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European Technical Assessment ETA 10/0033 of 7/11/2022

I General Part

Technical Assessment Body issuing the ETA	**Eurofins Expert Services Oy**
Trade name of the construction product	**Harmet Modular Houses**
Product family to which the construction product belongs	**Timber building kit**
Manufacturer	**Harmet OÜ, Puusepa tee 4 Kumna 76614 Harjumaa, Estonia**
Manufacturing plants	**Harmet OÜ Kumna factory** **Puusepa tee 4, Kumna 76614 Harjumaa, Estonia** **Harmet OÜ Pärnu Factory** **Plaadi 1, EE80043 Pärnu, Estonia**
This European Technical Assessment contains	**18 pages including 3 Annexes which form an integral part of this assessment. Separate Annex 3.**
This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of	**EAD 3400308-00-0203 Timber Building Kits**
This European Technical Assessment replaces	**European Technical Assessment ETA-10/0033 of 5.12.2017**

II Specific Part

1 Technical description of the product

Harmet module houses are predesigned timber frame building kits assembled in the factory to volumetric units. Harmet module house is delivered to the building site as volumetric units, 2 to 4 for a family house or 10 to 80 to form a multi-storey house.

The kits covered by this ETA consist of volumetric units, modules, comprising walls, floors and roof structures. The modules may contain several smaller rooms and they are made up of prefabricated timber frame wall units, floors, ceiling, roof units as well as windows and doors. Interior or exterior wall cladding may be installed at the factory or delivered to the site as separate packages for technical reasons. The extension of the delivery varies according to the chosen option and country of destination.

Floors transfer horizontal loads to the walls. The load-bearing horizontal constructions are usually made of timber beams with chipboard, acoustic panel and floor covering.

Roof constructions are made as a timber beam construction with mineral wool insulation, OSB boards, wind barrier, ventilation gap and roofing.

The basic design of the assembled components as well as the material and component specifications are shown in Annexes 1 - 3. Detailed design specifications including connections between the components and assembly are shown in the supporting document Annex 3.

The minimum content of the delivery comprises at least all timber and board parts for walls, floor and ceiling with the necessary fixings and connectors of load bearing parts that build a prefabricated volumetric unit. Thermal insulation is always part of the kit. Windows and external doors are optional, but the detailing of the interface between such components and the kit are specified in the Annex 3; their performance is according to a separate CE-marking of their own and not further dealt with within this ETA.

Substructure, external cladding and internal lining, roofing and roof underlay 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 assessment. This includes also supplementary constructions like such load-bearing constructions and compartment walls not specified in this ETA.

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

Intended uses

The building kits are suitable for various climatic conditions. They are intended mainly for following types of buildings and other comparable uses:

- Residential buildings (single-family houses, semi-detached houses, row houses, multi-storey buildings)
- Commercial buildings (accommodation, hotels, offices)
- Public buildings (kindergartens, schools)

The building kits are also intended be used in areas of seismic actions. Depending on the design, the kits can be considered as low-dissipative or dissipative structures, defined according to Eurocode 8 (EN 1998-1:2004) Clause 1.5.2.

Substructure

The kits are intended to be placed on all types of substructure such as concrete slab on ground, basement made of blocks of lightweight aggregate concrete, or pillars. A damp proof course shall be installed between the substructure and the wood based components according to the construction details provided by the manufacturer. 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
Diagonals, length > 5 m	±10 mm
Location of anchor bolts and column feet	±10 mm
Level of the substructure	-5, +0 mm

Working life / Durability

The provisions made in this European Technical Assessment are based on an assumed intended working life of the kit of 50 years for the load-bearing structure and for non-accessible components and materials and 25 years for repairable or replaceable components and materials such as claddings, roofing materials, exterior trims, and integrated components such as windows and doors. These provisions are based upon the current state of the art and the available knowledge and experience.. The real working life may be, in normal use conditions, considerably longer without major degradation affecting the basic requirements for works[3].

The indications given as to the working life of the construction product cannot be interpreted as a guarantee neither given by the product manufacturer or his representative nor by EOTA nor by the Technical Assessment Body, but are regarded only as a means for expressing the expected economically reasonable working life of the product.

Design

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

[3] The real working life of a product incorporated in a specific works depends on the environmental conditions to which that works is subject, as well as on the conditions of the design, execution, use and maintenance of that works. Therefore, it cannot be excluded that in certain cases the real working life of the product may also be shorter than referred to above.

Design of the works comprises the structural design (see Clause 3.1, BWR1) and, when required, also calculations regarding resistance to fire class (REI) and a heat loss calculation or energy calculation of the building.

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

Execution of construction works

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

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

Identification

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

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

Table 1. Basic requirements for construction works and essential characteristics

Basic requirement and essential characteristics	Performance
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, design calculations
Shear resistance in plane direction against horizontal loads	Clause 3.1, design calculations
Compression resistance - log walls	No performance assessed
Settling of construction of log	No performance assessed
Corrosion protection of metal fasteners	Clause 3.1
BWR 2. Safety in case of fire	
Reaction to fire of materials and components	Annex 1
Resistance to fire	Clause 3.2, Annex 2
External fire performance of roof covering	Clause 3.2
BWR 3. Hygiene, health and the environment	
Vapour permeability and moisture resistance	Clause 3.3 and Annex 3
Watertightness	Clause 3.3 and Annex 1
Durability class/ use class	Clause 3.3
Content, emission and/or release of dangerous substances	Clause 3.3
BWR 4. Safety and accessibility in use	
Impact resistance	Clause 3.4
BWR 5. Protection against noise	
Airborne sound insulation of walls, floors and roof structures	No performance assessed
Impact sound insulation of floors	No performance assessed
Sound absorption	No performance assessed
BWR 6. Energy economy and heat retention	
Thermal resistance	Clause 3.5
Air permeability	Clause 3.5
Thermal inertia	No performance assessed

3.1 Mechanical resistance and stability, BWR 1

Mechanical resistance for each kit is given by reference to design documents produced and held by the manufacturer according to the order for the works, on the basis of the standard component designs and materials. All building components are described with regard to their components and structure in the Annexes 1 – 3.

Individual design documents according to Eurocodes (EN 1990, EN 1991, EN 1995 and EN 1998) will be produced for the kit, containing resistance, stability and serviceability considerations of walls, floors roofs and their connections and openings against vertical and horizontal loads. Seismic actions may be taken into account as part of design of works.

Corrosion protection of metal fasteners

The structural fasteners used in the building kit fulfil the requirements for use class 2 as defined in EN 1995-1-1.

3.2 Safety in case of fire, BWR 2

Reaction to fire

The classification of the main materials with regard to reaction to fire is given in Annex 1. For roofing, reaction to fire is NPD.[4]

Resistance to fire

REI 15 – REI 60 structures: Resistance to fire is considered according EN 1995-1-2 as part of the design calculations. Class REI 60 can be achieved for the separating load-bearing construction parts and EI60 for separating non-loadbearing construction parts.

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

REI 90 structures: The wall and floor structures specified in Annex 2 are tested and classified according to EN 13501-2 for REI90 resistance to fire.

External fire performance of roof coverings

The external fire performance of roof coverings of the building kit is given in Annex 1.

3.3 Hygiene, health and environment, BWR 3

Vapour permeability and moisture resistance

The resistance to moisture has been assessed based on calculations according to EN ISO 13788. Main intended use is in 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.

[4] Reaction of fire of the roofing shall meet the requirements set in the place of use.

In such conditions, the function of timber frame parts as suspended base floors, roofs and parts with internal insulation and vapour barrier fulfils the common requirements. Vapour control layer and roof underlay to be used is specified in Annex 1.

In other climatic conditions, or if the use of building provide for that, 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.

Water vapour resistance s_d of the vapour barrier and wind barrier were declared by the manufacturer (Annex 1)

Watertightness

External envelope

Watertightness of the external envelope has been assessed to fulfil the common requirements for such conditions, where heavy driving rain occurs only occasionally. The ventilation gap behind the facade will prohibit water to penetrate into the wind barrier.

Internal surfaces

Requirements concerning the waterproofing of internal surfaces refer to wet areas as bathrooms. The long term performance of the kit provides that proper waterproofing of internal surfaces is used.

Waterproofing of internal surfaces of wet areas as bathrooms is made by the manufacturer. Under tiles, a liquid applied waterproofing is used that have adequate water tightness, crack bridging capacity and durability against alkali exposure (Annex 1 Penetrations, corners and wall-floor joints are reinforced and protected carefully. There is no vapour barrier behind the waterproofing. Tiles itself are not subject for this assessment.

Durability class / use class

Depending of species and if the timber is heartwood or sapwood, natural durability of timber material corresponds to class 3 (pine heartwood), 4 (spruce) or 5 (sapwood) according to EN 350-2. When properly assembled, the product will stay against the effects of weather during the intended working life in conditions that correspond to use class 3a as defined in EN 335.

Some components as weather strips of windows and doors and sealants round windows shall be maintained and replaced when needed, according to the recommendations given in the maintenance guide provided by the manufacturer.

The surface treatment shall be made according to the installation manual. Only such surface treatments shall be used that are proven by their manufacturer to be suitable for timber frame constructions. When the treatment is made, the instructions of the surface treatment manufacturer shall be followed.

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 (e.g. Biocide Directive). These kinds of treatments are not a part of this assessment.

Glued joints and glued components have been manufactured, tested and found satisfactory according to requirements for the relevant service class and the relevant standards.

The structures used in the building kit fulfil the requirements for service class 1 and 2 as defined in EN 1995-1-1.

Dangerous substances

Wood components that are part of the kit are not preservative treated.

The formaldehyde potential class of the glued laminated timber, LVL and wood-based boards is classified to be E1.

According to the written declaration of the manufacturer, Harmet building kits do not contain other harmful or dangerous substances listed in EOTA TR 34 dated October 2015.

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

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 (e.g. Biocide Directive). These kinds of treatments are not a part of this assessment.

3.4 Safety and accessibility in use, BWR 4

Impact resistance

On the basis of experience, impact resistance of walls covered by gypsum plasterboard is assessed to be adequate for the normal use of the kit.

3.5 Energy economy and heat retention, BWR 6

Thermal resistance

The U-values have been determined according to EN ISO 6946.

In the following table is presented U-values in W/(m²K) for walls The insulation material to be used has a design value of thermal conductivity λ_{Design} = 0,035 W/(mK).

Insulation material and λ	Annex 3, number of the sheet	Thickness of wall (mm)	Thickness of insulation mm	
			220	240
			U-values in W/(m²K)	
MULTIROCK 35; 0,035	5, 6	320	0,18	
MULTIROCK 35; 0,035	7	325		0,16

In the following table is presented U-values in W/(m²K) for suspended floors. The insulation material to be used has a design value of thermal conductivity λ_{Design} = 0,035 W/(mK).

Insulation material and λ	Annex 3, number of the sheet	Thickness of floor (mm)	Thickness of insulation mm		
			220	250	300
			U-values in W/(m²K)		
MULTIROCK 35; 0,035	27	260	0,18		
MULTIROCK 35; 0,035	33	340		0,15	
MULTIROCK 35; 0,035	28	390			0,13
MULTIROCK 35; 0,035	34	330		0,17	
MULTIROCK 35; 0,035	31	390			0,15
MULTIROCK 35; 0,035	30	390			0,14

In the following table is presented U-values in W/(m²K) for roofs The insulation material to be used has a design value of thermal conductivity λ_{Design} = 0,035 W/(mK).

Insulation material and λ	Annex 3, number of the sheet	Thickness of roof (mm)	Thickness of insulation mm
			350
			U-values in W/(m²K)
MULTIROCK 35; 0,035	42	500	0,13

Air permeability

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

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

According to the Decision 1999/455/EC of the European Commission[5], the system of assessment and verification of constancy of performance (see Annex V to the regulation (EU) No 305/2011) is System 1.

[5] Official Journal of the European Communities L 178/56-57 of 14.7.1999

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

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

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by Eurofins Expert Services Oy

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ANNEX 1

DESCRIPTION AND PERFORMANCE OF AS HARMET BUILDING KITS

1 Standard parts of the building kit

Wall elements are made as a timber frame construction. The thickness of the elements is 320 – 325 mm. The maximum length of the elements is usually 6,0 m.

Internal walls are made as a timber frame construction. The frame of the walls is delivered as part of the volume unit. The thickness of the internal walls with timber frame construction varies usually between 96 – 197 mm depending on the internal lining chosen.

Timber parts for the suspended floor, intermediate floor and roofing constructions may be prefabricated or delivered in falling lengths. Maximum dimensions of the parts depend on the transport method and shall be individually checked. Total thickness of floors varies between 250 and 390 mm and the total thickness of roofs between 425 and 497 mm, roofing included, depending on whether the roof is insulated or not. The dimensions of the components vary according to the house plan.

2 Materials and components

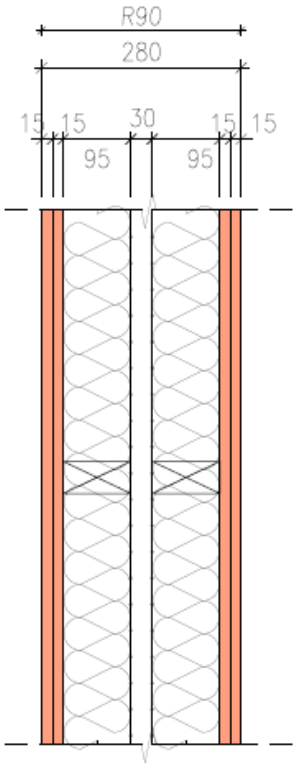
The following table contains materials and components used in the manufacturing of the kit. Note that all kits do not contain all materials or components mentioned.

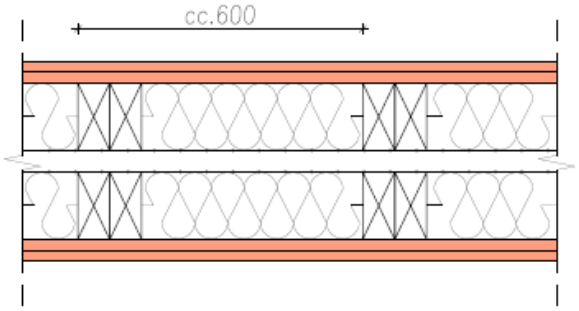
Material or component function	Material or component type	Material or component specification
Timber structures	Structural timber, EN 14081, Lotus Timber OÜ	D-s2,d0; C14 – C24
	Structural Laminated Veneer Lumber, EN 14374, Kerto-S, Metsäliitto Cooperative, Metsä Wood	D-s1,d0; Formaldehyde emission class E1
Roof trusses and frames	Masonite Beams and Columns, Masonite Beams AB	D-s2,d0, type H
	Structural timber, EN 14081, Lotus Timber OÜ	D-s2,d0; C30
External cladding	Fibre-cement flat sheet, EN 12467 Cembrit Production Oy	A1
Vapour barrier	Plastic film, EN-13984, UAB „Umaras“	F
Wind barrier	Underlays for walls, EN 13859-2, DuPont de Nemours	E
	Weatherboard, GM-H1, EN 15283-1, Knauf	A2-s1,d0; type 2.0 9 GM-H1
Waterproofing	SCHÖNOX AB Watertight covering kit, Schönox GmbH, EN 1928 method B	E
Thermal insulation	Mineral wool MULTIROCK 35, EN13162, Rockwool Ltd	A1;
	Thermal insulation EPS 100, EN 13163, Estplast Tootmine OÜ	E,
Wood fibre panels	Prepainted chipboard panel Huntonit Brannit 11mm, EN 13986, Huntonit AS – component of the wall	B-s1,d0
	Sound panel, Hunton Silencio 36 mm, EN 13986, Hunton Fiber AS - component of the suspended floor	E
	Floor panel 22 mm, EN 13986, Forestia AS	Dfl – s1
Gypsum board for dry construction	Humidboard 13 mm, EN 15283-1, Knauf,	A2-s1,d0; GM-H1
	Fire resistance plasterboard GKF 15 mm, EN 520–DF, Norgips OÜ	A2-s1,d0 (B)
	Gypsum plasterboard GKB 13 mm, EN 520, Norgips OÜ	A2-s1,d0 (B)
OSB	OSB 3 ECO, EN 13986, SIA "Kronospan Riga"	D-s2,d0
Roofing	Finnish Fibreboard, EN 13986, Finnish Fibreboard LTD	NDP

ANNEX 2

STRUCTURES WITH RESISTANCE TO FIRE PERFORMANCE REI 90

1. Compartment wall IW-01, REI 90

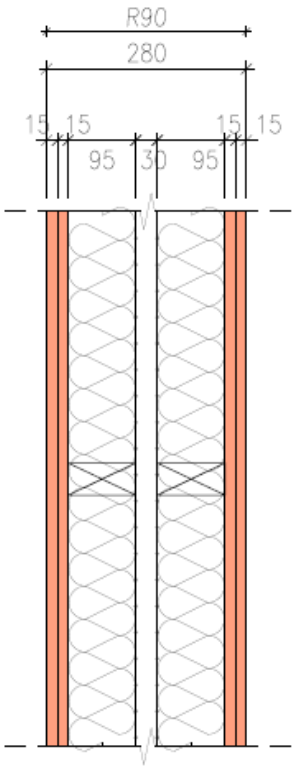


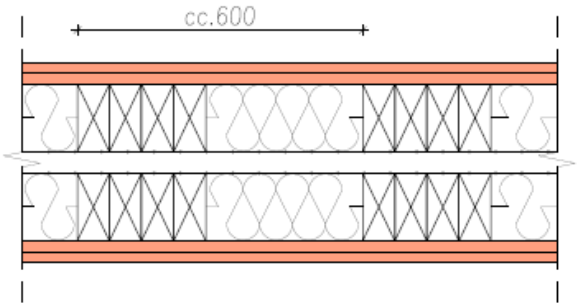


	Material description	Thickness	Reaction to Fire
1.	Gyproc GFL Fireline	15mm	A2–s1,d0
2.	Gyproc GFL Fireline	15mm	A2–s1,d0
3.	2x45x95mm Vertical framing c/c 600mm	95mm	D–s2,d2
3.1.	Noggings 45x95mm	–	D–s2,d2
3.2.	ROCKWOOL SUPERROCK 35	100mm	A1
4.	Packing rope to fix wool	–	–
5.	Air gap insulated around the Modules and Openings	30mm	
6.	Packing rope to fix wool	–	–
7.	2x45x95mm Vertical framing c/c 600mm	95mm	D–s2,d2
7.1.	Noggings 45x95mm	–	D–s2,d2
7.2.	ROCKWOOL SUPERROCK 35	100mm	A1
8.	Gyproc GFL Fireline	15mm	A2–s1,d0
9.	Gyproc GFL Fireline	15mm	A2–s1,d0

Figure A3.1: Compartment wall IW-01, maximum wall height 3m, fire exposure from one side, maximum line load 29 kN/m, corresponding to 8,7 kN/ stud. Only the structures which are essential for the REI90 classification are described in the figure. Timber frames have structural timber grade C24.

2. Compartment wall IW-02, REI 90

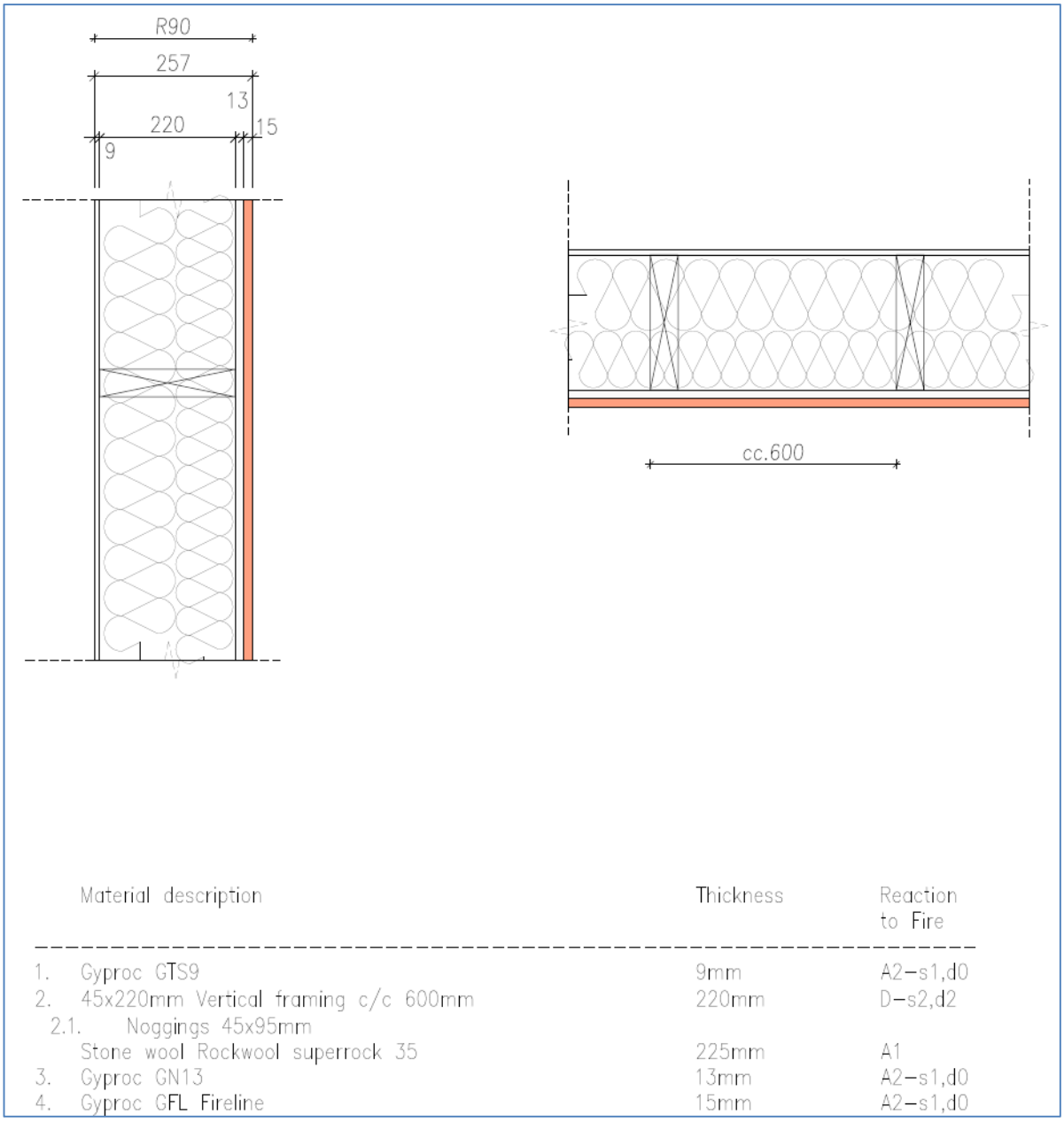




Material description	Thickness	Reaction to Fire
1. Gyproc GFL Fireline	15mm	A2–s1,d0
2. Gyproc GFL Fireline	15mm	A2–s1,d0
3. 4x45x95mm Vertical framing c/c 600mm	95mm	D–s2,d2
3.1. Noggings 45x95mm	–	D–s2,d2
3.2. ROCKWOOL SUPERROCK 35	100mm	A1
4. Packing rope to fix wool	–	–
5. Air gap insulated around the Modules and Openings	30mm	
6. Packing rope to fix wool	–	–
7. 4x45x95mm Vertical framing c/c 600mm	95mm	D–s2,d2
7.1. Noggings 45x95mm	–	D–s2,d2
7.2. ROCKWOOL SUPERROCK 35	100mm	A1
8. Gyproc GFL Fireline	15mm	A2–s1,d0
9. Gyproc GFL Fireline	15mm	A2–s1,d0

Figure A2.2: Compartment wall IW-02, maximum wall height 3m, fire exposure from one side, maximum line load 58 kN/m, corresponding to 8,7 kN/stud. Timber frames have structural timber grade C24. Only the structures which are essential for the REI90 classification are described in the figure.

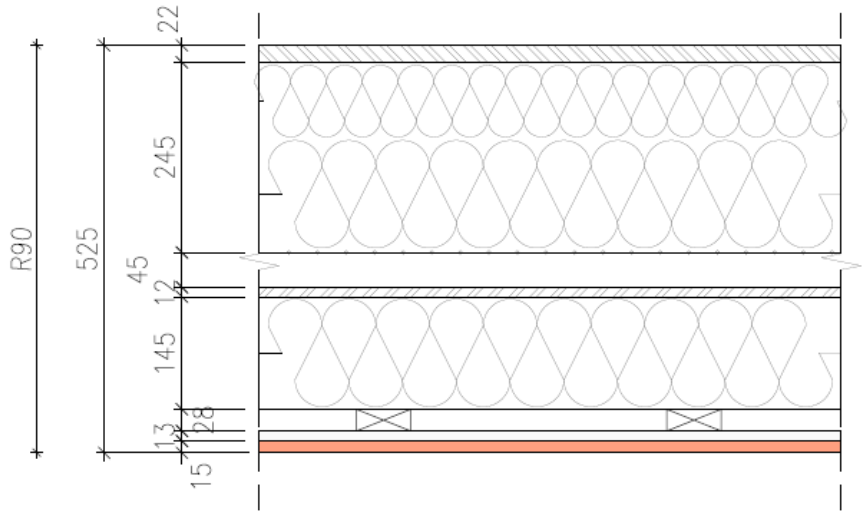
3. External wall EW-01, REI 90



	Material description	Thickness	Reaction to Fire
1.	Gyproc GTS9	9mm	A2-s1,d0
2.	45x220mm Vertical framing c/c 600mm	220mm	D-s2,d2
2.1.	Noggings 45x95mm Stone wool Rockwool superrock 35	225mm	A1
3.	Gyproc GN13	13mm	A2-s1,d0
4.	Gyproc GFL Fireline	15mm	A2-s1,d0

Figure A2.3: External wall EW-01, maximum wall height 3m, fire exposure from inside, maximum line load 45 kN/m, corresponding to 27 kN/stud. Timber frames have structural timber grade C24. Only the structures which are essential for the REI90 classification are described in the figure.

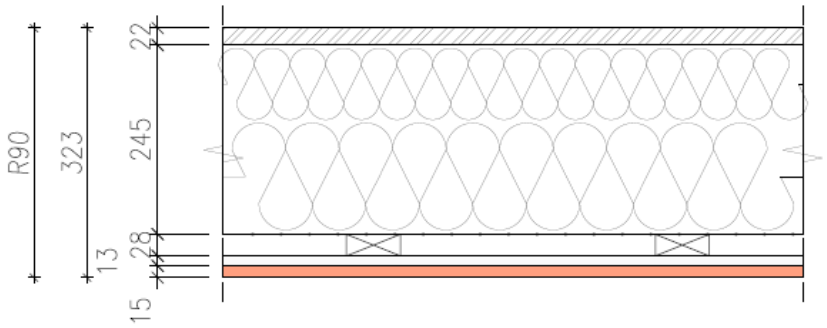
4. Intermediate floor FE-01, REI 90



	Material description	Thickness	Reaction to Fire
1.	Chipboard	22mm	D
2.	45x245mm framing c/c 400mm	245mm	D–s2,d2
2.1.	ROCKWOOL SUPERROCK 35	100mm	A1
3.	Steel wire	–	
4.	Air gap insulated around perimeter of Modules	112mm	
5.	OSB board	12mm	D
6.	45x145 Beams c/c 400mm	145mm	D–s2,d2
6.1.	ROCKWOOL SUPERROCK 35	150mm	A1
7.	28x70 battens c/c 400mm	28mm	D–s2,d2
8.	Gyproc GN13	13mm	A2–s1,d0
9.	Gyproc GFL Fireline	15mm	A2–s1,d0

Figure A2.4: Intermediate wall FE-01, maximum span length 4,0m, own weight 0,9 kN/m², Imposed load in fire design 1,6 kN/m² (from partition load 1,0kN/m² and 30% of live load 2,0 kN/m²). Timber frames have structural timber grade C24. Only the structures which are essential for the REI90 classification are described in the figure.

5. Intermediate floor FE-02, REI 90



	Material description	Thickness	Reaction to Fire
1.	Chipboard	22mm	D
2.	45x245mm framing c/c 400mm	245mm	D-s2,d2
2.1.	ROCKWOOL SUPERROCK 35	250mm	A1
3.	Steel wire	-	
4.	28x70 Battens c/c 400mm	28mm	D-s2,d2
5.	Gyproc GN13	13mm	A2-s1,d0
6.	Gyproc GFL Fireline	15mm	A2-s1,d0

Figure A2.5: Intermediate wall FE-02, maximum span length 4,0m, own weight 0,7 kN/m^2, Imposed load in fire design 1,6 kN/m^2 (from partition load 1,0kN/m^2 and 30% of live load 2,0 kN/m^2). Timber frames have structural timber grade C24. Only the structures which are essential for the REI90 classification are described in the figure.

ANNEX 3

STRUCTURE TYPES, TYPE DETAILS AND EXAMPLES OF PLAN AND SECTION DRAWINGS

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