SINTEF Technical Approval

TG 20710

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Revised:
Amended:
Valid until 01.02.2027
Provided listed on
www.sintefcertification.no

SINTEF confirms that

TIMBECO Building System

has been found to be fit for use in Norway and to meet the provisions regarding product documentation given in the regulation relating to the marketing of products for construction works (DOK) and regulations on technical requirements for building works (TEK), with the properties, fields of application and conditions for use as stated in this document

1. Holder of the approval

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2. Product description

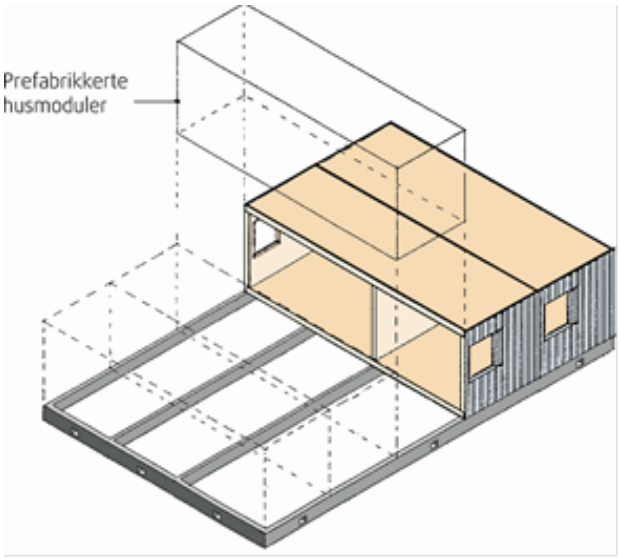
Timbeco Building System is prefabricated building modules and elements which are assembled on site for office buildings, housing etc., see fig. 1 and fig. 2. Fields of application are further described in chap. 3. The modules and elements are based on timber structures in floors, walls and roof of construction timber, CLT and I-beams.

The modules and elements are normally delivered from factory with outside cladding, and with windows and doors installed in external walls. Finished roofing may also be included. The modules are normally delivered with finished internal linings and surfaces, and partly with fixed internal work and technical installations installed in the factory. Modules may have open sides for connection to other modules. The modules may include wet rooms.

2.2 Scope
This approval encompasses standard design of the elements, including joints and connection to foundations. Fields of application is described in chapter 3.

The approval does not include surface materials, doors or windows. However, windows and doors are normally installed in the factory. The approval neither encompasses roofing, gutters and downpipes, nor supplementary structures such as e.g., stairways and balconies. Wet rooms built on site, suspended floor constructions above foundations are not included in the approval.

The principle design of standard elements is described in chapter 2.3 – 2.7. Specification of individual materials and components for the elements are shown in Table 1. The properties and performance of these materials and components must be documented by the respective manufacturers or suppliers.



Timbeco building modules

Detailed design and construction details for the elements are shown in" Standard *construction details for Timbeco Building System pertaining to SINTEF Technical Approval 20710.*" The version filed at SINTEF Community at any one time constitutes a formal part of the approval.

For constructions not shown in the approval and not mentioned in the fire, sound and u-value tables, calculations have to be done for each project.

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Table1
Timbeco Building System. Material specifications

Material / component	Spesification [1]	TG/PS [2]	Fire classification [3]	CE-marking [4]
Structural components				
Timber	Strength graded structural timber with class C24 or according to specific structural calculations. Moisture content max. 18 %, no tropical wood	-	D-s2, d0	EN 14081-1
Glued laminated timber	Peetri Puit OÜ Gluelam C24, CLT, KVH or according to specific structural calculations. Formaldehyde class E1	-	D-s2, d0	EN 14080 EN 14081
	Palmako Gluelam according to specific structural calculations. Formaldehyde class E1		D-s2, d0	EN 14080
	Products with SINTEF Technical approval for current application			
Timber I-joists	Products with SINTEF Technical approval for current application			
Steel	Steel post and beams according to specific structural calculations, A-235 and S355			EN 10025
	Steel nail plates for trusses and rafters			EN 14250
Wood based panels/boards				
Floor, wall and roof sheathing	Unilin Durelis Floor particleboards 12-22 mm, class P5		D-s2, d0	EN 13986
	Unilin Durelis wall particleboards 12 mm P5		D-s2, d0	EN 13986
	Products with SINTEF Technical approval for current application			
Wind barrier boards	9 mm Norgips GU9		A2-s1, d0	EN 520
	9 mm Norgips Weatherboard		A2-s1, d0	EN 520
	Gyproc GTS 9			
	Products with SINTEF Technical approval for current application			
Claddings and linings				
External cladding	19 mm solid wood cladding grade A according to EN 15146	-	D-s2, d0[5]	EN 14915 EN 14519 EN 15146
	Products with SINTEF Technical approval for current application			
Internal lining	Gyproc GFL 15		A2-s1, d0	EN 520
	Norgips humidboard (GM-H2)		A2-s1, d0	EN 520
	Gyproc GN		A2-s1, d0	EN 520
	Norgips GKB 13 mm		A2-s1, d0	EN 520
	Norgips Hard 13 mm		A2-s1, d0	EN 520
	Norgips Floor 15 mm		A2-s1, d0	EN 520
	Norgips GKF 12.5 and 15 mm		A2-s1, d0	EN 520
	Products with SINTEF Technical approval for current application			
Insulation				
Mineral wool	Isover Premium 33	-	A1	EN 13162
	Paroc extra / Ultra stone wool		A1	
	Products with SINTEF Technical approval for current application			
Sealing insulation	Isover SK-C, glasswool		A2-s1, d0	
	Isover KH		A1	
	Products with SINTEF Technical approval for current application			
Sound insulation	Isover FIO		A2-s1, d0	
	Products with SINTEF Technical approval for current application			
Floor plates for waterborne floor heating	Tycroc UHP		B	EN 13164
	Products with SINTEF Technical approval for current application			
Membranes and sealings				
Wind barrier, and subroofing roll product	Dupont Tyvek, Tyvek Solid 2480B		-	EN 13859-2
	Products with SINTEF Technical approval for current application			
Water vapour control layer	Kalliomuovi LDPE film			EN 13984
	Products with SINTEF Technical approval for current application			

Material / component	Spesification [1]	TG/PS [2]	Fire classification [3]	CE-marking [4]
Roofing	Products with SINTEF Technical approval for current application			
Tape	Siga Nail sealing tape			
	Products with SINTEF Technical approval for current application			-
Sealants	Tectis svillemembran			
	Isola Svillemembran			
	Soudal Flexifoam			
	Fibo Seal			
Fastener products				
Nails / screws	Screws, nails and metal fastenings from ITW, Essve, Hilti, Simpson Strongtie, Paslode. shall have hot dip zinc coating or equal effective corrosion protection for external use	-	-	EN 14592
Steel connectors	ITW, Simpson Strongtie			
Glues	LOCTITE HB S209 PURBOND		-	-
	Kiilto B3 Wood adhesive			
Wet rooms				
Hydroisolation	Kiilto Kerasafe +	TG 20672		
	Casco Wetstop foliemebran	TG 20750		
	Products with SINTEF Technical approval for current application			
Cladding walls	Fibo baderomspanel	TG 2289		
	Products with SINTEF Technical approval for current application			
PVC for wet rooms	Tarkett Tarko dry wet room system	TG 2598		
	Protan G PVC wet room system	TG 2437		
	Products with SINTEF Technical approval for current application			
Water pipes	Uponor tappevannssystem PEX	TG 20013		
	Products with SINTEF Technical approval for current application			
Drain pipes	Uponor HTP PP drain pipes and fittings			
	Unidrain gulvavløpssystem	TG 2552		
	Products with SINTEF Technical approval for current application			
Joint sealant	Fibo seal			
Tile grout	Kiilto Lattiasaumalasti			
	Kiilto Saumalaasti			
Levelling layer /floor mortar	Kiilto Kestonit Thermo			
Plasters	Kiilto Kerapid DF			
Cementious adhesive	Kiilto Flexfix			
	Kiilto Fiberglass Mesh			
	Kiilto 70			
Miscellaneous				
Sound isolation barriers	Sylodyn and Sylomer trinnlyddempere	TG 20682		
	Products with SINTEF Technical approval for current application			
Sound isolation brackets	Gyproc AP 25			
	Kauf AP			
Windows / doors	Windows and doors are not part of the approval, but products installed in the modules shall satisfy the requirements for thermal insulation and tightness in the technical regulations for construction works (TEK)			

[1] Dimensions not specified in the table shall be stated in "Standard construction details belonging to TG 20360" or according to specifications given for each individual building project

[2] The component shall be in accordance with the specified SINTEF Technical Approval (TG) or SINTEF Product Certificate (PS)

[3] Fire classification according to EN 13501-1, for applications according to "Standard construction details"

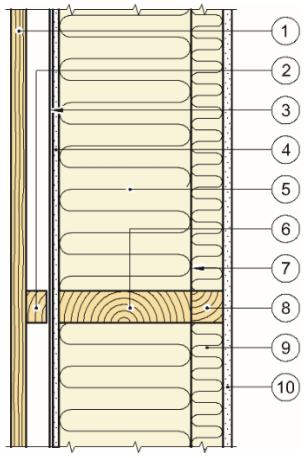
[4] The component shall be CE-marked according to the specified standard or ETA

[5] The given reaction to fire classification is only valid for untreated wood cladding.

2.3 External walls

Fig. 2 shows the principal design of standard external walls. The elements are storey-high and the length is adjusted to suit the house type and/or to facilitate transport.

External wall elements are normally delivered to the building site with exterior cladding, wind barrier, insulation and water vapour barrier, and with windows and possible doors installed at the factory. The walls are made with a total thermal insulation thickness from 190 mm (145+45) to 290mm (245+45) as required. Internal battens, insulation and lining inside the water vapour barrier is normally executed on the building site and are dependent on fire and sound requirements.

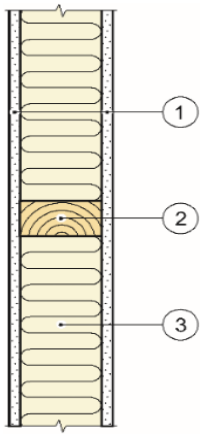


1	External cladding	6	Studs 45 mm x 195/245 mm c/c 600 mm
2	Battens c/c 600 mm	7	Vapour barrier
3	Wind barrier roll product	8	Battens
4	Wind barrier gypsum board	9	Mineral wool
5	Mineral wool	10	Internal lining

Fig. 2
Principle design of external walls with horizontal cladding.

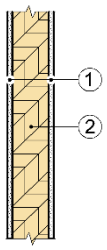
2.4 Internal walls

Fig. 3 shows the principle design of standard internal walls. The principle design of internal partition walls comprises min. 42 mm x 66 mm studs of structural timber spaced c/c 600 mm, with a layer of internal lining on each side. The elements are storey-high with lengths adjusted to suit to the house type and floor plan. The walls are normally insulated with mineral wool, and stud dimension suited for possible load bearing requirements. Dimension of studs and internal lining vary according to need for space for installations, load bearing, fire resistance and sound insulation.



1	Internal lining
2	Studs 42/45 mm x 66/…/245 mm
3	Mineral wool

Principle design of internal load bearing and non load bearing wall.

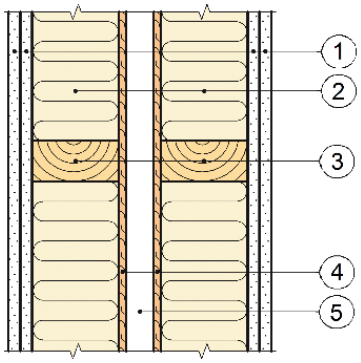


1	Internal lining
2	Cross laminated timer panel min 80 mm

Fig. 4
Principle design of internal load bearing walls of CLT

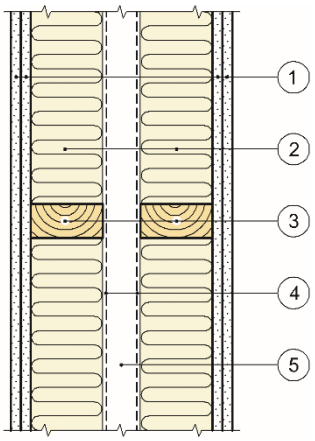
2.5 Separating walls between apartments.

Fig. 5, 6 and 7 shows the principle design of walls between separate apartments, based on storey-high wall elements installed as double walls. The principle design of separating walls comprises min 45 mm x 95 mm studs of structural timber spaced c/c 600 mm. The elements are assembled in the factory, the internal linings are mounted as part of the onsite element assembly. Dimensions and c/c of studs are according to static calculations. Internal lining according to fire and sound requirements.



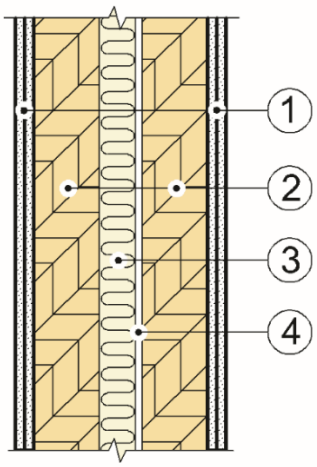
1	Internal lining layers	4	OSB, particle board, plywood
2	Rockwool insulation	5	Min 30 mm airgap
3	45 x 95…245 mm studs min c/c 600 mm		

Fig. 5
Principle design of separating wall housing units



1	Internal lining layers	4	Wind barrier film or steel mesh
2	100 …250 mm rockwool	5	Minimum 30 mm void
3	45 x 95…245 mm studs c/c 600 mm		

Fig 6
Principle design of separating wall housing units



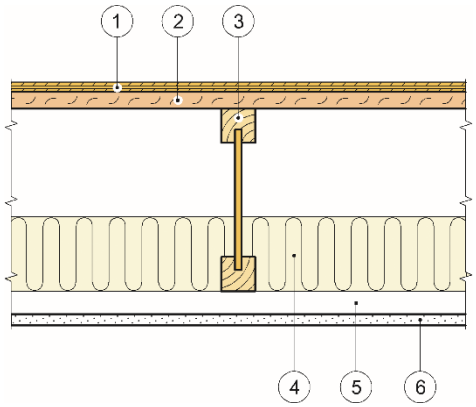
1	Internal lining layers	3	50 mm Rockwool
2	Cross laminated timber panels min 90 mm	4	10 mm air gap

Fig. 7
Principle design of separating walls between housing units

2.6 Floors

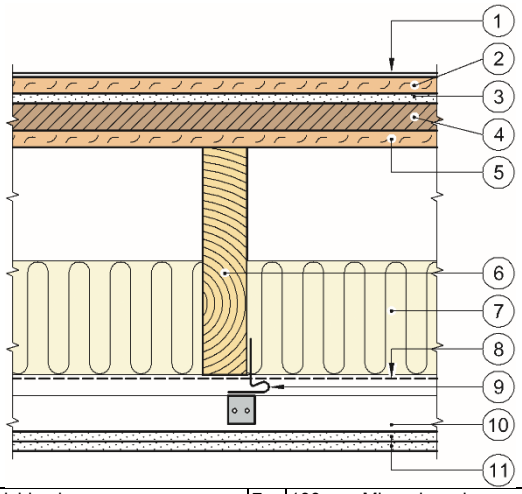
Fig. 8 shows the principle design of floating floors inside the same housing unit. The length is adjusted to suit the house width. The elements are normally delivered on-the building site with joists, floor sheathing (subfloor) and to some extent insulation, while further completion is carried out on the building site. For floors between separate apartments, see fig 9, the elements are supplemented with a floating floor on top and a ceiling construction as recommended in SINTEF Building Research Design Guide 522.511.

Standard floors are designed for stiffness in accordance with SINTEF Building Research Design Guide 522.351 unless no other specification is made for each specific building project.



1	Flooring	4	Mineral wool
2	Floor sheathing	5	Battens
3	Joist c/c 600 mm	6	Ceiling lining

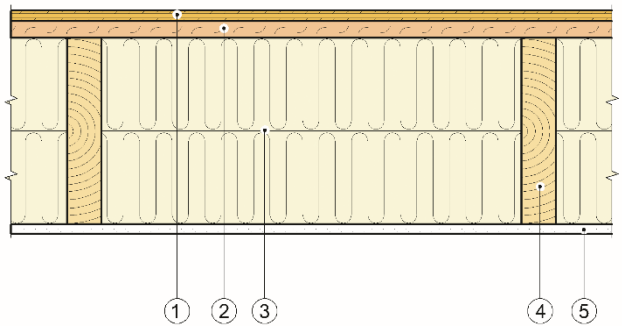
Principle design of suspended floor inside a housing unit



1/2	Finishing layer	7	100 mm Mineral wool
3	Gypsum	8	28x70 battens
4	Impact sound insulation 20 ...50 mm	9	Acustic metal profile battens
5	Floor sheathing	10	Battens
6	Joist according to static calculations	11	Ceiling layers

Fig. 9
Principle design of floor between housing unit

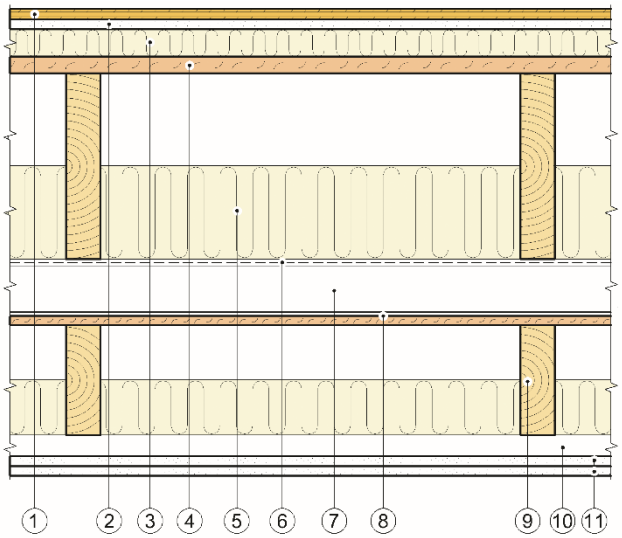
Fig 10 shows principle design of flooring above foundation. The floors are normaly delivered to the building site with joists, floor sheathing (subfloor), insulation, windbarrier film if required and windbarrier boards. While further completion is carried out on the building site. The load bearing frame are of structural timber, gluelam, I-joist or LVL according to static and U-value calculations.



1	Flooringt	4	joist c/c 600 mm
2	Floor sheathing	5	Wind barrier board
3	Min 200 mm mineral wool		

Fig. 10
Principle design of floor above foundations

Fig 11 shows principle design of flooring in modules. The floor is constructed as a load bearing frame of structural timber, gluelam or LVL according to structural calculations. Ceiling lining and floor layers are specified for each project according to sound and fire requirements.



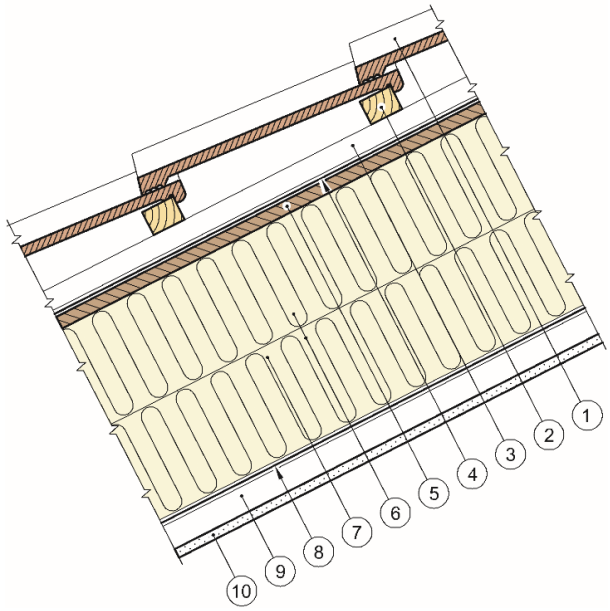
1	Finishing layer	7	45 mm airgap
2	Floor layers	8	Chipboard P5 / OSB 3
3	Impact sound insulation	9	Timber frame and 100 mm mineral wool
4	Floor sheating	10	Battens or acoustic profiles
5	Load bearing frame + 100 mm insulation	11	Internal lining
6	Steel net		

Fig. 11
Principle design of floor between modules

2.7 Roof elements

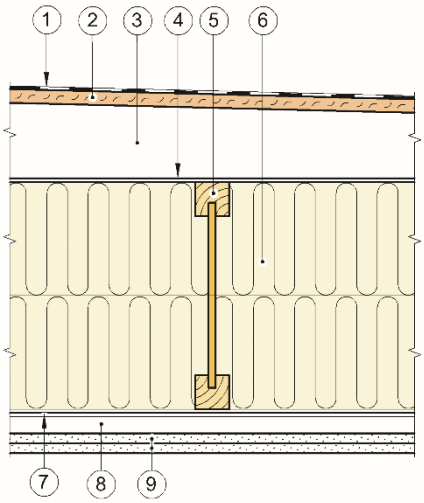
Fig. 12 shows the principle design of roof elements. The load-bearing structure is based on rafters of structural timber, gluelam or LVL c/c 600 mm, as indicated in Table 1. Dimension of the rafters are according to structural and U-value calculations. Ceiling layers are specified to each project according to fire requirements.

The roof elements are normally delivered on the building site with battens, counter battens, combined roofing underlay and wind barrier, thermal insulation and water vapour barrier.



1	Roofing cover	6	Insulation
2	Battens	7	Vapour barrier
3	Ventilation battens	8	Battens c/c 300 mm
4	subroofing	9	Internal lining
5	Rafters	10	

Fig. 12
Principle design of insulated roof elements



1	Roofing layer	6	Insulation
2	Chipboard P5 or OSB 3	7	Vapour barrier
3	Inclined ventilation battens	8	Battens c/c 300 mm
4	Subroofing	9	Internal lining
5	Load bearing frame		

Fig. 13
Principle design of roof structure over modules

2.8 Construction details in general

It is presumed that assembly and construction details for Timbeco elements which are not covered by "*Standard construction details for Timbeco Building System pertaining to SINTEF Technical Approval TG 207100*" are in accordance with the relevant recommendations in the SINTEF Building Research Design Guides. The Version of the construction details filed at SINTEF at any time is a formal part of the approval.

3. Fields of application

Timbeco Building System can be used for buildings in risk class 1-6 in fire class 1 and 2.

The building system is primarily assessed for use as housing.

The building system is only evaluated for use in the risk classes and fire class as stated here, other use is not covered by the approval. Use of the product in other buildings or other fire class with stricter requirements and pre accepted performances than given for housing in TEK 17 with guideline must be considered separately in each case. See chap. 6 regarding special conditions for use and installation.

4. Properties

4.1 Load-bearing capacity

The structural capacity of load-bearing elements is calculated separately in full for each individual building project in accordance with NS-EN 1995-1-1 with national annex NA, and NS-EN 1991-1-1, 3 and 4 with national annexes NA for imposed loads, snow loads and wind loads.

4.2 Reaction to fire

Reaction to fire classifications according to EN 13501-1 for products included in Timbeco Building System are given in Table 1. The classification is valid for the current field of application.

4.3 Fire resistance

The fire resistance for the elements are given in Table 2. The fire resistance is determined by calculations based on the handbook *Brandsäkra Trähus versjon 3* and EN 1995-1-2. The given fire resistance is only valid for the specified constructions as given in figure 2 – 12, "Standard construction details for Timbeco Building System" and materials as given in Table 1.

For constructions not mentioned in table 2, fire resistance must be calculated according to *Brandsäkra Trähus versjon 3* and EN 1995-1-2 , or relevant and valid SINTEF design guides.

The fire resistance is determined for one-sided fire exposure from the inside for external walls, and fire exposure from below for floors and roofs. For internal walls the fire resistance is determined for one-sided fire exposure, unless otherwise stated in Table 2

Design load capacity for limit state fire is given as maximum centric axial load per metre wall (kN/m with c/c 600 mm between the studs). Design load capacity for limit state fire for single span floors and roofs is given as maximum bending moment (kNm) per beam. *Full capacity* means that the cladding protects the structural timber from charring during the fire exposure period. The design for the load-bearing structure determined for the ultimate and serviceability limit states will therefore be decisive

Table 2
Timbeco Building System – Fire resistance and design load capacity for limit state fire

Structure and internal lining	Fire resistance [1)]	Design load capacity [2)]
External walls, fig. 2		
-12.5 mm gypsum type A - 195 mm mineral wool	REI 15	Full capacity
-12.5 mm gypsum type A - Studs min. 45x195 mm c/c 600 mm - 195 mm Rockwool	REI 30	19.1 kN/m
- Double layer of 12.5 mm gypsum board type A - 195 mm mineral wool	REI 30	Full capacity
-One layer 12.5 mm gypsym board type A + one layer 15 mm gypsum board type F - Studs min. 45x195 mm c/c 600 mm - 195 mm mineral wool	REI 60	20.9 kN/m
Internal walls, two sided fire, fig. 3 and 4		
-12.5 mm standard gypsum board - 95 mm mineral wool	R 15	Full capacity
-Double layer of 12.5 mm standard gypsum board - 95 mm mineral wool	R 30	Full capacity
-One 12.5 mm gupsym board type A + one layer 15 mm gypsum board type - Studs min. 45x145 mm c/c 600 mm - 145 mm mineral wool	R60	14.2 kN/m
Internal walls, fig. 3 and 4		
- Double layer of 12.5 mm standard gypsum board - 95 mm mineral wool	REI 30	Full capacity
-12.5 mm gypsym board type A + 15 mm gypsum board type F - Studs min. 45x95 mm c/c 600 mm - 95 mm mineral wool	REI 60	7.3 kN/m
Separating walls between house units, fig. 5 and 6		
- Double layer of 12.5 mm gypsum board type A - 2 x 95 mm mineral wool	REI 30	Full capacity
- 12.5 mm gypsum board type A + 12 mm OSB - Studs min. 45x95 c/c 600 mm - 95 mm Rockwool	REI 30	7.7 kN/m 3)
- 15 mm gypsum board type F + 12.5 mm gupsym board type A - Studs min. 45x95 mm c/c 600 mm - 2 x 95 mm mineral wool	REI 60	7.8 kN/m [3)]

Structure and internal lining	Fire resistance [1]	Design load capacity [2]
- 15 mm gypsum board type F + OSB 12 - Studs min. 45x95 mm c/c 600 mm - 2 x 95 mm mineral wool	REI 60	5.6 kN/m [3]
11 mm Huntonit MDF + 12.5 mm gypsum board type A - Studs min. 45x95 mm c/c 600 mm - 2 x 95 mm mineral wool	REI 30	9.0 kN/m [3]
11 mm Huntonit MDF + 15 mm gypsum board type F - Studs min. 45x95 mm c/c 600 mm - 2 x 95 mm mineral wool	REI 60	3.8 kN/m [3]
Floor inside house units, fig. 8		
- 12.5 mm gypsum board type A - 95 mm mineral wool	REI 15	Full capacity
- Double layer of 12.5 mm gypsum board type A - 95 mm mineral wool	REI 30	Full capacity
Floor between house units, fig. 9		
- Double layer of 12.5 mm gypsum board type A - 95 mm mineral wool	REI 30	Full capacity
- Double layer of 15 mm gypsum board type F - 95 mm mineral wool	REI 60	Full capacity
Floor between house units, moduls, fig. 11		
- One layer of 12.5 mm gypsum board type A - Joists min. 45x245 mm c/c 600 mm - 95 mm Rockwool	REI 30	7.8 kNm [4]
- Double layer of 12.5 mm gypsum board type A - Joists min. 45x245 mm c/c 600 mm - 95 mm Rockwool	REI 60	4.3 kNm [4]
Roof, fig 12/13		
- Double layer of 12.5 mm gypsum board type A - 300 mm mineral wool	REI 30	Full capacity
- Double layer of 15 mm gypsum board type F - 300 mm mineral wool	REI 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.
[3] Design load capacity for each individual wall leaf
[4] The insulation must be held in place

4.3 Sound insulation

With separating wall and floor construction as described in chap. 2, and with construction details for connections as indicated in "*Standard construction details for Timbeco Building System pertaining to SINTEF Technical Approval TG 20710*", the sound insulation properties in accordance with EN ISO 16283-1 and -2 as well as EN ISO 717-1 and -2, are expected to be as indicated in Table 3a and 3b for completed house constructions. The sound insulation depends also on the installation of technical service components like pipes, ducts etc., and must be assessed case by case in each building project.

Table 3a Sound insulation for floors

Floors				Estimated, weighted apparent sound reduction index dB	Estimated weighted normalised impact sound pressure level, dB
	Framework	Ceiling	Construction above frame	R'_w	$L'_{n,w}$
Fig 10	22 mm particleboards, Joists ≥ 300 mm, ≥ 100 mm min.wool	Acoustic-profil with 2 x 13 gypsum type A	Flooring 2 x 15 mm floor gypsum 36 mm Silencio	≥ 57	≤ 53
Fig 10	22 mm particleboards, Joists ≥ 400 mm, ≥ 200 mm min.wool	Acoustic-profile with 2 x 15 gypsum type F	flooring 2 x 15 mm floor gypsum 36 mm Silencio	≥ 58	≤ 52
Fig 11	22 mm particleboards, Joists ≥ 300 mm, ≥ 100 mm min.wool gap 45 mm	[1] Battens and 2 x 13 gypsum type A	Flooring 1 x 15 mm floor gypsum Acoustic plate, 36 mm Silencio	≥ 58	≤ 53
Fig 11	22 mm particleboards, Joists ≥ 300 mm, ≥ 100 mm min.wool gap 45 mm	[1] Acoustic-profile og 2 x 13 gypsum type A	Flooring 2 x 15 mm floor gypsum Acoustic plate, 36 mm Silencio	≥ 60	≤ 50

[1] Separate ceiling element with 12 mm OSB ≥ 120 mm beams with 100 mm min. wool

Table 3b
Sound insulation for internal walls

Walls				Estimated weighted normalised impact sound pressure level,
	Framwork / CLT	Gap	Lining	R'_w
Fig 2	Joint sill and stud, 66 mm	50 mm min.wool	1 x 13 gypsum both sides 2 x 13 gypsum both sides	≥ 35 ≥ 40
Fig 3	Joint 95m sill, with 66 mm displacement between studs	100 mm min.wooll	1 x 13 gypsum both sides 2 x 13 gypsum both sides	≥ 44 ≥ 50
Fig 3	Joint sill and stud, 95 mm	100 mm min.wool	2 x 13 gypsum both sides 3 x 13 gypsum both sides	≥ 40 ≥ 43
Fig 4	≥ 80 mm CLT	-	1 x 13 gypsum both sides 1 x 13 gypsum type A and 1 x 15 gypsum type F both sides	≥ 32 ≥ 35
Fig 6	Two separate 95 mm stud walls, ≥ 30 mm air gap	2 x 100 mm rockwool with barrier againts airgap	1 x 13 gypsum type A and 1 x 15 gypsum type F both sides 2 x 13 gypsum type A and 1 x 15 gypsum type F both sides Wood based panel 12 + gypsum 13 on both sides Gypsum 13 + Wood based finishing panel on both sides	≥ 58 ≥ 60 ≥ 55 ≥ 55
Fig 7	Two separate walls ≥ 90 mm CLT	50 mm rockwool + 10 mm airgap	1 x 13 gypsum type A and 1 x 15 gypsum type F both sides 2 x 15 gypsum type F both sides	≥ 55 ≥ 57

5.4 Thermal insulation
Table 4 shows thermal transmittance values, U-values, for standard module designs described in chap. 2, calculated according to EN ISO 6946. U-values for external walls are based on 15 % timber proportion, and do not include thermal loss due to extra timber around door and window openings. The values apply to a spacing of c/c 600 mm for studs, joists and rafters.

Table 4

Structure, with structural timber spaced c/c 600 mm	Total insulation thickness mm	U-value W/(m²K) λ_D = 0,035	U-value W/(m²K) λ_D = 0,033
External wall fig 2			
Studs-			
- 45 mm x 145 mm + 45 mm framing -	195	0.22	0.22
45 mm x 195 mm + 45 mm framing	245	0.18	0.17
45 mm x 245 mm + 50 mm framing	295	0.15	0.15
Roof elements fig 12			
Rafters			
-- 300 mm framing	300	0.15	0.14
- 350 mm framing	350	0.13	0.12
400 mm framing	400	0.11	0.11
450 mm framing	450	0.10	0.10
Floor elements fig 10			
Frame			
195 mm framing	195	0.22	0.21
245 mm framing	245	0.18	0.17
350 mm framing	350	0.13	0.12

5. Environmental aspects

5.1 Substances hazardous to health and environment
The components in Timbeco Building System contain no hazardous substances with priority in quantities that pose any increased risk for human health and environment. Chemicals with priority include CMR, PBT or vPvB substances.

The health and environmental evaluation do not include the surface treatment of outdoor wood panelling.

5.2 Effect on indoor environment
The component in Timbeco Building System is not regarded as emitting any particles, gases or radiation that have a perceptible impact on the indoor climate, or to have any significant impact on health.

5.3 Waste treatment/recycling
The components in Timbeco Building System shall be sorted as wood, metal, gypsum, residual waste or other appropriate waste fractions. The product shall be delivered to an authorized waste treatment plant for material recovery, energy recovery or disposal.

5.4 Environmental declaration
No environmental declaration (EPD) has been worked out for Timbeco Building System.

6. Special conditions for use and installation

6.1 Structural design
For each delivery a full structural calculation of the necessary load-bearing capacity of the elements shall be worked out and documented according to NS-EN 1995-1-1 with loads according to EN 1991-1.

6.2 Safety in case of fire
For each building project, the required fire resistance according to TEK shall be determined specifically for building parts that shall have load bearing and/or fire separating properties. The required design load capacity at limit state fire must be controlled against the capacities given in Table 2. Choice of construction is made based on the required fire resistance

Products for internal and external surfaces, behind ventilated claddings, insulation etc. must be chosen based on pre-accepted performances given in the guideline to TEK. The need for special measures to prevent spread of fire on facades must be evaluated for each building project.

Cladding for internal lining shall be installed according to the suppliers fitting instructions and the principles in *SINTEF Building Research Guide 543.204*.

Penetrations through building parts with fire resistance, and connections between building parts, must not reduce the fire resistance performance of the building parts. See *SINTEF Building Research Guide 520.342*.

The insulation in roof and floor that does not reach full design load capacity must be held tight by a wire with minimum diameter of 1.5 mm, and minimum tree wires per insulation board and max distance c/c 350 mm. Alternatively, a wire net with wire diameter minimum 1.5 mm can be stretched out up under the beams. The wire net must be fastened with minimum 50 mm long cramps.

Shafts for technical installations must be designed with fire resistance equivalent to the required fire resistance for the building, or with a fire rated penetration seal in the fire separating building part.

6.3 Insulation
Beyond what is stated in chapter 5.4 the necessary thermal insulation and U-values according to TEK shall be determined and verified for each individual building project.

6.4 Installation
The elements shall be installed as shown in "*Standard construction details for Timbeco Building System pertaining to SINTEF Technical Approval TG 20710.*"

Anchoring to foundations and connections between the elements shall be carried out according to the structural design for the required wind load resistance in the specific building project. Special attention must be paid to temporary load situations during erection of the building that may lead to reduced load-bearing capacity or other functions.

6.5 Transport and storage
Finished elements and moduls must be protected from exposure to precipitation during both transport and storage.

7. Factory production control

The factory production of Timbeco Building System is subject to supervisory factory production and product control according to contract with SINTEF Building and Infrastructure concerning SINTEF Technical Approval.

8. Basis for the approval

The evaluation of "*Timbeco Building system*" is based on reports owned by the holder of the approval and relevant SINTEF Design Guides.

9. Marking

Each delivery must be accompanied by documents comprising as a minimum the manufacturer's name and address, project identification, time and date of manufacture, assembly instructions, as well as specific construction details and assembly instructions that comply with the "*Standard construction details for Timbeco Building System belonging to SINTEF Technical Approval TG 20710*". The approval mark for SINTEF Technical Approval No. 20710 may also be used.

for SINTEF

Hans Boye Skogstad
Approval Manager