage, transportation and installation.

Package, transport, storage, erection and maintenance of the kits are laid down in manufacturer technical documentation.

[1] Annex B contains confidential information and is not included in the European Technical Assessment when that assessment is publicly disseminated.

2. Specification of the intended use(s) in accordance with the applicable European Assessment Document (hereinafter EAD)

“Kodumaja building modules” are intended for low rise or multi-storey houses, with vertical and horizontal separations between housing units and within the limitations of the regulations valid on the place of use. 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 intended use shall be evaluated for each individual case depending on the climatic and geographic conditions.

The modules are designed to accommodate climatic conditions where humidity predominantly flows from the building's interior to its exterior for a major part of the year. This essential aspect should be taken into careful consideration when deploying the building kits in the southern regions of Europe.

The kits are intended to be placed on all types of ordinary foundations like concrete slabs on ground, masonry or concrete basement walls, or strip foundations. The modules shall be placed on a foundation that meets the manufacturer’s specified requirements concerning dimensions, tolerances (± 3 mm) and loadbearing capacity. A damp-proof course or equivalent must prevent moisture uptake in the modules from foundations.

No special assessment of structural resistance related to seismic actions has been performed.

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

The provisions made in this ETA are based on an assumed working life of 50 years for load bearing and non-accessible construction components and materials, and 25 years for repairable or replaceable components and materials, provided that building kits are subject to appropriate installation, use and maintenance. The indications given on the working life cannot be interpreted as a guarantee given by the producer but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

The design process and complete works must comply with the procedures foreseen in the Member State in which the building kit will be erected.

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

The assessment is performed according to EAD 340308-00-0203, Timber Building Kits edition January 2019. The latest release of all referenced standards should always be taken into consideration. Product characteristics used in calculations are based on proved data provided by producers or by appropriate standard. Relevance of defined product characteristics is related to validity of standard / reports used in preparation of ETA.

Table 1 shows the characteristics for which the product performances are declared in this ETA. The characteristics correspond to the Kodumaja building modules design specified in Annex A1 and B.

Table 1 Performance of the product

Product name: Kodumaja building modules		**Intended use:** Low rise and multi-storey residential, institutional, commercial, and industrial buildings	
Basic Work Requirements (BWR)	**Essential characteristics of construction product**	**Assessment method**	**Product performance**
BWR 1: Mechanical resistance and stability	Resistance, stiffness and stability of wall, floor and roof elements and their connections against vertical and horizontal loads	Clause 3.1.1	See cl. 3.1.1 and Annex A1 and Annex A2, Table A2-1
	Shear resistance in plane direction against horizontal loads	Clause 3.1.2	No performance assessed (NPA)
	Corrosion protection of metal fasteners	Clause 3.1.3	Clause 3.1.3 and Annex A2, Table A2-2
BWR 2: Safety in case of fire	Reaction to fire	Clause 3.2.1	See cl. 3.2.1 and Annex A2 Table A2-1
	Fire resistance	Clause 3.2.2	See cl. 3.2.2 and Annex A3 Table A3-1
	External fire performance of roof covering	Clause 3.2.3	See cl. 3.2.3
BWR 3: Hygiene, health and the environment	Vapour permeability and moisture resistance	Clause 3.3.1	See cl. 3.3.1
	Watertightness • External envelope • Internal surfaces	Clause 3.3.2.1 Clause 3.3.2.2	See cl. 3.3.2.1 See cl. 3.3.2.2
	Durability class / Use class	Clause 3.3.3	See cl. 3.3.3
	Content and release of dangerous substances	Clause 3.3.4	No performance assessed (NPA)

Product name: Kodumaja building modules		Intended use: Low rise and multi-storey residential, institutional, commercial, and industrial buildings	
Basic Work Requirements (BWR)	**Essential characteristics of construction product**	**Assessment method**	**Product performance**
BWR 4: Safety and accessibility in use	Impact resistance	See cl. 3.4.1	See cl. 3.4.1
BWR 5: Protection against noise	Airborne sound insulation of walls, floors and roof structures	See cl. 3.5.1	See cl. 3.5.1 and Annex A1
	Impact sound insulation of floors	See cl. 3.5.2	See cl. 3.5.2 and Annex A1
	Sound absorption	See cl. 3.5.3	No performance assessed (NPA)
BWR 6: Energy economy and heat retention	Thermal resistance	See cl. 3.6.1	See cl. 3.6.1 and Annex A4 Table A4-1.
	Air permeability	See cl. 3.6.2	See cl. 3.6.2
	Thermal inertia	See cl. 3.6.3	No performance assessed (NPA)
BWR 7: Sustainable use of natural resources	Sustainable use of natural resources	See cl. 3.7	No performance assessed (NPA)

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

Indication of geometrical data of the components and elements and their properties related to mechanical resistance and stability are used as an expression of resistance, stiffness and stability of wall, floor and roof elements and their connections against vertical and horizontal loads.

The components of the kit - wall, floor and roof elements - are listed in Annex A1 and described with regard to their composition, including relevant fasteners for their assembling and for connections between components. Detailed material specifications (components and fasteners) are given in Annex Annex A2, Table A2-1. Typical connection details between the components are given in Annex B.

Information given are used for case-by-case calculations according EN 1990, EN 1991, EN 1995-1-1 and EN 1998-1 taking into consideration respective requirements of the Member States regarding ultimate limit state and serviceability limit state.

3.1.2 Shear resistance in plane direction against horizontal loads

No performance assessed (NPA) option is applied.

3.1.3 Corrosion protection of metal fasteners

Corrosion protection of metal fasteners corresponds to the requirements of the intended service class according to EN 1995-1-1 (Service Classes 1-3) and it is expressed as Service class, material type (stainless steel) or as type / thickness of corrosion protection (zinc coating). Corrosion protection of metal fasteners is given in Annex A2, Table A2-2.

3.2 Safety in case of fire (BWR 2)

3.2.1 Reaction to fire

Reaction to fire classification according to EN 13501-1+A1 is shown for each individual material and component in Annex A2.

A European reference fire scenario has not been established for facades. In some Member States, a classification according to EN 13501-1 might not be sufficient for the use in facades. An additional assessment of Kodumaja building modules according to national provisions (e.g. on the basis of a large scale fire test) might be necessary to comply with Member State regulations, until a European classification system has been completed.

3.2.1 Reaction to fire

For basic module designs, as shown in the Annex A1, the resistance to fire classified according to EN 13501-2+A1 is tabulated in Annex 3, table A3-1.

For alternative module design, as shown in Annex B only, the resistance to fire classified according to EN 13501-2+A1 is tabulated in Annex 3, table A3-2.

3.2.1 External fire performance of roof covering

The roof covering shall be tested using the test method relevant for the corresponding external fire performance roof class and classified according to EN 13501-5.

Reaction to fire classification for roof covering is shown in Annex A2, table A2-1.

3.3 Hygiene, health and the environment (BWR 3)

3.3.1 Vapour permeability and moisture resistance

Vapour permeability and moisture resistance of the module construction using the material properties defined in Annex A2, have been assessed on the basis of calculations according to EN ISO 13788 to be acceptable for the intended use indicated in clause 2. The overall design of the kit's external envelope has been assessed to provide adequate moisture control for the intended use.

For the areas where the climate requires (e.g. in regions with high external temperature and/or high vapour pressure), or cooling systems are installed and used for longer periods, the kit should not be used unless the risk of moisture condensation has been assessed for each individual works (EN ISO 13788).

3.3.2 Watertightness

3.3.2.1 External envelope

The typical design of the external envelope structures in "Kodumaja building modules" consists of well-known technical solutions and has been assessed on the basis of engineering judgement and relevant

experience[2] to give adequate watertightness against rain, driving rain and snow exposure in general. The watertightness of the external envelope has been assessed on the basis of the standard construction details as shown in Annex B. The kit elements are designed according to the two-stage principle.

3.3.2.1 Internal surfaces

The membrane system used to provide watertightness of zones with direct water exposure in internal wet room floors and walls has been tested and assessed according to the provisions in EAD 030352-00-0503 Watertight covering kits for wet room floors and/or walls.

The floors and walls classified as watertight face areas are shown in Annex 1, and membrane systems used in the kit are given in Annex 2, table A2-1.

3.3.3 Durability class / Use class

The timber species used in the modules are softwood in class 4 concerning natural durability and resistance to fungus attack according to EN 350-2. Structural components and internal linings are in hazard class 1 according to EN 335-1, and timber cladding is in hazard class 2.

Durability of wood-based panels is according to EN 13986 expressed as EN 335 Use Class (1 or 2).

Based on assessment of typical construction details, wood-based materials exposed to external climate have ability to dry between wetting periods.

3.3.4 Content and release of dangerous substances

No performance assessed (NPA) option is applied.

Note: Manufacturer declares that only timber-based products with formaldehyde class E1 and wood-based panels with release of pentachlorophenol ≤ 5 ppm, are used.

3.4 Safety and accessibility in use

3.4.1 Impact resistance

Impact resistance of module walls is assessed as adequate as well-known internal lining materials (OSB/3, gypsum fibre / plasterboards) with thickness (t ≥ 10 mm) and stud spacing (≤ 0.65 m) are used in element composition.

This deemed to satisfy the conditions of EAD 340308-00-00203, Clause 2.2.13.

3.5 Protection against noise

3.5.1 Airborne sound insulation of walls, floors and roof structures

Estimated weighted apparent airborne sound reduction index R’w (C; Ctr) (dB) for standard separating wall and floor constructions between housing units as defined in ISO 140/ISO 717 is R'w(C; Ctr) ≥ 55 dB.

No performance has been assessed for the roof constructions.

Values can be verified by on-site testing of completed structures.

[2] Knut Ivar Edvardsen og Trond Ramstad SINTEF Byggforsk (2014): Trehus Håndbok 5, Oslo ISBN 978-82-536-1391-8

3.5.2 Impact sound insulation of floors

Impact sound insulation performance for the typical floor constructions, as described in Annex A1 and annex B is verified on basis of estimated values of impact sound insulation expressed as weighted normalised impact sound pressure L'n,w (CI) (dB) (band with 1/3 octave) according to EN ISO 717-2.

Performance value determined for the standard separating floor construction between housing units in "Kodumaja Building Modules" is L'n,w (CI) ≤ 53 dB.

Values can be verified by on-site testing of completed structures.

No performance has been assessed for the roof constructions.

3.5.3 Sound absorption

No performance assessed (NPA) option is applied.

3.6 Energy economy and heat retention

3.6.1 Thermal resistance

According to EN ISO 6946 thermal resistance is calculated as thermal resistance R_T and as corresponding thermal transmittance Ua, see table for actual construction in Annex A1. Thermal conductivities of insulation materials as declared in declaration of performance (DoP), are used in thermal calculations.

3.6.2 Air permeability

The assessment of air permeability in the external envelope is based on the examination of joints between various components within the kit and connections between the kit and other building elements. To ensure airtightness, foil overlapping is employed at these joints, utilizing methods such as clamping and the application of tape.

Standard construction details of the kit presented in the Annex A1 and B have been assessed to have adequate air tightness for the specified intended use based on the judgement of the construction details on the basis of the knowledge and experience.[3]

3.6.3 Thermal inertia

No performance assessed (NPA) option is applied.[4]

3.7 Sustainable use of natural resources

No performance assessed (NPA) option is applied.

[3] Knut Ivar Edvardsen og Trond Ramstad SINTEF Byggforsk (2014): Trehus Håndbok 5, Oslo ISBN 978-82-536-1391-8

[4] Values for properties such as density, specific heat capacity, and thermal resistance of the relevant component are provided in Annex A2, Table A2-1. This information aids the designer in calculating the thermal inertia of the building for each building kit, also when it is required by relevant national legislation at intended building place.

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

According to the Decision 1999/455/EU of the European Commission, the system of assessment and verification of constancy of performance (see Annex V of Regulation (EU) No 305/2011) to be applied is system 1.

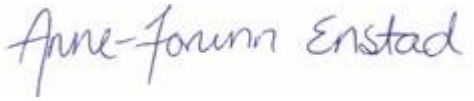
5. Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

All relevant technical details necessary for the implementation of the AVCP system are laid down in the Control Plan[5] deposited at SINTEF AS.

Issued in Oslo on 26.10.2023

By

SINTEF AS by its institute SINTEF Community



Anne-Jorunn Enstad

Certification Manager

Annexes

Annex A1 – Basic module design/ building elements
Annex A2 – Material and component specifications
Annex A3 – Resistance to fire
Annex B – Standard construction details (separate document, not included)

[5] The control plan is a confidential part of this European Technical Assessment and only handed over to the notified body involved in the procedure of attestation and verification and constancy of performance.

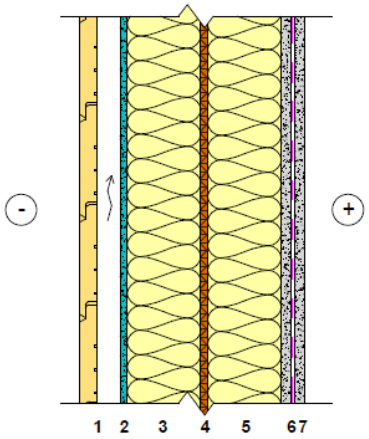
ANNEX A1
Index of building elements:

1 External wall – type EW-01
2 External wall (wet-room) – type EW-01-W
3 External wall – type EW-02
4 External wall (wet-room) – type EW-02-W
5 External wall – type EW-03
6 External wall (wet-room) – type EW-03-W
7 Internal wall – type IW-01
8 Internal wall (wet-room) – type IW-01-W
9 Load bearing separating wall – type PW-01
10 Load bearing separating wall (wet-room) – type PW-01-W
11 Intermediate storey partition floor – type CE-01
12 Intermediate storey partition floor (wet-room) – type CE-02
13 Floor – type FE-01
14 Floor – type FE-02
15 Floor (wet-room)– type FE-03
16 Floor (wet-room)– type FE-04
17 Roof (sloped) RE-01
18 Roof (flat) RE-02

1	External wall – type EW-01

Building Element

Wall cross section:



Building physics characteristics:

Thermal resistance[1] (Ch. 3.6.1):

	Mineral glass wool	
$D_{insulation}$ [mm]	U [W/m²K]	R [m²K/W]
95+95	0.21	4.74
95+120	0.19	5.30
95+145	0.17	5.84
95+170	0.16	6.39
95+195	0.14	6.92

[1] Values given are valid for internal substrates A
Values are based on 15% timber proportion in layer 4 and 6

Vapour permeability and moisture resistance (Ch. 3.3.1):
no condensation

Airborne sound insulation (Ch. 3.5.1):
Rw (C; C_{tr}) **≥ 50 (-2; -7) db**

Element composition (from outside to inside):

Nr	Building material	Type	Dimensions [mm]	Spac. / Dist. [mm]
1	External layers (see External layers table)			
2	Wind-barrier gypsum plasterboard	EH / GM-H; A2-s1,d0	≥ 9	-
3	Thermal insulation: Mineral glass wool	λ_D=0,035 W/mK; A1	95/120/145/170/195	-
	Solid timber frame	C24	45/95 (120,145,170,195)	e ≤ 600
4	Timber based boards	OSB/3	9	-
5	Thermal insulation: Mineral glass wool	λ_D=0,035 W/mK; A1	95	-
	Solid timber frame	C24	45/95	e ≤ 600
6	Vapour barrier (between plasterboards, not in wet rooms)	S_d ≥ 40; F	≥ 0.15	-
7	Internal substrates (see Internal substrates layers table)			

Fasteners:

Nr	Building material	Type / Dimensions [mm]	Spac. / Dist. [mm] Edge	Middle
2	Wind-barrier gypsum plasterboard	Accoding to producer manual	Accoding to producer manual	
3/5	Solid timber frame	Nail 3.1x90	min. 2pcs/joint	
4	Timber based boards (OSB/3)	Nail 2.5x50	≤ 100	≤ 100

External layers

	Building materials	Type	Dimensions [mm]	Spac. / Dist.[mm]
A	Vertical timber laths	Solid timber	30/70	e ≤ 600
	Horizontal timber cladding	Solid timber	≥19	
B	Vertical timber laths	Solid timber	30/70	e ≤ 600
	Horizontal timber laths	Solid timber	30/45	e ≤ 600
	Vertical timber cladding	Solid timber	≥19	
C	Vertical timber laths	Solid timber	30/70 (95)	e ≤ 600
	Fibre-cement boards	A2-s1,d0	≥8	

Fasteners:

Building material	Type / Dimensions [mm]	Spac. / Dist. [mm] Edge	Middle
Timber laths	Nail 3.1x90 / 3.8x130	2 pcs/joint	
Timber cladding	Nail 2.5x50	min. 1 pcs/joint	
Fibre-cement boards	Accoding to producer manual	Accoding to producer manual	

KODUMAJA	External wall EW-01 (Drawing:)	Ver 2	15.08.2023	1 : 8 (Scale:)	1/2 (Page:)

Building Element

Internal substrates

	Building materials	Type	Dimensions [mm]
A	Gypsum plasterboards Gypsum plasterboards	A2-s1,d0 (Type A) A2-s1,d0 (Type A)	13 13
B	Gypsum plasterboards Gypsum plasterboards	A2-s1,d0 (Type DF) A2-s1,d0 (Type DF)	13 13
C	Gypsum plasterboards Gypsum plasterboards Timber based boards (OSB/3 / Plywood)	A2-s1,d0 (Type A) A2-s1,d0 (Type A) D-s2,d2	13 13 9 / 18
D	Gypsum plasterboards Gypsum plasterboards Timber based boards (OSB/3 / Plywood)	A2-s1,d0 (Type A) A2-s1,d0 (Type A) D-s2,d2	13 13 9 / 18

Fasteners:

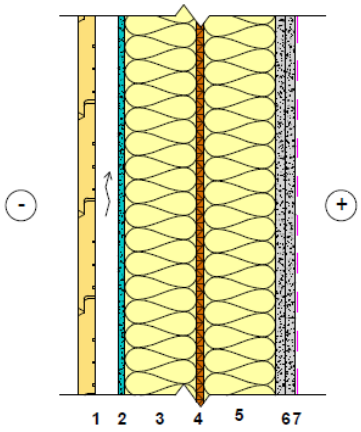
Building material	Type / Dimensions [mm]	Spac. / Dist. [mm]	
		Edge	Middle
Gypsum plasterboards	Screw 3.9x35 / 3.9x50	600 / 200	600 / 300
Timber based boards (OSB/3)	Nail 2.5x50	100	100
Timber based boards (Plywood)	Screw 4.2x55	100	100

KODUMAJA	External wall EW-01 (Drawing:)	Ver 1	01.04.2022	1 : 8 (Scale:)	2/2 (Page:)

2	External wall (wet-room) – type EW-01-W

Building Element

Wall cross section:



Building physics characteristics:

Thermal resistance[1] (Ch. 3.6.1):

	Mineral glass wool	
$D_{insulation}$ [mm]	U [W/m²K]	R [m²K/W]
95+95	0.21	4.74
95+120	0.19	5.30
95+145	0.17	5.84
95+170	0.16	6.39
95+195	0.14	6.92

1) Values given are valid for internal substrates A
Values are based on 15% timber proportion in layer 4 and 6

Vapour permeability and moisture resistance (Ch. 3.3.1):
no condensation

Airborne sound insulation (Ch. 3.5.1):
Rw (C; C_{tr}) **≥ 50 (-2; -7) db**

Element composition (from outside to inside):

Nr	Building material	Type	Dimensions [mm]	Spac. / Dist. [mm]
1	External layers (see External layers table)			
2	Wind-barrier gypsum plasterboard	EH / GM-H; A2-s1,d0	≥ 9	-
3	Thermal insulation: Mineral glass wool	λ_D=0,035 W/mK; A1	95/120/145/170/195	-
	Solid timber frame	C24	45/95 (120,145,170,195)	e ≤ 600
4	Timber based boards	OSB/3	9	-
5	Thermal insulation: Mineral glass wool	λ_D=0,035 W/mK; A1	95	-
	Solid timber frame	C24	45/95	e ≤ 600
6	Wet room internal substrates (see Internal substrates in wet room table)			
7	Watertight covering kits for wet room			

Fasteners:

Nr	Building material	Type / Dimensions [mm]	Spac. / Dist. [mm]	
			Edge	Middle
2	Wind-barrier gypsum plasterboard	Accoding to producer manual	Accoding to producer manual	
3/5	Solid timber frame	Nail 3.1x90	min. 2pcs/joint	
4	Timber based boards (OSB/3)	Nail 2.5x50	≤ 100	≤ 100

External layers

	Building materials	Type	Dimensions [mm]	Spac. / Dist.[mm]
A	Vertical timber laths	Solid timber	30/70	e ≤ 600
	Horizontal timber cladding	Solid timber	≥19	
B	Vertical timber laths	Solid timber	30/70	e ≤ 600
	Horizontal timber laths	Solid timber	30/45	e ≤ 600
	Vertical timber cladding	Solid timber	≥19	
C	Vertical timber laths	Solid timber	30/70 (95)	e ≤ 600
	Fibre-cement boards	A2-s1,d0	≥8	

Fasteners:

Building material	Type / Dimensions [mm]	Spac. / Dist. [mm]	
		Edge	Middle
Timber laths	Nail 3.1x90 / 3.8x130	2 pcs/joint	
Timber cladding	Nail 2.5x50	min. 1 pcs/joint	
Fibre-cement boards	Accoding to producer manual	Accoding to producer manual	

KODUMAJA	External wall (wet-room) EW-01-W	Ver 2	15.08.2023	1 : 8	1/2
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Building Element

Internal substrates in wet room			
	Building materials	**Type**	**Dimensions [mm]**
A	Gypsum plasterboards Gypsum plasterboards	A2-s1,d0 (Type A / DFH2IR) A2-s1,d0 (Type A)	13 13
B	Gypsum plasterboards Gypsum plasterboards	A2-s1,d0 (Type DF / DFH2IR) A2-s1,d0 (Type DF)	13 13
C	Gypsum plasterboards Gypsum plasterboards Timber based boards (OSB/3 / Plywood)	A2-s1,d0 (Type A / DFH2IR) A2-s1,d0 (Type A) D-s2,d2	13 13 9 / 18
D	Gypsum plasterboards Gypsum plasterboards Timber based boards (OSB/3 / Plywood)	A2-s1,d0 (Type A / DFH2IR) A2-s1,d0 (Type A) D-s2,d2	13 13 9 / 18

Fasteners:

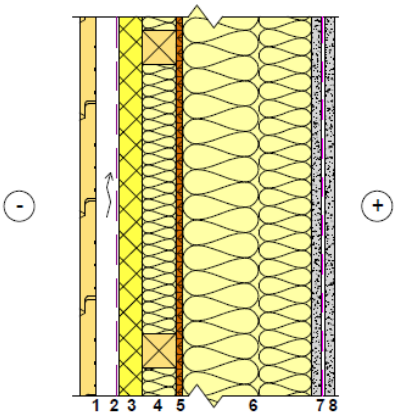
Building material	**Type / Dimensions [mm]**	**Spac. / Dist. [mm]**	
		Edge	Middle
Gypsum plasterboards	Screw 3.9x35 / 3.9x50	600 / 200	600 / 300
Timber based boards (OSB/3)	Nail 2.5x50	100	100
Timber based boards (Plywood)	Screw 4.2x55	100	100

KODUMAJA	External wall (wet-room) EW-01-W	Ver 1	01.04.2022	1 : 8	2/2
	Drawing:			Scale:	Page:

3	External wall – type EW-02

Building Element

Wall cross section:



Building physics characteristics:

Thermal resistance[1] (Ch. 3.6.1):

	Mineral glass wool[2]		Mineral stone wool[3]	
$D_{insulation}$ [mm]	U [W/m²K]	R [m²K/W]	U [W/m²K]	R [m²K/W]
170+45+30	0.16	6.14	0.16	6.08
195+45+30	0.15	6.67	0.15	6.61
220+45+30	0.14	7.20	0.14	7.14

1) Values given are valid for internal substrates A
Values are based on 15% timber proportion in layer 4 and 6
2) Values are given for mineral glass wool insulation in layer 3
3) Values are given for mineral stone wool insulation in layer 3

Vapour permeability and moisture resistance (Ch. 3.3.1):
no condensation

Airborne sound insulation (Ch. 3.5.1):
Rw (C; C_{tr}) **≥ 55 (-4; -11) db**

Element composition (from outside to inside):

Nr	Building material	Type	Dimensions [mm]	Spac. / Dist. [mm]
1	External layers (see External layers table)			
2	Vapour permeable membrane	S_d ≤ 0.025; E / B-s1,d0	≥ 0.15	-
3	Wind-barrier board:			
	- Mineral glass wool	λ_D=0,031 W/mK; A2-s1,d0	30	-
	- Mineral stone wool	λ_D=0,033 W/mK; A1	30	-
4	Thermal insulation: Mineral glass wool	λ_D=0,035 W/mK; A1	45	-
	Timber battens	Solid timber	45/45	e ≤ 600
5	Timber based boards	OSB/3	9	-
6	Thermal insulation: Mineral glass wool	λ_D=0,035 W/mK; A1	170/195/220	-
	Solid timber frame	C24	45/170 (195,220)	e ≤ 600
7	Vapour barrier (between plasterboards)	S_d ≥ 40; F	≥ 0.15	-
8	Internal substrates (see Internal substrates table)			

Fasteners:

Nr	Building material	Type / Dimensions [mm]	Spac. / Dist. [mm] Edge	Middle
3	Wind-barrier board	Accoding to producer manual	Accoding to producer manual	
4	Timber battens	Nail 3.1x90	min. 2pcs/joint	
5	Timber based boards (OSB/3)	Nail 2.5x50	≤ 100	≤ 100
6	Solid timber frame	Nail 3.1x90	min. 2pcs/joint	

External layers

	Building materials	Type	Dimensions [mm]	Spac. / Dist.[mm]
A	Vertical timber laths	Solid timber	30/70	e ≤ 600
	Horizontal timber cladding	Solid timber	≥19	
B	Vertical timber laths	Solid timber	30/70	e ≤ 600
	Horizontal timber laths	Solid timber	30/45	e ≤ 600
	Vertical timber cladding	Solid timber	≥19	
C	Vertical timber laths	Solid timber	30/70 (95)	e ≤ 600
	Fibre-cement boards	A2-s1,d0	≥8	

Fasteners:

Building material	Type / Dimensions [mm]	Spac. / Dist. [mm] Edge	Middle
Timber laths	Nail 3.1x90 / 3.8x130	2 pcs/joint	
Timber cladding	Nail 2.5x50	min. 1 pcs/joint	
Fibre-cement boards	Accoding to producer manual	Accoding to producer manual	

KODUMAJA	External wall EW-02 (Drawing:)	Ver 2	15.08.2023	1 : 8 (Scale:)	1/2 (Page:)

Building Element

Internal substrates			
	Building materials	**Type**	**Dimensions [mm]**
A	Gypsum plasterboards Gypsum plasterboards	A2-s1,d0 (Type A) A2-s1,d0 (Type A)	13 13
B	Gypsum plasterboards Gypsum plasterboards	A2-s1,d0 (Type DF) A2-s1,d0 (Type DF)	13 13
C	Gypsum plasterboards Gypsum plasterboards Timber based boards (OSB/3 / Plywood)	A2-s1,d0 (Type A) A2-s1,d0 (Type A) D-s2,d2	13 13 9 / 18
D	Gypsum plasterboards Gypsum plasterboards Timber based boards (OSB/3 / Plywood)	A2-s1,d0 (Type A) A2-s1,d0 (Type A) D-s2,d2	13 13 9 / 18

Fasteners:

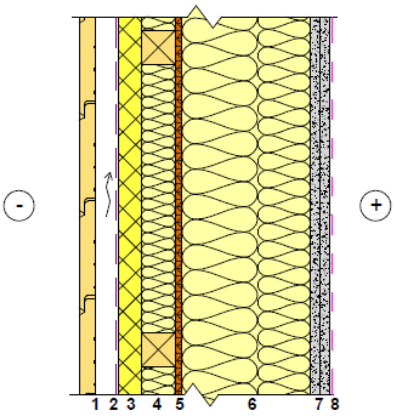
Building material	**Type / Dimensions [mm]**	**Spac. / Dist. [mm]**	
		Edge	Middle
Gypsum plasterboards	Screw 3.9x35 / 3.9x50	600 / 200	600 / 300
Timber based boards (OSB/3)	Nail 2.5x50	100	100
Timber based boards (Plywood)	Screw 4.2x55	100	100

KODUMAJA	External wall EW-02 Drawing:	Ver 1	01.04.2022	1 : 8 Scale:	2/2 Page:

4	External wall (wet-room) – type EW-02-W

Building Element

Wall cross section:



Building physics characteristics:

Thermal resistance[1] (Ch. 3.6.1):

	Mineral glass wool[2]		Mineral stone wool[3]	
$D_{insulation}$ [mm]	U [W/m²K]	R [m²K/W]	U [W/m²K]	R [m²K/W]
170+45+30	0.16	6.14	0.16	6.08
195+45+30	0.15	6.67	0.15	6.61
220+45+30	0.14	7.20	0.14	7.14

[1] Values given are valid for internal substrates A
Values are based on 15% timber proportion in layer 4 and 6
[2] Values are given for mineral glass wool insulation in layer 3
[3] Values are given for mineral stone wool insulation in layer 3

Vapour permeability and moisture resistance (Ch. 3.3.1):
no condensation

Airborne sound insulation (Ch. 3.5.1):
Rw (C; C_{tr}) **≥ 55 (-4; -11) db**

Element composition (from outside to inside):

Nr	Building material	Type	Dimensions [mm]	Spac. / Dist. [mm]
1	External layers (see External layers table)			
2	Vapour permeable membrane	S_d ≤ 0.025; E / B-s1,d0	≥ 0.15	-
3	Wind-barrier board:			
	- Mineral glass wool	λ_D=0,031 W/mK; A2-s1,d0	30	-
	- Mineral stone wool	λ_D=0,033 W/mK;A1	30	-
4	Thermal insulation: Mineral glass wool	λ_D=0,035 W/mK; A1	45	-
	Timber battens	Solid timber	45/45	e ≤ 600
5	Timber based boards	OSB/3	9	-
6	Thermal insulation: Mineral glass wool	λ_D=0,035 W/mK; A1	170/195/220	-
	Solid timber frame	C24	45/170 (195,220)	e ≤ 600
7	Wet room internal substrates (see Internal substrates in wet room table)			
8	Watertight covering kits for wet room			

Fasteners:

Nr	Building material	Type / Dimensions [mm]	Spac. / Dist. [mm] Edge	Middle
3	Wind-barrier board	Accoding to producer manual	Accoding to producer manual	
4	Timber battens	Nail 3.1x90	min. 2pcs/joint	
5	Timber based boards (OSB/3)	Nail 2.5x50	≤ 100	≤ 100
6	Solid timber frame	Nail 3.1x90	min. 2pcs/joint	

External layers

	Building materials	Type	Dimensions [mm]	Spac. / Dist.[mm]
A	Vertical timber laths Horizontal timber cladding	Solid timber Solid timber	30/70 ≥19	e ≤ 600
B	Vertical timber laths Horizontal timber laths Vertical timber cladding	Solid timber Solid timber Solid timber	30/70 30/45 ≥19	e ≤ 600 e ≤ 600
C	Vertical timber laths Fibre-cement boards	Solid timber A2-s1,d0	30/70 (95) ≥8	e ≤ 600

Fasteners:

Building material	Type / Dimensions [mm]	Spac. / Dist. [mm] Edge	Middle
Timber laths	Nail 3.1x90 / 3.8x130	2 pcs/joint	
Timber cladding	Nail 2.5x50	min. 1 pcs/joint	
Fibre-cement boards	Accoding to producer manual	Accoding to producer manual	

KODUMAJA	External wall (wet-room) EW-02-W	Ver 2	15.08.2023	1 : 8	1/2
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Building Element

Internal substrates in wet room			
	Building materials	**Type**	**Dimensions [mm]**
A	Gypsum plasterboards Gypsum plasterboards	A2-s1,d0 (Type A / DFH2IR) A2-s1,d0 (Type A)	13 13
B	Gypsum plasterboards Gypsum plasterboards	A2-s1,d0 (Type DF / DFH2IR) A2-s1,d0 (Type DF)	13 13
C	Gypsum plasterboards Gypsum plasterboards Timber based boards (OSB/3 / Plywood)	A2-s1,d0 (Type A / DFH2IR) A2-s1,d0 (Type A) D-s2,d2	13 13 9 / 18
D	Gypsum plasterboards Gypsum plasterboards Timber based boards (OSB/3 / Plywood)	A2-s1,d0 (Type A / DFH2IR) A2-s1,d0 (Type A) D-s2,d2	13 13 9 / 18

Fasteners:

Building material	**Type / Dimensions [mm]**	**Spac. / Dist. [mm]**	
		Edge	Middle
Gypsum plasterboards	Screw 3.9x35 / 3.9x50	600 / 200	600 / 300
Timber based boards (OSB/3)	Nail 2.5x50	100	100
Timber based boards (Plywood)	Screw 4.2x55	100	100

KODUMAJA	External wall (wet-room) EW-02-W	Ver 1	01.04.2022	1 : 8	2/2
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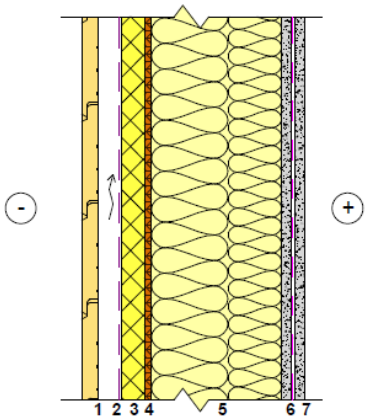
5	External wall – type EW-03

Building Element

Wall cross section:



Building physics characteristics:

Thermal resistance[1] (Ch. 3.6.1):

$D_{insulation}$ [mm]	Mineral glass wool[2] U [W/m²K]	Mineral glass wool[2] R [m²K/W]	Mineral stone wool[3] U [W/m²K]	Mineral stone wool[3] R [m²K/W]
170+30	0.20	5.06	0.20	5.00
195+30	0.18	5.58	0.18	5.52
220+30	0.16	6.10	0.17	6.04

[1] Values given are valid for internal substrates A
Values are based on 15% timber proportion in layer 5
[2] Values are given for mineral glass wool insulation in layer 3
[3] Values are given for mineral stone wool insulation in layer 3

Vapour permeability and moisture resistance (Ch. 3.3.1):
no condensation

Airborne sound insulation (Ch. 3.5.1):
Rw (C; C_{tr}) **≥ 55 (-4; -11) db**

Element composition (from outside to inside):

Nr	Building material	Type	Dimensions [mm]	Spac. / Dist. [mm]
1	External layers (see External layers table)			
2	Vapour permeable membrane	S_d ≤ 0.025; E / B-s1,d0	≥ 0.15	-
3	Wind-barrier board:			
	- Mineral glass wool	λ_D=0,031 W/mK; A2-s1,d0	30	-
	- Mineral stone wool	λ_D=0,033 W/mK; A1	30	-
4	Timber based boards	OSB/3	9	-
5	Thermal insulation: Mineral glass wool	λ_D=0,035 W/mK; A1	170/195/220	-
	Solid timber frame	C24	45/170 (195,220)	e ≤ 600
6	Vapour barrier (between plasterboards)	S_d ≥ 40; F	≥ 0.15	-
7	Internal substrates (see Internal substrates layers table)			

Fasteners:

Nr	Building material	Type / Dimensions [mm]	Spac. / Dist. [mm] Edge	Middle
3	Wind-barrier board	Accoding to producer manual	Accoding to producer manual	
4	Timber based boards (OSB/3)	Nail 2.5x50	≤ 100	≤ 100
5	Solid timber frame	Nail 3.1x90	min. 2pcs/joint	

External layers

	Building materials	Type	Dimensions [mm]	Spac. / Dist.[mm]
A	Vertical timber laths	Solid timber	30/70	e ≤ 600
	Horizontal timber cladding	Solid timber	≥19	
B	Vertical timber laths	Solid timber	30/70	e ≤ 600
	Horizontal timber laths	Solid timber	30/45	e ≤ 600
	Vertical timber cladding	Solid timber	≥19	
C	Vertical timber laths	Solid timber	30/70 (95)	e ≤ 600
	Fibre-cement boards	A2-s1,d0	≥8	

Fasteners:

Building material	Type / Dimensions [mm]	Spac. / Dist. [mm] Edge	Middle
Timber laths	Nail 3.1x90 / 3.8x130	2 pcs/joint	
Timber cladding	Nail 2.5x50	min. 1 pcs/joint	
Fibre-cement boards	Accoding to producer manual	Accoding to producer manual	

KODUMAJA	External wall EW-03 (Drawing:)	Ver 2	15.08.2023	1 : 8 (Scale:)	1/2 (Page:)

Building Element

Internal substrates			
	Building materials	**Type**	**Dimensions [mm]**
A	Gypsum plasterboards Gypsum plasterboards	A2-s1,d0 (Type A) A2-s1,d0 (Type A)	13 13
B	Gypsum plasterboards Gypsum plasterboards	A2-s1,d0 (Type DF) A2-s1,d0 (Type DF)	13 13
C	Gypsum plasterboards Gypsum plasterboards Timber based boards (OSB/3 / Plywood)	A2-s1,d0 (Type A) A2-s1,d0 (Type A) D-s2,d2	13 13 9 / 18
D	Gypsum plasterboards Gypsum plasterboards Timber based boards (OSB/3 / Plywood)	A2-s1,d0 (Type A) A2-s1,d0 (Type A) D-s2,d2	13 13 9 / 18

Fasteners:

Building material	**Type / Dimensions [mm]**	**Spac. / Dist. [mm]**	
		Edge	Middle
Gypsum plasterboards	Screw 3.9x35 / 3.9x50	600 / 200	600 / 300
Timber based boards (OSB/3)	Nail 2.5x50	100	100
Timber based boards (Plywood)	Screw 4.2x55	100	100

KODUMAJA	External wall EW-03	Ver 1	01.04.2022	1 : 8	2/2
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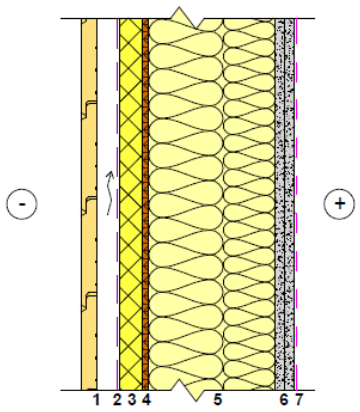
6	External wall (wet-room) – type EW-03-W

Building Element

Wall cross section:



Building physics characteristics:

Thermal resistance[1] (Ch. 3.6.1):

	Mineral glass wool[2]		Mineral stone wool[3]	
$D_{insulation}$ [mm]	U [W/m²K]	R [m²K/W]	U [W/m²K]	R [m²K/W]
170+30	0.20	5.06	0.20	5.00
195+30	0.18	5.58	0.18	5.52
220+30	0.16	6.10	0.17	6.04

1) Values given are valid for internal substrates A
Values are based on 15% timber proportion in layer 5
2) Values are given for mineral glass wool insulation in layer 3
3) Values are given for mineral stone wool insulation in layer 3

Vapour permeability and moisture resistance (Ch. 3.3.1):
no condensation

Airborne sound insulation (Ch. 3.5.1):
Rw (C; C_{tr}) **≥ 55 (-4; -11) db**

Element composition (from outside to inside):

Nr	Building material	Type	Dimensions [mm]	Spac. / Dist. [mm]
1	External layers (see External layers table)			
2	Vapour permeable membrane	S_d ≤ 0.025; E / B-s1,d0	≥ 0.15	-
3	Wind-barrier board:			
	- Mineral glass wool	λ_D=0,031 W/mK; A2-s1,d0	30	-
	-Mineral stone wool	λ_D=0,033 W/mK; A1	30	-
4	Timber based boards	OSB/3	9	-
5	Thermal insulation: Mineral glass wool	λ_D=0,035 W/mK; A1	170/195/220	-
	Solid timber frame	C24	45/170 (195,220)	e ≤ 600
6	Wet room internal substrates (see Internal substrates in wet room table)			
7	Watertight covering kits for wet room			

Fasteners:

Nr	Building material	Type / Dimensions [mm]	Spac. / Dist. [mm] Edge	Middle
3	Wind-barrier board	Accoding to producer manual	Accoding to producer manual	
4	Timber based boards (OSB/3)	Nail 2.5x50	≤ 100	≤ 100
5	Solid timber frame	Nail 3.1x90	min. 2pcs/joint	

External layers

	Building materials	Type	Dimensions [mm]	Spac. / Dist.[mm]
A	Vertical timber laths Horizontal timber cladding	Solid timber Solid timber	30/70 ≥19	e ≤ 600
B	Vertical timber laths Horizontal timber laths Vertical timber cladding	Solid timber Solid timber Solid timber	30/70 30/45 ≥19	e ≤ 600 e ≤ 600
C	Vertical timber laths Fibre-cement boards	Solid timber A2-s1,d0	30/70 (95) ≥8	e ≤ 600

Fasteners:

Building material	Type / Dimensions [mm]	Spac. / Dist. [mm] Edge	Middle
Timber laths	Nail 3.1x90 / 3.8x130	2 pcs/joint	
Timber cladding	Nail 2.5x50	min. 1 pcs/joint	
Fibre-cement boards	Accoding to producer manual	Accoding to producer manual	

KODUMAJA	External wall (wet-room) EW-03-W	Ver 2	15.08.2023	1 : 8	1/2
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Building Element

Internal substrates in wet room			
	Building materials	**Type**	**Dimensions [mm]**
A	Gypsum plasterboards Gypsum plasterboards	A2-s1,d0 (Type A / DFH2IR) A2-s1,d0 (Type A)	13 13
B	Gypsum plasterboards Gypsum plasterboards	A2-s1,d0 (Type DF / DFH2IR) A2-s1,d0 (Type DF)	13 13
C	Gypsum plasterboards Gypsum plasterboards Timber based boards (OSB/3 / Plywood)	A2-s1,d0 (Type A / DFH2IR) A2-s1,d0 (Type A) D-s2,d2	13 13 9 / 18
D	Gypsum plasterboards Gypsum plasterboards Timber based boards (OSB/3 / Plywood)	A2-s1,d0 (Type A / DFH2IR) A2-s1,d0 (Type A) D-s2,d2	13 13 9 / 18

Fasteners:

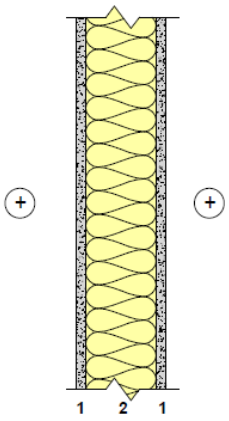
Building material	**Type / Dimensions [mm]**	**Spac. / Dist. [mm]**	
		Edge	Middle
Gypsum plasterboards	Screw 3.9x35 / 3.9x50	600 / 200	600 / 300
Timber based boards (OSB/3)	Nail 2.5x50	100	100
Timber based boards (Plywood)	Screw 4.2x55	100	100

KODUMAJA	External wall (wet-room) EW-03-W Drawing:	Ver 1	01.04.2022	1 : 8 Scale:	2/2 Page:

7	Internal wall – type IW-01

Building Element

Wall cross section:



Building physics characteristics:

Thermal resistance (Ch. 3.6.1): -

Airborne sound insulation (Ch. 3.5.1):
Rw ≥ **35 db**

Element composition (from inside to inside):

Nr	Building material	Type	Dimensions [mm]	Spac. / Dist. [mm]
1	Internal layers (see Internal layers table)			
2	Thermal insulation:			
	- Mineral glass wool	A1	70/95/120/145	-
	- Mineral stone wool	A1	70/95/120/145	-
	Solid timber frame	Solid timber / finger jointed timber	45/70 (95/120/145)	e ≤ 600

Fasteners:

Nr	Building material	Type / Dimensions [mm]	Spac. / Dist. [mm] Edge	Middle
2	Solid timber frame	Nail 3.1x90	min. 2pcs/joint	

Internal substrates (internal separating walls)

	Building materials	Type	Dimensions [mm]
A	Gypsum plasterboards	A2-s1,d0 (Type A)	13
B	Gypsum plasterboards Gypsum plasterboards	A2-s1,d0 (Type A) A2-s1,d0 (Type A)	13 13
C	Gypsum plasterboards Timber based boards (OSB/3 / Plywood)	A2-s1,d0 (Type A) D-s2,d2	13 9 / 18
D	Gypsum plasterboards Gypsum plasterboards Timber based boards (OSB/3 / Plywood)	A2-s1,d0 (Type A) A2-s1,d0 (Type A) D-s2,d2	13 13 9 / 18

Fasteners:

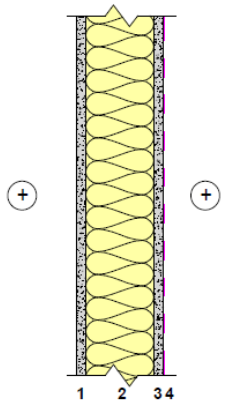
Building material	Type / Dimensions [mm]	Spac. / Dist. [mm] Edge	Middle
Gypsum plasterboards	Screw 3.9x35 / 3.9x50	600 / 200	600 / 300
Timber based boards (OSB/3)	Nail 2.5x50	100	100
Timber based boards (Plywood)	Screw 4.2x55	100	100

KODUMAJA	Internal wall IW-01 (Drawing:)	Ver 2	15.08.2023	1 : 8 (Scale:)	1/1 (Page:)

8	Internal wall (wet-room) – type IW-01-W

Building Element

Wall cross section:



Building physics characteristics:

Thermal resistance (Ch. 3.6.1): -

Airborne sound insulation (Ch. 3.5.1):
Rw ≥ **35 db**

Element composition (from inside to inside):

Nr	Building material	Type	Dimensions [mm]	Spac. / Dist. [mm]
1	Internal substratess (see Internal substrates table)			
2	Thermal insulation:			
	- Mineral glass wool	A1	70/95/120/145	-
	- Mineral stone wool	A1	70/95/120/145	-
	Solid timber frame	Solid timber / finger jointed timber	45/70 (95/120/145)	e ≤ 600
3	Wet room internal substrates (see Internal substrates in wet room table)			
4	Watertight covering kits for wet room			

Fasteners:

Nr	Building material	Type / Dimensions [mm]	Spac. / Dist. [mm] Edge	Middle
2	Solid timber frame	Nail 3.1x90	min. 2pcs/joint	

Internal substrates (internal separating walls)

	Building materials	Type	Dimensions [mm]
A	Gypsum plasterboards	A2-s1,d0 (Type A)	13
B	Gypsum plasterboards Gypsum plasterboards	A2-s1,d0 (Type A) A2-s1,d0 (Type A)	13 13
C	Gypsum plasterboards Timber based boards (OSB/3 / Plywood)	A2-s1,d0 (Type A) D-s2,d2	13 9 / 18
D	Gypsum plasterboards Gypsum plasterboards Timber based boards (OSB/3 / Plywood)	A2-s1,d0 (Type A) A2-s1,d0 (Type A) D-s2,d2	13 13 9 / 18

Internal substrates in wet room (internal separating walls)

	Building materials	Type	Dimensions [mm
A	Gypsum plasterboards	A2-s1,d0 (Type A / DFH2IR)	13
B	Gypsum plasterboards Gypsum plasterboards	A2-s1,d0 (Type A / DFH2IR) A2-s1,d0 (Type A)	13 13
C	Gypsum plasterboards Timber based boards (OSB/3 / Plywood)	A2-s1,d0 (Type A / DFH2IR) D-s2,d2	13 9 / 18
D	Gypsum plasterboards Gypsum plasterboards Timber based boards (OSB/3 / Plywood)	A2-s1,d0 (Type A / DFH2IR) A2-s1,d0 (Type A) D-s2,d2	13 13 9 / 18

Fasteners:

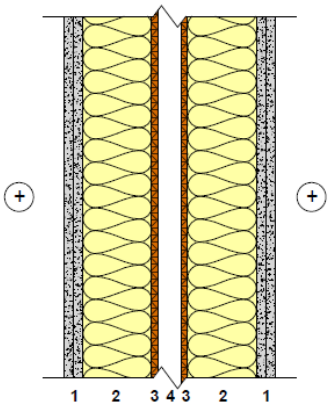
Building material	Type / Dimensions [mm]	Spac. / Dist. [mm] Edge	Middle
Gypsum plasterboards	Screw 3.9x35 / 3.9x50	600 / 200	600 / 300
Timber based boards (OSB/3)	Nail 2.5x50	100	100
Timber based boards (Plywood)	Screw 4.2x55	100	100

KODUMAJA	Internal wall (wet-room) IW-01-W	Ver 2	15.08.2023	1 : 8	1/1
	Drawing:			Scale:	Page:

9	Load bearing separating wall – type PW-01

Building Element

Wall cross section:



Building physics characteristics:

Thermal resistance (Ch. 3.6.1): -

Airborne sound insulation (Ch. 3.5.1):
$R'_w \geq$ **60 db**
$R'_w+C_{50\text{-}3150} \geq$ **52 db**
$R'_w+C_{50\text{-}5000} \geq$ **52 db**

Element composition (from inside to inside):

Nr	Building material	Type	Dimensions [mm]	Spac. / Dist. [mm]
1	Internal layers (see Internal layers table)			
2	Thermal insulation: Mineral glass wool	A1	95	-
	Solid timber frame	C24	45/95	e ≤ 600
3	Timber based boards	OSB/3	9	-
4	Air gap	-	~32	-

Fasteners:

Nr	Building material	Type / Dimensions [mm]	Spac. / Dist. [mm]	
			Edge	Middle
2	Solid timber frame	Nail 3.1x90	2pcs/joint	
3	Timber based boards (OSB/3)	Nail 2.5x50	≤ 100	≤ 100

Internal substrates

	Building materials	Type	Dimensions [mm]
A	Gypsum plasterboards Gypsum plasterboards	A2-s1,d0 (Type A) A2-s1,d0 (Type A)	13 13
B	Gypsum plasterboards Gypsum plasterboards	A2-s1,d0 (Type DF) A2-s1,d0 (Type DF)	13 13
C	Gypsum plasterboards Gypsum plasterboards Timber based boards (OSB/3 / Plywood)	A2-s1,d0 (Type A) A2-s1,d0 (Type A) D-s2,d2	13 13 9 / 18
D	Gypsum plasterboards Gypsum plasterboards Timber based boards (OSB/3 / Plywood)	A2-s1,d0 (Type A) A2-s1,d0 (Type A) D-s2,d2	13 13 9 / 18

Fasteners:

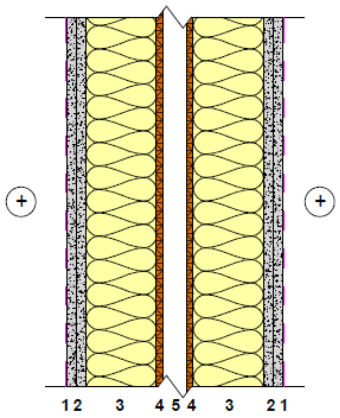
Building material	Type / Dimensions [mm]	Spac. / Dist. [mm]	
		Edge	Middle
Gypsum plasterboards	Screw 3.9x35 / 3.9x50	600 / 200	600 / 300
Timber based boards (OSB/3)	Nail 2.5x50	100	100
Timber based boards (Plywood)	Screw 4.2x55	100	100

KODUMAJA	Load bearing separating wall PW-01 (Drawing:)	Ver 2	15.08.2023	1 : 8 (Scale:)	1/1 (Page:)

10	Load bearing separating wall (wet-room) – type PW-01-W

Building Element

Wall cross section:



Building physics characteristics:

Thermal resistance (Ch. 3.6.1): -

Airborne sound insulation (Ch. 3.5.1):
$R'_w \geq$ **60 db**
$R'_w+C_{50\text{-}3150} \geq$ **52 db**
$R'_w+C_{50\text{-}5000} \geq$ **52 db**

Element composition (from inside to inside):

Nr	Building material	Type	Dimensions [mm]	Spac. / Dist. [mm]
1	Watertight covering kits for wet room			
2	Wet room internal substrates (see Internal substrates in wet room table)			
3	Thermal insulation: Mineral glass wool	A1	95	-
	Solid timber frame	C24	45/95	e ≤ 600
4	Timber based boards	OSB/3	9	-
5	Air gap	-	~32	-

Fasteners:

Nr	Building material	Type / Dimensions [mm]	Spac. / Dist. [mm]	
			Edge	Middle
2	Solid timber frame	Nail 3.1x90	2pcs/joint	
3	Timber based boards (OSB/3)	Nail 2.5x50	≤ 100	≤ 100

Internal substrates in wet room

	Building materials	Type	Dimensions [mm]
A	Gypsum plasterboards Gypsum plasterboards	A2-s1,d0 (Type A / DFH2IR) A2-s1,d0 (Type A)	13 13
B	Gypsum plasterboards Gypsum plasterboards	A2-s1,d0 (Type DF / DFH2IR) A2-s1,d0 (Type DF)	13 13
C	Gypsum plasterboards Gypsum plasterboards Timber based boards (OSB/3 / Plywood)	A2-s1,d0 (Type A / DFH2IR) A2-s1,d0 (Type A) D-s2,d2	13 13 9 / 18
D	Gypsum plasterboards Gypsum plasterboards Timber based boards (OSB/3 / Plywood)	A2-s1,d0 (Type A / DFH2IR) A2-s1,d0 (Type A) D-s2,d2	13 13 9 / 18

Fasteners:

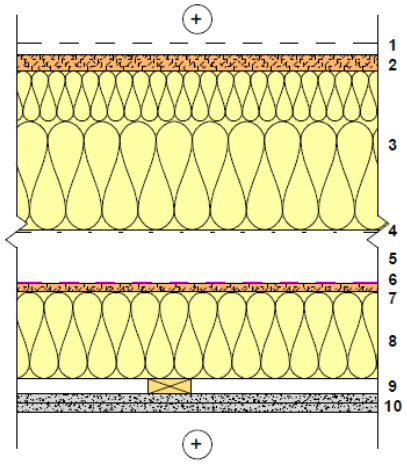
Building material	Type / Dimensions [mm]	Spac. / Dist. [mm]	
		Edge	Middle
Gypsum plasterboards	Screw 3.9x35 / 3.9x50	600 / 200	600 / 300
Timber based boards (OSB/3)	Nail 2.5x50	100	100
Timber based boards (Plywood)	Screw 4.2x55	100	100

KODUMAJA	Load bearing separating wall (wet-room) PW-01-W	Ver 2	15.08.2023	1 : 8	1/1
	Drawing:			Scale:	Page:

11 Intermediate storey partition floor – type CE-01

Building Element

Floor cross section:



Building physics characteristics:

Thermal resistance (Ch. 3.6.1): -

Airborne sound insulation (Ch. 3.5.1):
$R'_w \geq$ **60 db**
$R'_w + C_{50\text{-}3150} \geq$ **56 db**
$R'_w + C_{50\text{-}5000} \geq$ **56 db**
$D_{nT,w} \geq$ **60 db**
$D_{nT,w} + C_{50\text{-}3150} \geq$ **56 db**

Impact sound insulation (Ch. 3.5.2):
$L'_{n,w} \leq$ **50 db**
$L'_{n,w} + C_{I,50\text{-}2500} \leq$ **53 db**
$L'_{nT,w} \leq$ **50 db**
$L'_{nT,w} + C_{I,50\text{-}2500} \leq$ **53 db**

Element composition (from top downwards):

Nr	Building material	Type	Dimensions [mm]	Spac. / Dist. [mm]
1	Floor layers			-
2	Timber based boards (Chipboard)	P6	22/28	-
3	Thermal insulation: Mineral glass wool	λ_D=0,035 W/mK; A1	195/220/245/250/300	-
	Solid timber frame /	C24	45/195 (220/245)	e ≤ 600
	or I-joist frame	C30+	47 (70)/250 (300)	e ≤ 600
4	Steel net	galvanized	1	-
5	Air gap	-	≥59	-
6	Module protection film	Water resistance = W1; E	≥0.2	-
7	Timber based boards (Chipboard)	P2	12	-
8	Thermal insulation: Mineral glass wool	λ_D=0,035 W/mK; A1	95/120/145	-
	Solid timber frame	C24	45/95 (120/145)	e ≤ 600
9	Timber laths	Solid timber	≥21/60	e ≤ 400
10	Ceiling plasterboards (see ceiling layers table)			-

Fasteners:

Nr	Building material	Type / Dimensions [mm]	Spac. / Dist. [mm] Edge	Middle
2	Chipboard	Nail 2.6x65 + Glue	150	200
3/8	Solid timber frame	Nail 3.1x90	min. 2pcs/joint	
3	I-joist frame	Nail 3.1x90 / 3.8x130	min. 4+2pcs/joint	
7	Chipboard	Nail 2.5x50	200	300
9	Timber laths	Nail 2.8x65	min. 2pcs/joint	

Ceiling layers

	Building materials	Type	Dimensions [mm]
A	Gypsum plasterboards	A2-s1,d0 (Type A)	13
	Gypsum plasterboards	A2-s1,d0 (Type A)	13
B	Gypsum plasterboards	A2-s1,d0 (Type DF)	15
	Gypsum plasterboards	A2-s1,d0 (Type DF)	15

Fasteners:

Building material	Type / Dimensions [mm]	Spac. / Dist. [mm] Edge	Middle
Gypsum plasterboards	Screw 3.9x35 / 3.9x50	200	300

KODUMAJA	Drawing: Intermediate storey partition floor CE-01	Ver 2	15.08.2023	Scale: 1 : 8	Page: 1/2

Building Element

Floor layers 1/2		
	Building materials	**Dimensions [mm**
A	Parquet Flooring underlay	8-14 2
B	Parquet Flooring underlay Sound absorbing layer	8-14 2 7
C	Parquet Flooring underlay Floor gypsum plasterboard Floor gypsum plasterboard	8-14 2 13 13
D	Parquet Flooring underlay Sound-absorbant layer Floor gypsum plasterboard Floor gypsum plasterboard	8-14 2 7 13 13
E	Parquet Flooring underlay Floor gypsum plasterboard Floor gypsum plasterboard Sound damping board	8-14 2 13 13 20

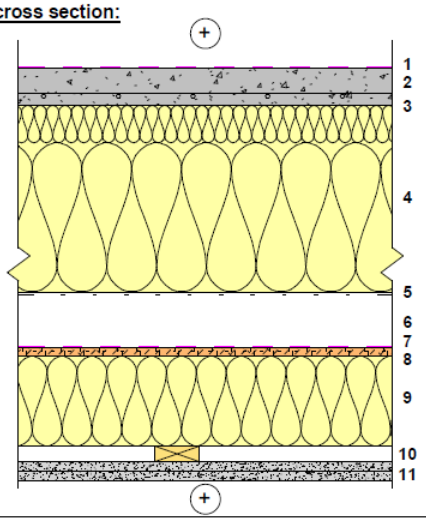
Floor layers 2/2		
	Building materials	**Dimensions [mm**
F	Parquet Flooring underlay Sound-absorbant layer Reinforced concrete	8-14 2 7 ≥38
G	PVC Self-leveling compound	3 4
H	PVC Self-leveling compound Floor gypsum plasterboard Floor gypsum plasterboard	3 4 13 13
I	PVC Self-leveling compound Floor gypsum plasterboard Floor gypsum plasterboard Sound-absorbant layer	3 4 13 13 7

KODUMAJA	Intermediate storey partition floor CE-01 Drawing:	Ver 1	01.04.2022	1 : 8 Scale:	2/2 Page:

12	Intermediate storey partition floor (wet room)– type CE-02

Building Element

Floor cross section:



Building physics characteristics:

Thermal resistance (Ch. 3.6.1): -

Airborne sound insulation (Ch. 3.5.1): -

Impact sound insulation (Ch. 3.5.2): -

Element composition (from top downwards):

Nr	Building material	Type	Dimensions [mm]	Spac. / Dist. [mm]
1	Watertight covering kits for wet room			
2	Reinforced concrete	≥C25; B500	≥35 ; 5x150x150	-
3	Steel sheet	zinc steel	1	-
4	Thermal insulation: Mineral glass wool	λ_D=0,035 W/mK; A1	250	-
	I-joist frame	C30+	47 (70)/ 250	e ≤ 400
5	Steel net	galvanized	1	-
6	Air gap	-	≥59	-
7	Module protection film	Water resistance = W1; E	≥0.2	-
8	Timber based boards (Chipboard)	P2	12	-
9	Thermal insulation: Mineral glass wool	λ_D=0,035 W/mK; A1	95/120/145	-
	Solid timber frame	C24	45/95 (120/145)	e ≤ 600
10	Timber laths	Solid timber	≥21/60	e ≤ 400
11	Ceiling layers (see ceiling layers table)			

Fasteners:

Nr	Building material	Type / Dimensions [mm]	Spac. / Dist. [mm] Edge	Middle
3	Steel sheet	Nail 2,5x25	600	600
4	I-joist frame	Nail 3.1x90 / 3.8x130	min. 4+2pcs/joint	
8	Chipboard	Nail 2.5x50	200	300
9	Solid timber frame	Nail 3.1x90	min. 2pcs/joint	
10	Timber laths	Nail 2.8x65	min. 2pcs/joint	

Ceiling layers

	Building materials	Type	Dimensions [mm]
A	Gypsum plasterboards Gypsum plasterboards	A2-s1,d0 (Type A) A2-s1,d0 (Type A)	13 13
B	Gypsum plasterboards Gypsum plasterboards	A2-s1,d0 (Type DF) A2-s1,d0 (Type DF)	15 15

Fasteners:

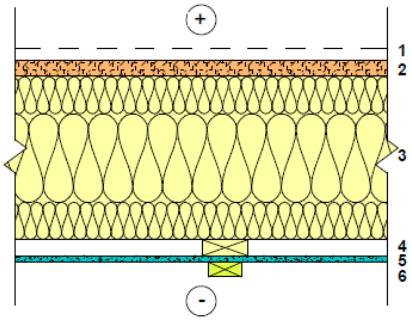
Building material	Type / Dimensions [mm]	Spac. / Dist. [mm] Edge	Middle
Gypsum plasterboards	Screw 3.9x35 / 3.9x50	200	300

KODUMAJA	Intermediate storey partition floor (wet-room) CE-02	Ver 2	15.08.2023	1 : 8	1/1
	Drawing:			Scale:	Page:

13	Floor – type FE-01

Building Element

Floor section:



Building physics characteristics:

Thermal resistance[1] (Ch. 3.6.1):

	Mineral glass wool	
$D_{insulation}$ [mm]	U [W/m²K]	R [m²K/W]
245	0.18	5.65
245+45	0.15	6.57
250	0.16	6.33
300	0.13	7.52
350	0.12	8.71
400	0.10	9.90
450	0.09	11.09
500	0.08	12.28

[1] Values given are valid without floor layers
Values are based on 7.5 / 15% timber proportion in layer 3 and 20% timber proportion in layer 4

Vapour permeability and moisture resistance (Ch. 3.3.1):
no condensation

Element composition (from top downwards):

Nr	Building material	Type	Dimensions [mm]	Spac. / Dist. [mm]
1	Floor layers			-
2	Timber based boards (Chipboard)	P6	22/28	-
3	Thermal insulation: Mineral glass wool	λ_D=0,035 W/mK; A1	245/290/300/350/400/450/500	-
	Solid timber frame /	C24	45/245 (290)	e ≤ 600
	or I-joist frame	C30+	47 (70)/250 (300/350/400/450/500)	e ≤ 600
4	Timber laths	Solid timber	≥21/60	e ≤ 400
5	Wind-barrier gypsum plasterboard	EH / GM-H; A2-s1,d0	≥ 9	-
6	Timber batten	Impregnated solid timber	20/45	e ≤ 400

Fasteners:

Nr	Building material	Type / Dimensions [mm]	Spac. / Dist. [mm] Edge	Middle
2	Chipboard	Nail 2.8x65 + Glue	150	200
3	Solid timber frame	Nail 3.8x130	min. 2pcs/joint	
3	I-joist frame	Nail 3.1x90 / 3.8x130	min. 4+2pcs/joint	
4	Timber laths	Nail 2.8x65	min. 2pcs/joint	
5	Wind-barrier gypsum plasterboard	According to producer manual	According to producer manual	
6	Timber batten	Nail 2.5x50	min. 1pcs/joint	

Floor layers 1/2

	Building materials	Dimensions [mm
A	Parquet Flooring underlay	8-14 2
B	Parquet Flooring underlay Sound absorbing layer	8-14 2 7
C	Parquet Flooring underlay Floor gypsum plasterboard Floor gypsum plasterboard	8-14 2 13 13
D	Parquet Flooring underlay Sound-absorbant layer Floor gypsum plasterboard Floor gypsum plasterboard	8-14 2 7 13 13
E	Parquet Flooring underlay Floor gypsum plasterboard Floor gypsum plasterboard Sound damping board	8-14 2 13 13 20

Floor layers 2/2

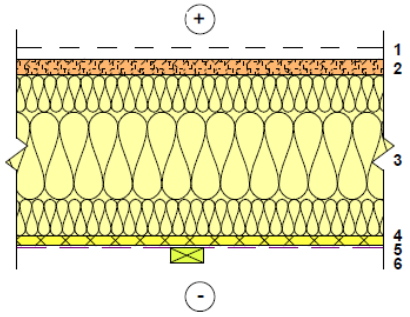
	Building materials	Dimensions [mm
F	Parquet Flooring underlay Sound-absorbant layer Reinforced concrete	8-14 2 7 ≥38
G	PVC Self-leveling compound	3 4
H	PVC Self-leveling compound Floor gypsum plasterboard Floor gypsum plasterboard	3 4 13 13
I	PVC Self-leveling compound Floor gypsum plasterboard Floor gypsum plasterboard Sound-absorbant layer	3 4 13 13 7

KODUMAJA	Floor FE-01 (Drawing:)	Ver 2	15.08.2023	1 : 8 (Scale:)	1/1 (Page:)

14	Floor – type FE-02

Building Element

Floor section:



Building physics characteristics:

Thermal resistance[1] (Ch. 3.6.1):

	Mineral glass wool	
$D_{insulation}$ [mm]	U [W/m²K]	R [m²K/W]
245+13	0.17	5.90
245+45+13	0.15	6.81
250+13	0.15	6.58
300+13	0.13	7.78
350+13	0.11	8.97
400+13	0.10	10.16
450+13	0.09	11.35
500+13	0.08	12.54

[1] Values given are valid without floor layers
Values are based on 7.5 / 15% timber proportion in layer 3

Vapour permeability and moisture resistance (Ch. 3.3.1):
no condensation

Element composition (from top downwards):

Nr	Building material	Type	Dimensions [mm]	Spac. / Dist. [mm]
1	Floor layers			-
2	Timber based boards (Chipboard)	P6	22/28	-
3	Thermal insulation: Mineral glass wool	λ_D=0,035 W/mK; A1	245/290/300/350/400/450/500	-
	Solid timber frame /	C24	45/245 (290)	e ≤ 600
	or I-joist frame	C30+	47 (70)/250 (300/350/400/450/500)	e ≤ 600
4	Wind-barrier board: Mineral glass wool	λ_D=0,031 W/mK; A2-s1,d0	13	-
5	Vapour permeable membrane	S_d ≤ 0.025; E	≥ 0.15	-
6	Timber laths	Impregnated solid timber	20/45	e ≤ 400

Fasteners:

Nr	Building material	Type / Dimensions [mm]	Spac. / Dist. [mm] Edge	Middle
2	Chipboard	Nail 2.8x65 + Glue	150	200
3	Solid timber frame	Nail 3.8x130	min. 2pcs/joint	
3	I-joist frame	Nail 3.1x90 / 3.8x130	min. 4+2pcs/joint	
4	Wind-barrier board	Staples 10.7x32	≤ 600, min. 1pcs	
6	Timber laths	Nail min. 2.5x50	min. 1pcs/joint	

Floor layers 1/2

	Building materials	Dimensions [mm
A	Parquet Flooring underlay	8-14 2
B	Parquet Flooring underlay Sound absorbing layer	8-14 2 7
C	Parquet Flooring underlay Floor gypsum plasterboard Floor gypsum plasterboard	8-14 2 13 13
D	Parquet Flooring underlay Sound-absorbant layer Floor gypsum plasterboard Floor gypsum plasterboard	8-14 2 7 13 13
E	Parquet Flooring underlay Floor gypsum plasterboard Floor gypsum plasterboard Sound damping board	8-14 2 13 13 20

Floor layers 2/2

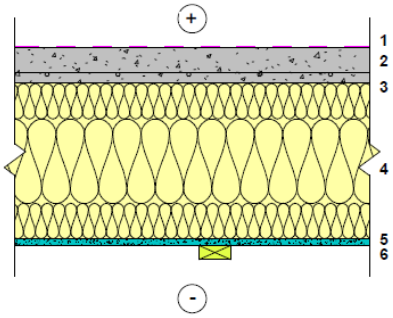
	Building materials	Dimensions [mm
F	Parquet Flooring underlay Sound-absorbant layer Reinforced concrete	8-14 2 7 ≥38
G	PVC Self-leveling compound	3 4
H	PVC Self-leveling compound Floor gypsum plasterboard Floor gypsum plasterboard	3 4 13 13
I	PVC Self-leveling compound Floor gypsum plasterboard Floor gypsum plasterboard Sound-absorbant layer	3 4 13 13 7

KODUMAJA	Drawing: Floor FE-02	Ver 2	15.08.2023	Scale: 1 : 8	Page: 1/1

5	Floor (wet-room) type FE-03

Building Element

Floor cross section:



Building physics characteristics:

Thermal resistance[1] (Ch. 3.6.1):

	Mineral glass wool	
$D_{insulation}$ [mm]	U [W/m²K]	R [m²K/W]
250	0.17	6.01
300	0.14	7.20
350	0.12	8.39
400	0.10	9.58
450	0.09	10.77

[1] Values given are valid without floor layers
Values are based on 7.5 / 15% timber proportion in layer 4

Vapour permeability and moisture resistance (Ch. 3.3.1):
no condensation

Element composition (from top downwards):

Nr	Building material	Type	Dimensions [mm]	Spac. / Dist. [mm]
1	Watertight covering kits for wet room			
2	Reinforced concrete	≥C25; B500	≥35 ; 5x150x150	-
3	Steel sheet	zinc steel	1	-
4	Thermal insulation: Mineral glass wool	λ_D=0,035 W/mK; A1	250/300/350/400/450	e ≤ 400
	I-joist frame	C30+	47 (70)/ 250 (300/350/400/450)	e ≤ 400
5	Wind-barrier gypsum plasterboard	EH / GM-H; A2-s1,d0	≥ 9	-
6	Timber batten	Impregnated solid timber	20/45	e ≤ 400

Fasteners:

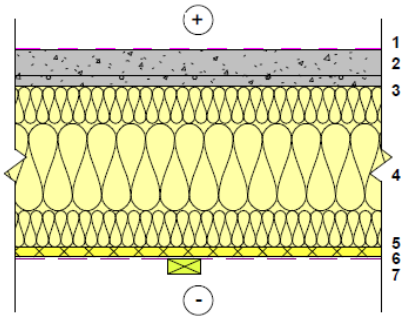
Nr	Building material	Type / Dimensions [mm]	Spac. / Dist. [mm] Edge	Middle
3	Steel sheet	Nail 2,5x25	600	600
4	I-joist frame	Nail 3.1x90 / 3.8x130	min. 4+2pcs/joint	
5	Wind-barrier gypsum plasterboard	According to producer manual	According to producer manual	
6	Timber batten	Nail 2.5x50	min. 1 pcs/joint	

KODUMAJA	Floor (wet-room) FE-03	Ver 2	15.08.2023	1 : 8	1/1
	Drawing:			Scale:	Page:

16	Floor (wet-room)– type FE-04

Building Element

Floor cross section:



Building physics characteristics:

Thermal resistance[1] (Ch. 3.6.1):

	Mineral glass wool	
$D_{insulation}$ [mm]	U [W/m²K]	R [m²K/W]
250+13	0.16	6.43
300+13	0.13	7.62
350+13	0.11	8.81
400+13	0.10	10.00
450+13	0.09	11.19

[1] Values given are valid without floor layers
Values are based on 7.5 / 15% timber proportion in layer 4

Vapour permeability and moisture resistance (Ch. 3.3.1):
no condensation

Element composition (from top downwards):

Nr	Building material	Type	Dimensions [mm]	Spac. / Dist. [mm]
1	Watertight covering kits for wet room			
2	Reinforced concrete	≥C25; B500	≥35 ; 5x150x150	-
3	Steel sheet	zinc steel	1	-
4	Thermal insulation: Mineral glass wool	λ_D=0,035 W/mK; A1	250 (300/350/400/450)	e ≤ 400
	I-joist frame	C30+	47 (70)/250 (300/350/400/450)	e ≤ 400
5	Wind-barrier board: Mineral glass wool	λ_D=0,031 W/mK; A2-s1,d0	13	-
6	Vapour permeable membrane	S_d ≤ 0.025; E	≥ 0.15	-
7	Timber laths	Impregnated solid timber	20/45	e ≤ 400

Fasteners:

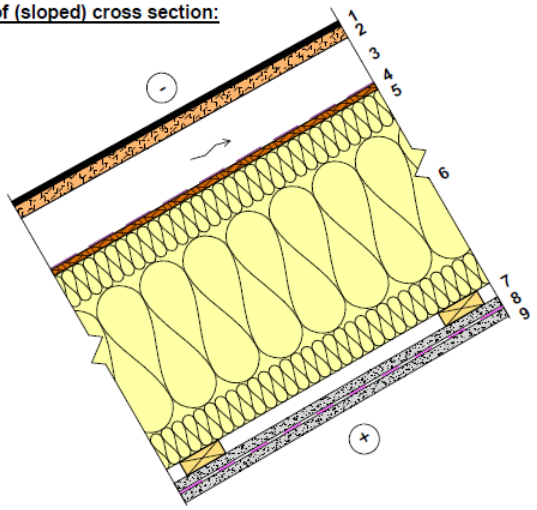
Nr	Building material	Type / Dimensions [mm]	Spac. / Dist. [mm] Edge	Middle
3	Steel sheet	Nail 2,5x25	600	600
4	I-joist frame	Nail 3.1x90 / 3.8x130	min. 4+2pcs/joint	
5	Wind-barrier board	Staples 10.7x32	≤ 600, min. 1pcs	
7	Timber laths	Nail min. 2.5x50	min. 1pcs/joint	

KODUMAJA	Floor (wet-room) FE-04	Ver 2	15.08.2023	1 : 8	1/1
	Drawing:			Scale:	Page:

17	Roof (sloped) RE-01

Building Element

Roof (sloped) cross section:



Building physics characteristics:

Thermal resistance[1] (Ch. 3.6.1):

	Mineral glass wool	
$D_{insulation}$ [mm]	U [W/m²K]	R [m²K/W]
300	0.13	7.51
350	0.12	8.70
400	0.10	9.89
450	0.09	11.08
500	0.08	12.27

[1] Values given are valid for ceiling layers A
Values are based on 7.5 / 15 % timber proportion in layer 6 and 20% timber proportion in layer 7

Vapour permeability and moisture resistance (Ch. 3.3.1):
no condensation

Element composition (from top downwards):

Nr	Building material	Type	Dimensions [mm]	Spac. / Dist. [mm]
1	Roof cover (SBS / PVC)	B_{roof}	≥ 1.6	-
2	Timber based boards (Chipboard)	P5	18	-
3	Timber laths	C24	45/ 45 (70/95/120)	e ≤ 400
4	Vapour permeable membrane	S_d ≤ 0.025; E	≥ 0.15	-
5	Timber based boards	OSB/3	9	-
6	Thermal insulation: Mineral glass wool	λ_D=0,035 W/mK; A1	(300/350/400/450/500)	-
	Timber I-joist frame	C30+	47 (70)/300 (350/ 400/ 450/ 500)	e ≤ 600
7	Timber battens	Solid timber	≥21/60	e ≤ 400
8	Vapour barrier (between plasterboards)	S_d ≥ 40; F	≥ 0.15	-
9	Ceiling layers (see ceiling layers table)			

Fasteners:

Nr	Building material	Type / Dimensions [mm]	Spac. / Dist. [mm] Edge	Middle
2	Chipboard	Nail 2.5x60	150	200
3	Timber laths	Screw 6.0x120	Project specific	
6	Timber based boards (OSB/3)	Nail 2.5x50	≤ 200	≤ 300
7	I-joist frame	Nail 3.1x90/ 3.8x130	min. 4+2pcs/ joint	
8	Timber battens	Nail 2.8x65	2pcs/ joint	

Ceiling layers

	Building materials	Type	Dimensions [mm]
A	Gypsum plasterboards	A2-s1,d0 (Type A)	13
	Gypsum plasterboards	A2-s1,d0 (Type A)	13
B	Gypsum plasterboards	A2-s1,d0 (Type DF)	15
	Gypsum plasterboards	A2-s1,d0 (Type DF)	15

Fasteners:

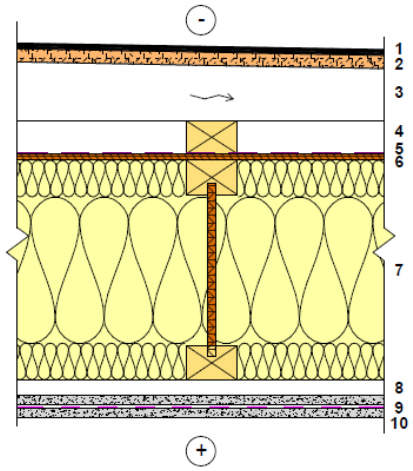
Building material	Type / Dimensions [mm]	Spac. / Dist. [mm] Edge	Middle
Gypsum plasterboards	Screw 3.9x35 / 3.9x50	200	300

KODUMAJA	Roof (sloped) RE-01	Ver 2	15.08.2023	1 : 8	1/1
	Drawing:			Scale:	Page:

18	Roof (flat) RE-02

Building Element

Roof (flat) cross section:



Building physics characteristics:

Thermal resistance[1] (Ch. 3.6.1):

	Mineral glass wool	
$D_{insulation}$ [mm]	U [W/m²K]	R [m²K/W]
300	0.13	7.51
350	0.12	8.70
400	0.10	9.89
450	0.09	11.08
500	0.08	12.27

[1] Values given are valid for ceiling layers A
Values are based on 7.5 / 15 % timber proportion in layer 6 and 20% timber proportion in layer 7

Vapour permeability and moisture resistance (Ch. 3.3.1):
no condensation

Element composition (from top downwards):

Nr	Building material	Type	Dimensions [mm]	Spac. / Dist. [mm]
1	Roof cover (SBS / PVC)	B_{roof}	≥ 1.6	-
2	Timber based boards (Chipboard)	P5	18	-
3	Timber frame sloped /	C24	45/ min. 70 (height according to slope)	e ≤ 400
4	Timber cross-laths	Solid timber	45/70	e ≤ 600
5	Vapour permeable membrane	S_d ≤ 0.025; E	≥ 0.15	-
6	Timber based boards	OSB/3	9	-
7	Thermal insulation: Mineral glass wool	λ_D=0,035 W/mK; A1	(300/350/400/450/500)	-
	Timber I-joist frame	C30+	47 (70)/300 (350/ 400/ 450/ 500)	e ≤ 600
8	Timber battens	Solid timber	≥21/60	e ≤ 400
9	Vapour barrier (between plasterboards)	S_d ≥ 40; F	≥ 0.15	-
10	Ceiling layers (see ceiling layers table)			

Fasteners:

Nr	Building material	Type / Dimensions [mm]	Spac. / Dist. [mm] Edge	Middle
2	Chipboard	Nail 2.5x60	150	200
3	Timber frame sloped	Nail 5.0x90	1pcs/ joint	
5	Timber laths	Screw 6.0x120	Project specific	
6	Timber based boards (OSB/3)	Nail 2.5x50	≤ 200	≤ 300
7	I-joist frame	Nail 3.1x90/ 3.8x130	min. 4+2pcs/ joint	
8	Timber battens	Nail 2.8x65	2pcs/ joint	

Ceiling layers

	Building materials	Type	Dimensions [mm]
A	Gypsum plasterboards	A2-s1,d0 (Type A)	13
	Gypsum plasterboards	A2-s1,d0 (Type A)	13
B	Gypsum plasterboards	A2-s1,d0 (Type DF)	15
	Gypsum plasterboards	A2-s1,d0 (Type DF)	15

Fasteners:

Building material	Type / Dimensions [mm]	Spac. / Dist. [mm] Edge	Middle
Gypsum plasterboards	Screw 3.9x35 / 3.9x50	200	300

KODUMAJA	Roof (flat) RE-02	Ver 2	15.08.2023	1 : 8	1/1
	Drawing:			Scale:	Page:

Annex A2 – Material and component specifications

Table A2-1 – Material and component specifications "Kodumaja Building modules"

MATERIAL GROUP	PRODUCT	STANDARD	MAIN DIMENSIONS (mm)	CHARACTERISTICS				
				MECHANICAL	BUILDING PHYSICS			REACTION TO FIRE
				ρ (kg/m³)	λ (W/mK)	μ (-)	c (J/kgK)	Euroclass (EN 13501-1)
Structural Timber								
Strength graded timber, Spruce, C24		EN 14081-1	≥22	420	0.12	50	1600	D-s2,d0 (2003/593/EC)
Glued laminated timber, Spruce, GL28h		EN 14080	≥22	≥450	0.12	40	1600	D-s2,d0 (2005/610/EC)
Structural laminated veneer lumber, Spruce,		EN 14374	≥18	≥400	0.12	-	-	D-s2,d0 ((EU) 2017/2293)
Light composite wood-based beams		ETA based on EAD 130367-00-0304[1)] Light Composite Wood-based Beams and Columns	Various	-	0.13	-	-	D-s2,d0 (ETA)
Non-structural Timber								
Solid timber		Kodumaja factory production control (FPC) defined criteria	Various	≥450	0.12	40	-	-
Finger jointed timber		-	Various		0.12	-	-	-
Internal Panelling and Cladding								
Wood based boards	Oriented strand board, OSB 3	EN 13986	9	≥600	0.13	50	1700	D-s2,d0 (2007/348/EC)
	Particleboard, P2	EN 13986	12	≥600	0.13	50	1700	D-s2,d0, Dfl-s1 (2007/348/EC)
	Particleboard, P5	EN 13986	18	≥600	0.13	50	1700	D-s2,d0, Dfl-s1 (2007/348/EC)
	Particleboard, P6	EN 13986	22, 28	≥600	0.13	50	1700	D-s2,d0, Dfl-s1 (2007/348/EC)
	Plywood	EN 13986	18	≥450	0.13	200	1600	D-s2,d0 (2007/348/EC)
Gypsum boards	Gypsum plasterboard type A	EN 520	12.5	≥600	0.21-0.25	10	1000	A2-s1,d0 (2006/673/EC)
	Gypsum plasterboard type DF	EN 520	12.5 / 15	≥800	0.25	10	1000	A2-s1,d0 (2006/673/EC)
	Gypsum plasterboard type DFH2IR	EN 520	12.5 / 15	≥800	0.25	10	1000	A2-s1,d0 (2006/673/EC)
	Gypsum plasterboard EH2	EN 520	9.5	≥600	0.25	10-15	1000	A2-s1,d0 (2006/673/EC)
	Gypsum plasterboard DIR	EN 520	12.5	≥1000	0.25	10	1000	A2-s1,d0 (2006/673/EC)
	Gypsum fibre boards type GM-H1	EN 15283-1	9.5	≥600	0.25	10	1000	A2-s1,d0 (EN 15283-2)
External Panelling and Cladding								
Wood cladding		EN 14915	≥19	450	0.13	50	1600	D-s2,d0 (2006/213/EC)
Fibre-cement boards		EN 12467	≥8	-	-	-	-	A2-s1,d0 (EN 12467)
Thermal insulation								
Mineral glass wool		EN 13162	50-200	≥15	0.035	1	-	A1 (EN 13162)
Mineral glass wool		EN 13162	30	-	0.031	1	-	A2-s1,d0 (EN 13162)
Mineral stone wool		EN 13162	50-200	≥28	0.037	1	-	A1 (EN 13162)
Mineral stone wool		EN 13162	30	-	0.033	1	-	A1 (EN 13162)
Extruded polystyrene XPS		EN 13164	20-30	-	-	-	-	E (EN 13164)
Membranes								
Vapour barrier		EN 13984	≥0.15	-	-	S_d ≥40 m	-	NPD
Vapour permeable membrane		EN 13859-2	-	-	-	S_d ≤0.2 m	-	B-s1,d0
Watertight covering kits for wet room floors and/or walls		ETA based on EAD 030352-00-0503[1) 2)] Watertight covering kits for wet room	-	-	-	S_d ≥10 m	-	-

MATERIAL GROUP	PRODUCT	STANDARD	MAIN DIMENSIONS (mm)	CHARACTERISTICS				
				MECHANICAL	BUILDING PHYSICS			REACTION TO FIRE
				ρ (kg/m³)	λ (W/mK)	μ (-)	c (J/kgK)	Euroclass (EN 13501-1)
		floors and/or walls						
Sealing Materials								
Fire resistance acrylic sealant		-	-	-	-	-	-	-
Elastic assembly adhesive		-	-	-	-	-	-	Technical data sheet
Neutral silicone sealant		EN 15651	-	-	-	-	-	-
Acrylic sealant		EN 15651	-	-	-	-	-	-
Airtight sealing tape		-		-	-	-	-	Technical data sheet
Door / Window interior tape			-	-	-	-	-	Technical data sheet
Door / Window exterior tape			-	-	-	-	-	Technical data sheet
Screed material and floor screeds		EN 13813	-	-	-	-	-	-
Fasteners								
Screws / nails / staples for interior and exterior applications		EN 14592, ETA based on EAD 130186-00-0603[1)]	Various	-	-	-	-	A1 (96/603/EC)
Screws for the fixing of gypsum plasterboard		EN 14566	Various	-	-	-	-	A1 (96/603/EC)
Joist hangers		ETA based on EAD 130186-00-0603[1)] Three-Dimensional Nailing Plates	Various	-	-	-	-	A1 (96/603/EC)
Angle brackets		ETA based on EAD 130186-00-0603[1)] Three-Dimensional Nailing Plates	Various	-	-	-	-	A1 (96/603/EC)
Roofing materials								
Flexible sheet for waterproofing - Bitumen		EN 13707[3)]	2.5-5.0	-	-	-	-	B_{ROOF}(t2) (EN 13707)
Flexible sheet for waterproofing - PVC		EN 13956[3)]	1.6	-	-	-		B_{ROOF}(t2) (EN 13956)
Windows and external doors								
Windows and external doors		EN 14351-1	Uw ≤ 1,4 [W/m²K]		Rw ≥ 35 [dB]			DoP
Internal doors		EN 14351-2	-		-			-

1) Various ETAs; ETA number is specified in the quality system of "Kodumaja building modules". ETA is only valid if it accompanied by CPR-certificate issued based on the same ETA.

2) The products that have a SINTEF Technical Approval, are assessed and approved in accordance with provisions in EAD 030352-00-0503 Watertight covering kits for wet room floors and/or walls and may be used. The valid approvals may be found at https://www.sintefcertification.no and are specified in the quality system of "Kodumaja building modules"

3) The products shall be classified as watertight in accordance with relevant harmonised standard (EN) and have valid CPR certificate, or valid SINTEF Technical approval (https://www.sintefcertification.no/Contents/Index/3)

Table A2-2 – Corrosion protection of fasteners used in "Kodumaja building modules".

Product	Technical specification	Main dimensions (mm)	Corrosion protection (Service class)
Staples	EN 14592+A1	See Annex 1	Service class 1, 2
Corrugated staples	EN 14592+A1, ETA based on EAD 130033-00-0603*	See Annex 1	Service class 1, 2
Screws	EN 14592+A1, ETA based on EAD 130033-00-0603*	See Annex 1	Service class 1, 2 (3 outdoor)
Screws (gypsum board)	EN 14566+A1	See Annex 1	Service class 1, 2
Nails	EN 14592+A1, ETA based on EAD 130033-00-0603*	See Annex 1	Service class 1, 2 (3 outdoor)
Connectors / Punched metal plate fasteners	EN 14545	According to pre-defined solutions / structural calculation	Service class 1, 2
Three-dimensional nailing plates (joist hangers, hold downs, angle brackets)	ETA based on ETAG 015 used as EAD and EAD 130186-00-0603*	According to pre-defined solutions / structural calculation	Service class 1, 2

*Various ETAs; ETA number is specified in the quality system of "Kodumaja building modules".

Annex A3 – Resistance to fire

The fire resistance for the building components are given in Table A3-1 and A3-2. The fire resistance is determined by tests, and by calculations according to the manual *Brandsäkra Trähus versjon 3* and EN 1995-1-2.

Design load capacity for limit state fire is given by maximum centric axial load per meter wall (kN/m with c/c 600 mm between the studs). Design load capacity for limit state fire for single spanned floors and roof is given by maximum bending moment (kNm) per beam. "No reduction" means that board materials protect structural timber components from charring during the fire exposure period, and the design capacity determined for ultimate and serviceability limit states can be applied.

Table A3-1

For basic module designs as shown in the Annex A1, the resistance to fire classified according to EN 13501-2 is as follows for fire exposure from the inside on external walls, one-sided on internal walls and from below on separating floors and roofs. The drawings are shown in Annex A1.

Structure	***Fire resistance[1)]***	***Design load capacity[2)]***
External walls – shown in Annex A1, drawing EW-01, EW-01-W, EW-02, EW-02-W, EW-03, EW-03-W) - with 2 layers of 12.5 mm gypsum board type A lining - wall height ≤ 2,6 m	***REI 30***	***Full capacity***
External walls – shown in Annex A1, drawing EW-01, EW-01-W, EW-02, EW-02-W, EW-03, EW-03-W - with 2 layers of 12.5 mm gypsum board type F lining - wall height ≤ 2,6 m	***REI 60***	***117 kN/m***
Internal separating walls – load -bearing– shown in Annex A1, drawing PW—01, PW—01-W - with 2 layers of 12.5 mm gypsum board type A lining - wall height ≤ 2,6 m	***REI 30***	***Full capacity***
Internal separating walls – load-bearing– shown in Annex A1, drawing PW—01, PW—01-W - with 2 layers of 12.5 mm gypsum board type F lining - wall height ≤ 2,6 m	***REI 60***	***17 kN/m***
Shaft walls not load-bearing, one sided fire - shown in Annex A1, drawing IW-01, IW-01-W - with one layer of 12.5 mm gypsum board type A lining on each side and 70 mm mineral wool - wall height ≤ 2,6 m	***EI 30***	***-***
Shaft walls not load-bearing, one sided fire - shown in Annex A1, drawing IW-01, IW-01-W - with 2 layers of 12.5 mm gypsum board type A lining on each side and 70 mm stone wool - wall height ≤ 2,6 m	***EI 60***	***-***
Separating floors – shown in Annex A1, drawing CE-01, CE-02 - with 2 layers of 12.5 mm gypsum board type A as ceiling	***REI 30***	***Full capacity***
Separating floors – shown in Annex A1, drawing CE-01, CE-02 - with 2 layers of 15 mm type F gypsum board as ceiling	***REI 60***	***Full capacity***
Roof – shown in Annex A1, drawing RE-01, RE-02 - with 2 layers of 12.5 mm gypsum board type A as ceiling	***R 30***	***Full capacity***
Roof – shown in Annex A1, drawing RE-01, RE-02 - with 2 layers of 15 mm type F gypsum board as ceiling	***R 60***	***Full capacity***

1) Fire resistance equivalent to classification according to EN 13501-2. The fire resistance for separating (EI) and load bearing (R) elements in minutes.

2) Vertical design load capacity at accidental limit state in case of fire. "Full capacity" means no reduction in capacities determined at limit state fire.

Table A3-2
For alternative module designs as shown in Annex B, the resistance to fire classified according to EN 13501-2 is as follows for fire exposure one-sided on internal walls and from below on separating floors. The loadbearing capacities of structures for action fire are calculated according to EN 1995-1-2 for each individual kit and delivery.

Structure	***Fire resistance[1)]***
Internal separating walls – load-bearing (see Annex B) - confidential information	***REI 90***
Separating floors – load-bearing (see Annex B) - confidential information	***REI 120***

[1)] Fire resistance equivalent to classification according to EN 13501-2. The fire resistance for separating (EI) and load bearing (R) elements in minutes.

[2)] Vertical design load capacity at accidental limit state in case of fire. "Full capacity" means no reduction in capacities determined at limit state fire.