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European Technical Assessment

ETA 20/0371
11/04/2023

General Part

Technical Assessment Body issuing the ETA: Kiwa Nederland B.V.	
Trade name of the construction product	PhoneStar - Soundproofing board & soundproofing dry screed PhoneStrip - Sound decoupling load bearing strip
Product family to which the construction product belongs	Soundproofing boards/dry screed and load bearing strips made of corrugated cardboard filled with quartz sand
Manufacturer	Wolf Bavaria GmbH Gutenbergstraße 8 D-91560 Heilsbronn, Germany www.wolf-bavaria.com
Manufacturing plant(s)	Plant 1, Plant 2
This European Technical Assessment contains	88 pages including 8 Annex(es) which form an integral part of this assessment
	Annex H 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 210134-00-1202
This version replaces	ETA 20/0371, version 01 issued on 01/05/2020

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Specific parts

1. Technical description of the product

PhoneStar boards, PhoneStar Schalli strips and PhoneStrip strips are made of water resistance corrugated cardboard. Hollow spaces filled with a mixture of dry quartz sands; the cutting edges are closed by an adhesive tape. Regarding PhoneStrip, at least the cardboard is laminated or coated with Polyethylene (PE), Polypropylen (PP), Polyvinylchlorid (PVC) or Aluminum at one side. Or any other film product.
PhoneStar boards are used as sound insulation and dry screed in floors, as like as sound insulationin walls, ceilings, roofs.

PhoneStar Schalli strips are nonload bearing sound decoupling strips for floors to stableing edge areas, doorways, and corners at soft impact sound insulation layers. PhoneStar Schalli can be screwed or dowled at walls and ceilings for decoupling PhoneStar boards or plaster boards.

PhoneStrip are used as sound decoupling and load bearing component or for in floor, walls, ceilings, roofs, under stairs and under machines.

In general, there are two different types of PhoneStar:

PhoneStar Twin PhoneStar ST Twin PhoneStar Plus Twin PhoneStar 9, 10, 20 PhoneStar Schalli 10, 20	PhoneStar Tri PhoneStar ST Tri PhoneStar Plus Tri PhoneStar 12,5, 15, 25, 30, 35, 40 PhoneStar Schalli 12,5, 15, 25, 30
	
Thickness 9-20 mm Two or four waves in one direction	Thickness 12,5-40 mm Three, four or six waves in one direction

In general, there are different types of PhoneStrip, PhoneStrip 2000:
Thickness 9-30 mm; two, three, four, five or six waves in one direction. At least one side laminated with Polyethylene (PE), Polypropylen (PP), Polyvinylchlorid (PVC) or Aluminum. Or any other film product.

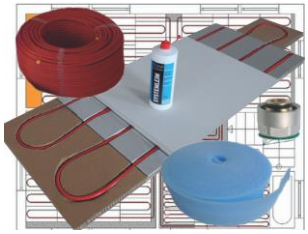
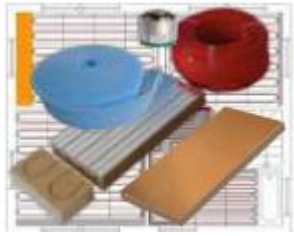
1.1 Components

The components mentioned in table 1 are shall be used for PhoneStar boards or PhoneStrip and constructions as decribed in this ETA.

Table 1 - Related components

Product	Picture	Description
Wolf Tape for PhoneStar Twin and Tri		Taping cutting edges of PhoneStar

Product	Picture	Description
Wolf Tape for PhoneStar ST Twin and ST Tri		Taping cutting edges of PhoneStar ST
Wolf Tage for PhoneStar Plus Tri and Twin		Taping cutting edges of PhoneStar Plus
Wolf Tape for PhoneStrip Blue and Black		Taping cutting edges of PhoneStrip
Wolf System Glue Bottle 1,1 kg Approx. 10 m² a bottle		Gluing plasterboards on PhoneStar at different systems solutions. Or gluing PhoneStar together.
Wolf Gap filler		Seal PhoneStar joints to the flanking components
Wolf Parquet Glue **1 K PUR**		Gluing PhoneStar on concrete floors
Wolf Roll Glue		Gluing PhoneStar layers together, Wolf Power Floor on PhoneStar, PhoneStar on solid floors
Wolf decoupling plate 1000 x 600 x 4 mm		It s used for decopling tiles and natural stones from PhoneStar plates and Wolf Power Floor under floor heating system.
Wolf Protect woodfiber 1200 x 800 x 4 mm		Wolf protect getting laid on filler or bounded split before PhoneStar getting installed.
Wolf sperating layer		It is used between Wolf Power Floor underfloor heating and dry screed.

Product	Picture	Description
Wolf Hugo dry screed		Dry screed made of gysum
Wolf Power Floor Slim system **Pipe distance in 125 mm**		Underfloor heating made of Aluminumfloil and cardboard. Can be used for walls and ceilings
Wolf Power Floor Light system **Pipe distance in 125 mm or 250 mm**		Underfloor heating made of Aluminum and cardboard. Can be used for walls and ceilings
Wolf Power Floor Nature system **Pipe distance in 125**		Underfloor tempering made of cardboard. No Aluminium.
Wolf Power Floor Öko Plus system **Pipe distance in 125 mm or 250 mm**		Underfloor heating made of Aluminum and cardboard. Can be used for walls and ceilings
Wolf Tack Underfloor heating system for wet screeds		Underfloor heating system for wet screeds
Wolf System Dowel Box: 50 / 250 pcs. Dimensions: 6 x 60, 6 x 80, 8 x 100 mm Consumption: 12 pcs. / plate		Direct installing PhoneStar on masonry walls
Gypsum screw Dimension: 5,5 x 38 mm Box: 500 pcs.		Fixing a plasterboard onto PhoneStar
Timber Screw Dimension: 3,9 x 35 mm Box: 1000 pcs.		Fixing PhoneStar boards onto timber constructions

Product	Picture	Description
Metal Screw Dimension: 3,9 x 35 mm Box: 1000 pcs.		Fixing PhoneStar boards onto metal constructions.
Gypsum fibre Screw Dimension: 3,9 x 22 mm Box: 1000 pcs		Fixing Plasterboard onto PhoneStar in connection with Wolf System Glue.
Decoupling Clips **TPS 25 Protector or product 56393**		Acoustic decoupling system for timber ceilings and concrete ceiling
Angel plate 30°	 	Used for a powerful easy fixing for CLT elements

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

2.1 Intended use

PhoneStar boards are non-load bearing boards for planking and lining of building components. PhoneStar boards are only to be used as additional panel(s) behind the surface panel of internal floors, walls and ceilings in order to improve acoustic performance. PhoneStar boards cannot be the final layer. On top of floors, PhoneStar needs an end surface or dry screed, underfloor heating elements or wet screed. On walls, ceilings and roofs it is necessary to screw and or glue any kind of plaster, cement boards, wood planks or wood based panels on top of PhoneStar.

PhoneStar Schalli strips are nonload bearing sound decoupling strips for floors to stableing edge areas, doorways, and corners at soft impact sound insulation layers. PhoneStar Schalli can be screwed or dowled at walls and ceilings for decoupling PhoneStar boards or plaster boards.

PhoneStrip strips are load bearing strips for sound decoupling of all kind of building components and machines. If a fixing of walls and floors is necessary through PhoneStrip, any conectors and screws who are available on the market can be used. PhoneStrip is able to absorb vertical loads.

Examples of application areas of PhoneStar boards are mentioned in Annex A.
Examples of application areas of PhoneStrip strips are mentioned in Annex B.

2.2 Intended working life

The intended working life of the PhoneStar boards and PhoneStrip strips is assumed to be endless provided that:

- PhoneStar / PhoneStrip are used in dry conditions:
  - a mean air temperature in the range from 5 °C to 35 °C with a minimum of 0 °C and a maximum of 50 °C;
  - a mean daily air relative humidity (RH) in the range of 20 %RH to 75 %RH. Maximum air relative humidity may only exceed 85 %RH for short periods of time. Rain during assemblytime does not matters.
- PhoneStar / PhoneStrip stays the products works are properly processed;
- the assembly of PhoneStar / PhoneStrip is performed as per installation guide, under normal site conditions, by adequately trained installers;
- minor damages are repaired or damaged elements are replaced (for example damage caused by impact).

The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded as a means for choosing the right product in relation to the reasonable expected working life of the works.

2.3 Packaging, transport and storage

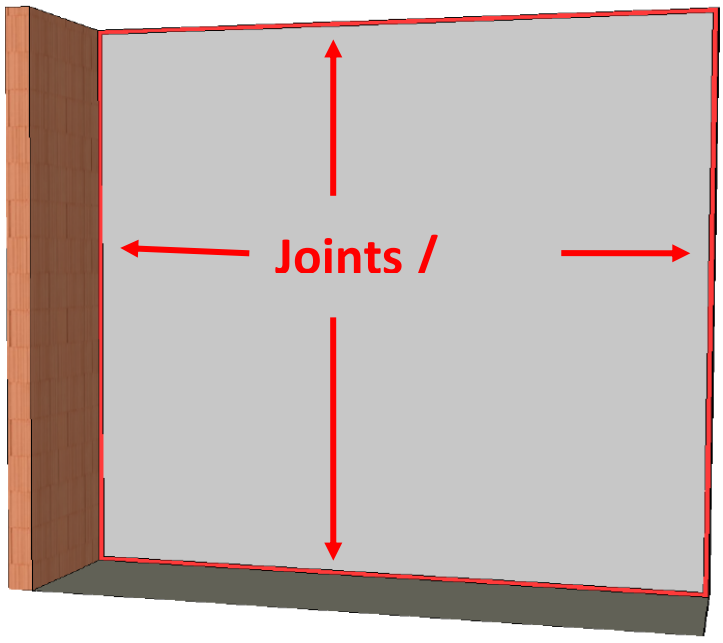
The PhoneStar boards are strapped on pallets encased in a thick corrugated cardboard box structure, which is placed over the product. PhoneStar shall be handled and stored with care and be protected from accidental damage. The PhoneStar boards must be protected from moisture during transport, storage and installation. The product should be stored flat, under cover, in dry well ventilated conditions inside. Protect PhoneStar from direct sunlight when stored over a long period of time.

2.4 Cutting to size

Cut PhoneStar boards and PhoneStrip on a stable working table with a circle saw or a jigsaw or a cutting knife and take care of general working protection. After cutting PhoneStar, the cutting edges must be sealed with Wolf Bavaria PhoneStar Tape. In order to maintain the Wolf Bavaria guarantee, only appropriate Wolf Tape may be used. See table 1 for the appropriate tapes for PhoneStar boards and PhoneStrip.
For further clarification see Annex C, PhoneStar – Cutting and Taping.

2.5 Use, maintenance and repair

Before installing PhoneStar boards the house or building must be protected by floor, walls, roofs, windows and front doors which prevent infiltration and penetration of rain, snow etc. and of groundwater.
Check temperature and humidity and make sure they are in range of manufactures guidelines and this document. Measured values shall be documented!
The PhoneStar boards must be acclimatised before use. At least 24 hours or even more!
Protect PhoneStar from direct sunlight in the long run.
When doweling or screwing the PhoneStar boards on the construction, make sure that the label is facing inside the room (label shall be on the visible side).
Start installing PhoneStar in a bottom corner and dowel or screw and or glue the PhoneStar board on the construction. Avoid cross joints!
Make sure that the plasterboard does not touch any flanking elements. Leave there a joint between 2 – 3 mm and seal the joints with Wolf joint filler. This improves the airborne sound insulation.
The plasterboard needs a 3 mm joints to all flanking components. Seal the flanking joints with acryl or silicon (see red line in the picture below).

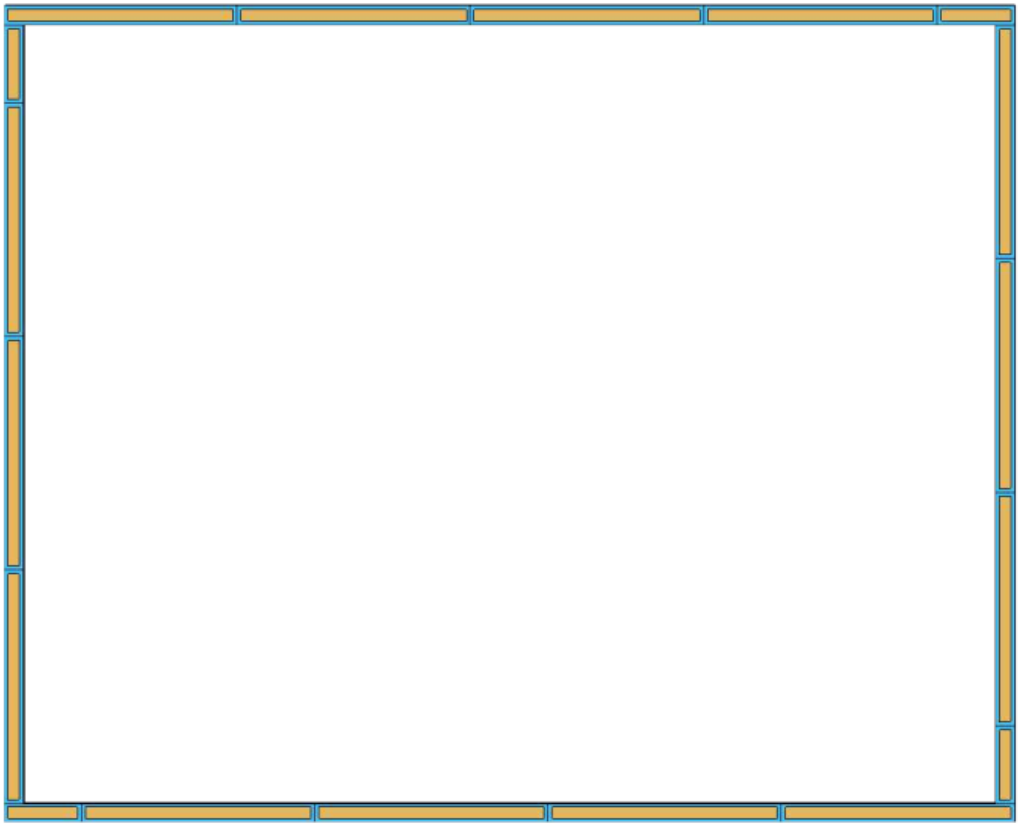


PhoneStar cannot be used as final layer. It is necessary to screw and or glue any kind for final board like a plaster or cement boards or wood panels or wood based panels on top of PhoneStar.
After installing the Plaster board on PhoneStar, the Plaster boards shall be finished in accordance with the processing instructions by the manufacturer of the Plaster boards used.
Recommendations on maintenance and repair

Small damages on surfaces or edges can be sealed with Wolf Tape only. Before small damages on PhoneStar boards are sealed, make sure the channels are still filled with sand. In order to maintain the properties of PhoneStar boards, the channels shall be refilled with silicon sand when necessary.

For further information: please see the latest instruction manual of Wolf Bavaria GmbH under www.wolf-bavaria.com.

PhoneStrip strips can be nailed, glued, screwed or stapled on top of walls where ceilings or floors will be placed or on floors where the walls getting placed for the next floor. It is important that the laminated side is facing to the outside or weather side. Assembly on buildingside during rain doesn't matter to PhoneStrip.



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

3.1 BWR 2 – Safety in case of fire

3.1.1 Reaction to fire

PhoneStar and PhoneStrip are tested in accordance with EN 13501-1 and classified Class E.

3.1.2 Propensity to undergo continuous smouldering

PhoneStar and PhoneStrip are tested in accordance with EN 16733. PhoneStar and PhoneStrip do not show propensity to undergo continuous smouldering

3.2 BWR 3 – Hygiene, health and the environment

3.2.1 Water vapour permeability

3.2.1.1 PhoneStar boards

The water vapour resistance factor μ according to EN ISO 12572:

- PhoneStar 10 mm = 17;
- PhoneStar 15 mm = 14.

3.2.2 PhoneStrip strips

No performance assessd.

3.3 BWR 4 – Safety and accessibility in use

3.3.1 Creep

3.3.1.1 PhoneStar boards

The creep coefficient of PhoneStar has been tested in accordance with EAD 210134-00-1202, clause 2.2.1.4. The creep coefficient φ_t = 0,225 - 0,264.

3.3.2 Pressure resistance

3.3.2.1 PhoneStrip strips

The pressure resistance of PhoneStrip is determined according to EN 26891.

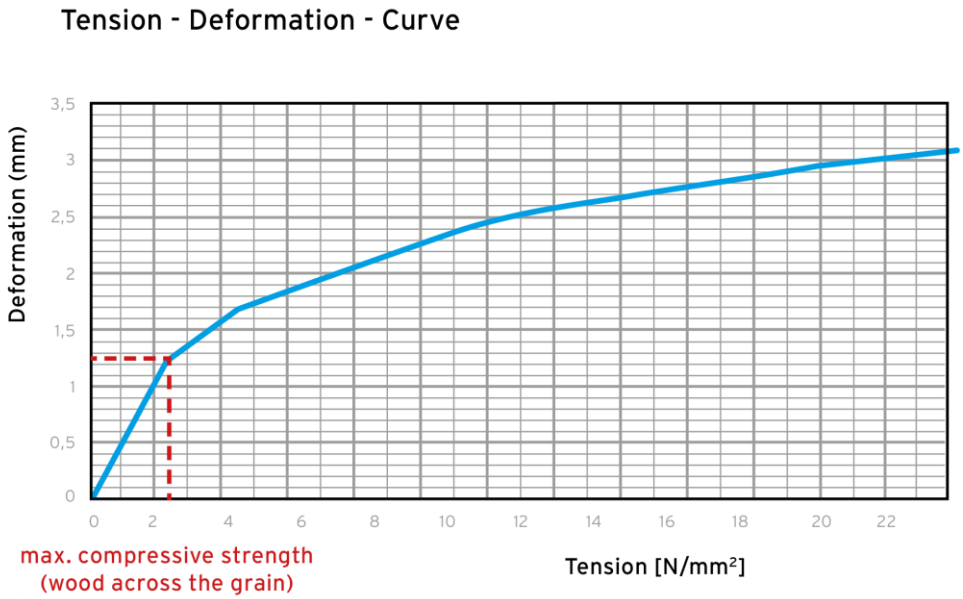
- compressive strength: characteristic $f_{c,k}$ = 23.0 N/mm²;
- compressive strength: design $f_{c,d}$ = 1/1,3 x 23 N/m² = 17.69 N/m², including a typical safety factor of 1.3 as common in timber constructions.

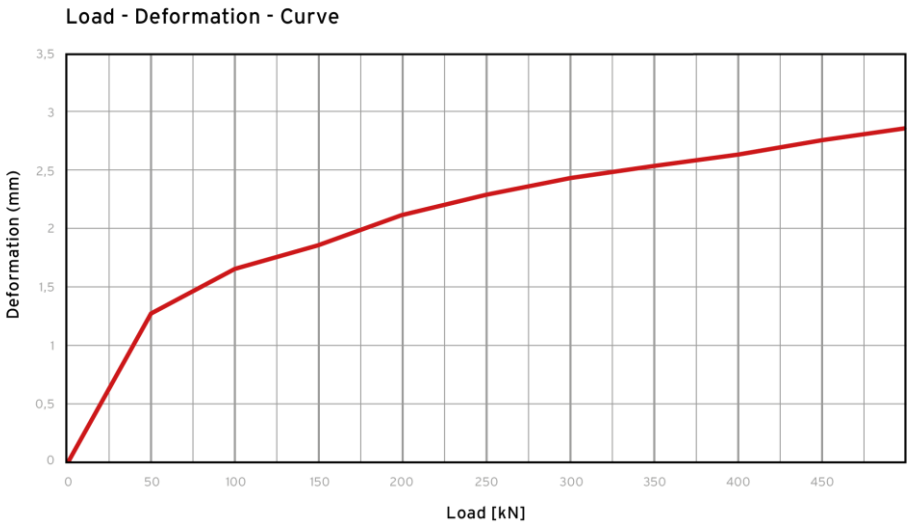
PhoneStrip strength modification factor k_{mod} = 0 according to EN 26891.

3.3.3 Deformation

3.3.3.1 PhoneStrip strips

PhoneStrip maximum final deformation 3.5 mm +/- 0.5 mm according to EN 26891 Table 2. The deformation at 2.5 N/mm² is 1.2 mm +/- 0.5 mm.





3.4 BWR 5 – Protection against noise

3.4.1 Airborne sound insulation

3.4.1.1 PhoneStar boards

The laboratory airborne sound insulation, R_w ($C;C_{tr}$) has been determined according to EN ISO 10140-2. The values and constructions are given in Annex D.

3.4.2 Impact sound insulation

3.4.2.1 PhoneStar boards

The laboratory impact sound insulation, $L_{n,w}$ (C_I) and $\Delta L_{n,w}$ ($C_{I\Delta}$) have been determined according to EN ISO 10140-3. The values and constructions are given in Annex D.

3.4.3 Dimensions (length, width, thickness)

The length (l) and width (b) have been determined according to EN 822. The thickness (d_B) have been determined in accordance with EN 12431. The results are shown in table 3.

Table 3: Dimensions and tolerances

	PhoneStar boards		PhoneStrip strips	
Length	500 to 2500 mm	± 3 mm	100 to 1250 mm	± 3 mm
Width	500 to 800 mm	± 3 mm	50 to 800 mm	± 3 mm
Thickness	9 to 40 mm	+ 0.5 / - 1.5 mm	9 to 30 mm	+ 0.5 / - 1.5 mm

3.4.4 Squareness, flatness

3.4.4.1 PhoneStar boards

The squareness (S_b) and maximum deviation from flatness (S_{max}) have been determined according to EN 824 and EN 825 respectively.

- Squareness (S_b): ≤ 1.0 mm/m;
- Flatness (S_{max}): ≤ 2 mm.

3.4.5 Density

The density has been determined according to EN 1602.

- PhoneStar boards ≥ 1.200 kg/m³ ± 100 kg/m³.
- PhoneStrip strips ≥ 1.300 kg/m³ ± 100 kg/m³.

Remark

Desity converted to m²:

- PhoneStar Tri boards: 18 kg/m² up to 21 kg/m²;

- PhoneStar ST Tri boards: 17 kg/m² up to 20 kg/m²;

- PhoneStar Twin / ST Twin boards: 12kg/m² up to 14 kg/m².

3.4.6 Flexural strength

3.4.6.1 PhoneStar boards

The flexural strength has been determined according to EN 520. The results are shown in table 4.

Table 4: Flexural strength

Product	Flexural strength	
	Longitudinal	Transverse
PhoneStar Tri	≥ 4,8 N/mm²	≥ 2,8 N/mm²
PhoneStar Twin	≥ 4,5 N/mm²	≥ 2,5 N/mm²
Phonestar ST Twin	≥ 4,5 N/mm²	≥ 2,5 N/mm²

3.4.7 Compressive stress / strength

3.4.7.1 PhoneStar boards

The compressive strength ($б_m$) and compressive stress at 10% strain ($б_{10}$) have been determined according to EN 826.

- Compressive strength ($б_m$): ≥ 1000 kPa;
- Compressive stress at 5% strain ($б_5$)[(1)]: ≥ 1000 kPa.

(1) 10% strain not reached.

3.4.8 Surface hardness

3.4.8.1 PhoneStar boards

The surface hardness is 14 mm average and ≤ 15 mm, determined according to EN 520.

3.4.9 Resistance to functional failure from concentrated load

3.4.9.1 PhoneStar boards

The resistance to functional failure has been determined according to EAD 210134-00-1202, Annex E.

3.4.10 Vibration reduction index

3.4.10.1 PhoneStrip strips

The vibration reduction index has been determined according to EN ISO 10848-1. The values and constructions are given in Annex F.

3.5 BWR 6 – Energy economy and heat retention

3.5.1 Thermal conductivity

3.5.1.1 PhoneStar boards

The thermal conductivity (λ) of PhoneStar boards is ≤ 0.17 W/(m·K) according to EN 12664.

3.5.1.2 PhoneStrip strips

No performance assessd.

3.5.2 Thermal transmittance

3.5.2.1 PhoneStar boards

The calculated U-values for thermal conductivity of exemplary constructions have been determined according to EN ISO 6946 for the constructions are given in Annex G.

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

4.1 System of assessment and verification of constancy of performance

According to the decision 2000/273/EC, published in the Official Journal of the European Union (OJEU) L86 of 7/4/2000) of the European Commission, the system of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) is 3 for any use except for uses subject to regulations on reaction to fire.

For uses subject to regulations on reaction to fire (including the propensity to undergo continuous smouldering) the AVCP system given in the following table apply:

Product	Intended use	Levels or classes	System
Self-supporting composite lightweight panels	For uses subject to reaction to fire regulations	$A^{(1)}$, $B^{(1)}$, $C^{(1)}$	1
		$A^{(2)}$, $B^{(2)}$, $C^{(2)}$	3
		$A^{(3)}$, D , E, F	4

1) Materials for which the reaction to fire performance is susceptible to change during production; (in general, those subject to chemical modification, e.g. fire retardants, or where changes of composition may lead to changes in reaction to fire performance.
2) Materials for which the reaction to fire performance is not susceptible to change during the production process.
3) Materials of Class A that according to Decision 96/603/EC, amended by Decision 2003/424/EC, does not require to be tested for reaction to fire.

4.2 Tasks of the manufacturer

4.2.1 Factory production control

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall insure that the product is in conformity with this European Technical Approval.
Within the framework of FPC the manufacturer shall carry out tests and controls with the prescribed test plan as deposited at Kiwa Nederland B.V., which is part of this European Technical Approval.

The results of the FPC shall be recorded and shall be kept for a period of at least 10 years.
The results of the FPC are evaluated and shall include at least the following information:
- designation of products and the constituents (raw materials);
- method of control or testing (according to control plan);
- date of manufacture of the products and date of testing of the products and the constituents;
- result of control and testing and comparison with requirements and declarations;
- result of treatment of products which do not meet declarations.

On request the results shall be presented to Kiwa Nederland B.V.

The control plan shall contain in detail the extent, nature and frequency of testing and controls to be performed and shall address at least the following items/characteristics and (minimum) frequencies as detailed in table 5.

Table 5 - Control plan for the manufacturer; cornerstones

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
Factory production control (FPC) [**including testing of samples taken at the factory in accordance with a prescribed test plan**]					
Receipt of materials					
1	Specifications cardboard	Delivery ticket or label on package Supplier certificates or supplier tests	Conformity with the order[1)]	--	Each delivery
2	Dimensions cardboard (l, b)	EN 822		--	Each delivery
3	Squareness cardboard	EN 824		--	Each delivery
4	Layers construction of cardboard	Visual	Directions and damages	--	Each delivery
5	Moisture content cardboard	Measuring	Conformity with the order	--	Each delivery
6	Quartz sand	Delivery ticket or label on package Supplier certificates or supplier tests	Conformity with the order	-- --	Each delivery Each delivery
7	Moisture content quartz sand	Proctortest	Conformity with the order	--	Each delivery
8	Tape	Delivery ticket or label on package Supplier certificates or supplier tests	Conformity with the order	--	Each delivery
Production					
9	Dimensions cardboard	Measuring	Conformity with control plan[2)]	--	Start of (new) production
10	Squareness cardboard	Measuring	Conformity with control plan	--	Start of (new) production
11	Moisture content cardboard	Measuring	Conformity with control plan	--	Start of (new) production
12	Layers construction of cardboard	Visual	Directions and damages	--	continuously

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
13	Moisture content quartz sand	Proctor test	Conformity with control plan	--	Start of (new) production
14	Filling of cardboard	Visual, weighing	Conformity with control plan	--	Start of (new) production
Finished product					
15	Visual check of the product	Visual check	Adhesion of tape, damages	all	Continuously
16	Length and width	EN 822	Conformity with control plan	1	Daily
17	Thickness	EN 520 / 5.4		1	Daily
18	Squareness	EN 824		1	Daily
19	Flatness	EN 825		1	Daily
20	Weight	Weighing board/strip		1	Daily
21	Flexural strength	EN 520 / 5.7		3	Every batch, min. once per month
22	Compressive strength/strain	EN 826		3	Every batch, min. once per month
23	Surface hardness	EN 520 / 5.12		1	Every batch, min. once per month
24	Reaction to fire	EN ISO 11925-2		1	Every batch, min. once per month

[1)] Specifications of the order shall be in accordance to the control plan as agreed upon between manufacturer and TAB.

[2)] The control plan shall be agreed upon between manufacturer and TAB.

4.2.2 Declaration of performance

The manufacturer shall draw up a Declaration of Performance stating that PhoneStar boards and strips are in conformity with the provisions of this European Technical Approval.

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

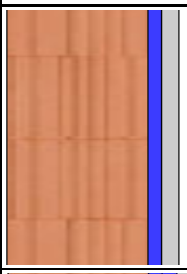
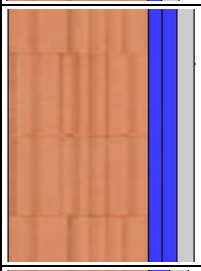
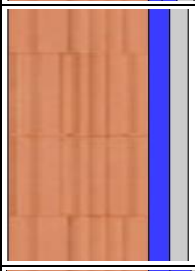
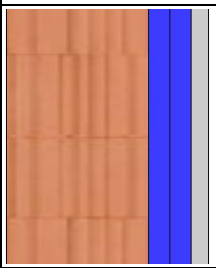
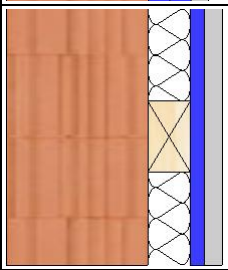
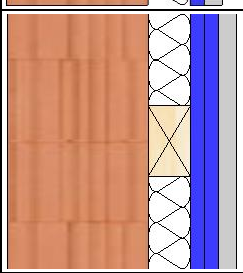
All materials of the products shall be in accordance with the provisions laid down in this ETA.
All materials used in the partitions shall fulfil the criteria in this ETA.
Changes to the product/production process, which could result in this deposited data / information being incorrect, should be notified to the approval body before the changes are introduced. The approval body will decide whether or not such changes affect the ETA and consequently the validity of the CE marking on the basis of the ETA and so whether further assessment / alterations to the ETA, is necessary.

Issued in Rijswijk on 11-04-2023 by

Ron Scheepers
Kiwa Nederland B.V.

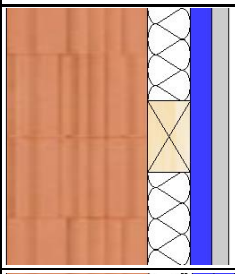
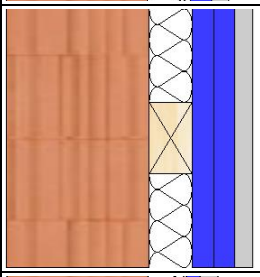
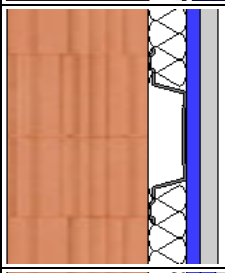
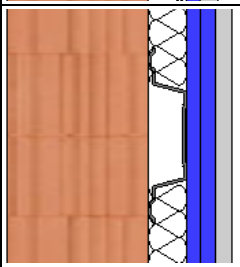
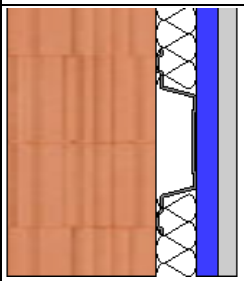
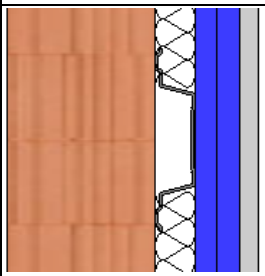
Annex A - Application areas PhoneStar boards

A.1 Masonry / brick walls

Type	Ref. No	Approved Constructions on **masonry / brick** walls	Thickness [mm]	System drawing
1	WMZ D 1.1	Masonry wall 115 mm **PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	22,5	
2	WMZ D 1.1 2 x Twin	Masonry wall **2 x PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	32,5	
3	WMZ D 1.2	Masonry wall **PhoneStar Tri 15 mm** Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	27,5	
4	WMZ D 1.2 2 x Tri	Masonry wall **2 x PhoneStar 15 mm** Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	42,5	
5	WMZ L 1.2	Masonry wall Battens W 50 x T 30 mm **PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	52,5	
6	WMZ L 1.2 2 x Twin	Masonry wall Battens W 50 x T 30 mm **2 x PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	62,5	

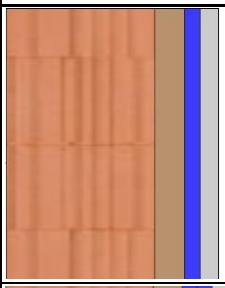
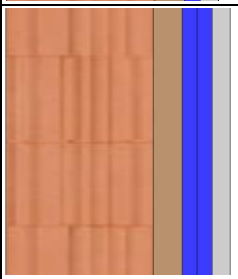
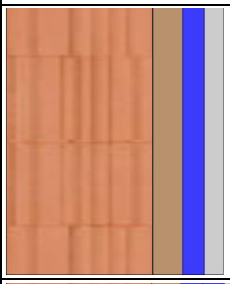
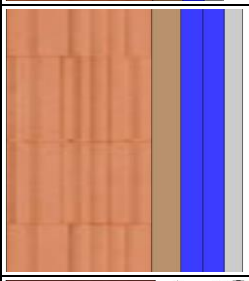
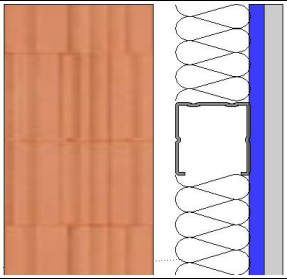
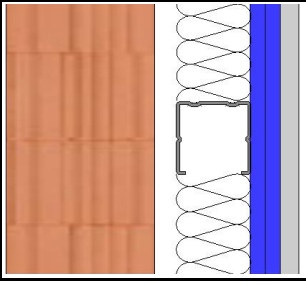
Annex A - Application areas PhoneStar boards

A.1 Masonry / brick walls

Type	Ref. No	Approved Constructions on **masonry / brick** walls	Thickness [mm]	System drawing
7	WMZ L 1.2	Masonry wall Battens W 50 x T 30 mm **PhoneStar Tri 15 mm** Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	57,5	
8	WMZ L 1.2 2 x Tri	Masonry wall Battens W 50 x T 30 mm **2 x PhoneStar Tri 15 mm** Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	72,5	
9	WMZ H 1.1	Masonry wall Resilient bars T 27 mm **Phonestar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	49,5	
10	WMZ H 1.1 2 x Twin	Masonry wall Resilient bars T 27 mm **2 x PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	59,5	
11	WMZ H 1.2	Masonry wall Resilient bars T 27 mm **PhoneStar Tri 15 mm** Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	54,5	
12	WMZ H 1.2 2 x Tri	Masonry wall Resilient bars T 27 mm **PhoneStar Tri 15 mm** Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	69,5	

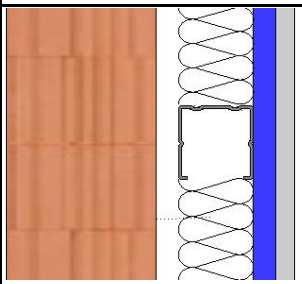
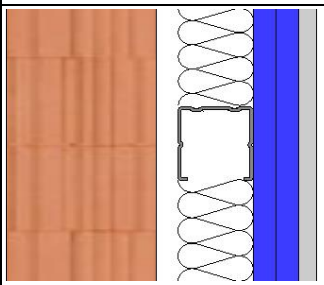
Annex A - Application areas PhoneStar boards

A.1 Masonry / brick walls

Type	Ref. No	Approved Constructions on **masonry / brick** walls	Thickness [mm]	System drawing
13	WMZ W 1.1	Masonry wall Wood fibre 20 mm **PhoneStar Twin 10 mm** Plasterboard 12,5 *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	42,5	
14	WMZ W 1.1 2 x Twin	Masonry wall Wood fibre 20 mm **2 x PhoneStar Twin 10 mm** Plasterboard 12,5 *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	52,5	
15	WMZ W 1.2	Wood fibre 20 mm **PhoneStar Tri 15 mm** Plasterboard 12,5 *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	47,5	
16	WMZ W 1.2 2 x Tri	Wood fibre 20 mm **2 x PhoneStar Tri 15 mm** Plasterboard 12,5 *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	62,5	
17	WMZ V 1.1	Air gap 10 mm Steel stud T 50 mm (Cavity) **PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	82,5	
18	WMZ V 1.1 2 x Twin	Air gap 10 mm Steel stud T 50 mm (Cavity) 2 x PhoneStar Twin 10 mm Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	92,5	

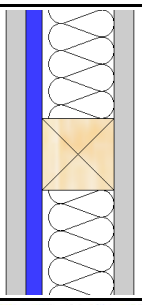
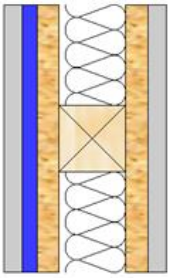
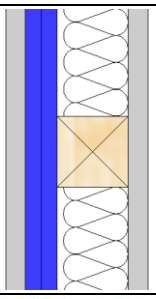
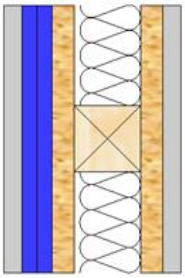
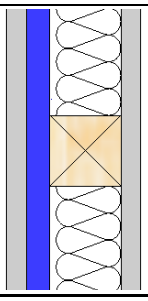
Annex A - Application areas PhoneStar boards

A.1 Masonry / brick walls

Type	Ref. No	Approved Constructions on **masonry / brick** walls	Thickness [mm]	System drawing
19	WMZ V 1.2	Air gap 10 mm Steel stud T 50 mm (Cavity) **PhoneStar Tri 15 mm** Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	87,5	
20	WMZ V 1.2 2 x Tri	Air gap 10 mm Steel stud T 50 mm (Cavity) **2 x PhoneStar Tri 15 mm** Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	102,5	

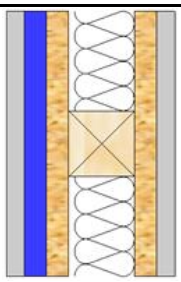
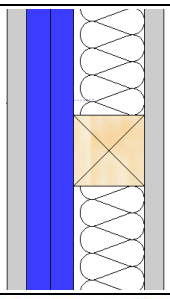
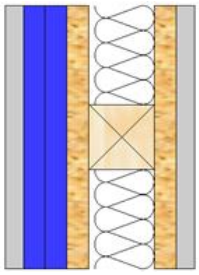
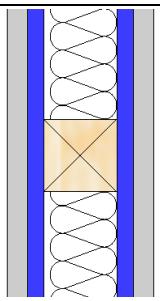
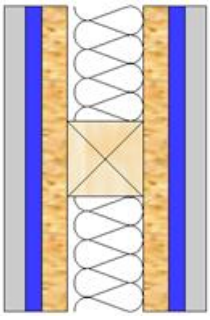
Annex A - Application areas PhoneStar boards

A.2 Timber stud walls

Type	Ref. No	Approved Constructions on **timber stud** walls	Thickness [mm]	System drawing
1	WSH 1.1	Plasterboard 12,5 mm **PhoneStar Twin 10 mm** Timber stud T ≥ 45 mm (Cavity) Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	80,0	
2	WSH 1.1 OSB beidseitig	Plasterboard 12,5 mm **PhoneStar Twin 10 mm** OSB 12 mm Timber stud T ≥ 45 mm (Cavity) OSB 12 mm Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	104,0	
3	WSH 1.3 2 x Twin	Plasterboard 12,5 mm **2 x PhoneStar Twin 10 mm** Timber stud T ≥ 45 mm (Cavity) Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	90,0	
4	WSH 1.3 OSB beidseitig 2 x Twin	Plasterboard 12,5 mm **2 x PhoneStar Twin 10 mm** OSB 12 mm Timber stud T ≥ 45 mm (Cavity) OSB 12 mm Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	114,0	
5	WSH 1.2	Plasterboard 12,5 mm **PhoneStar Tri 15 mm** Timber stud T ≥ 45 mm (Cavity) Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	85,0	

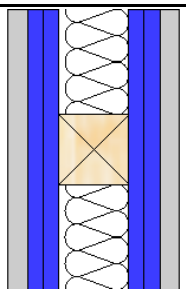
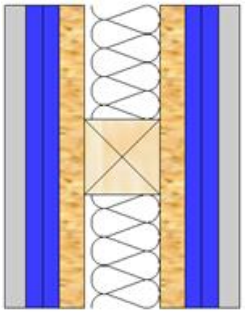
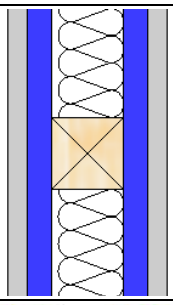
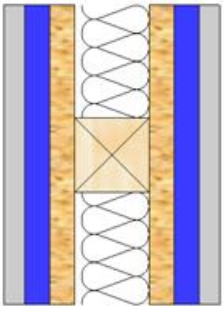
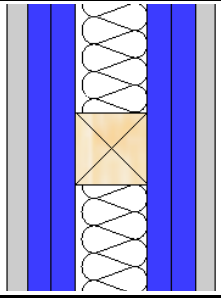
Annex A - Application areas PhoneStar boards

A.2 Timber stud walls

Type	Ref. No	Approved Constructions on **timber stud** walls	Thickness [mm]	System drawing
6	WSH 1.2 OSB beidseitig	Plasterboard 12,5 mm **PhoneStar Tri 15 mm** OSB 12 mm Timber stud T ≥ 45 mm (Cavity) OSB 12 mm Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	109,0	
7	WSH 1.2 2 x Tri	Plasterboard 12,5 mm **2 x PhoneStar Tri 15 mm** Timber stud T ≥ 45 mm (Cavity) Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	100	
8	WSH 1.2 OSB beidseitig 2 x Tri	Plasterboard 12,5 mm **2 x PhoneStar Tri 15 mm** OSB 12 mm Timber stud T ≥ 45 mm (Cavity) OSB 12 mm Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	112,5	
9	WSH 2.1	Plasterboard 12,5 mm **PhoneStar Twin 10 mm** Timber stud T ≥ 45 mm (Cavity) **PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	90,0	
10	WSH 2.1 OSB beidseitig	Plasterboard 12,5 mm **PhoneStar Twin 10 mm** OSB 12 mm Timber stud T ≥ 45 mm (Cavity) OSB 12 mm **PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	114,0	

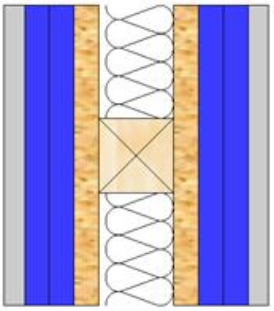
Annex A - Application areas PhoneStar boards

A.2 Timber stud walls

Type	Ref. No	Approved Constructions on **timber stud** walls	Thickness [mm]	System drawing
11	WSH 2.1 2 x Twin	Plasterboard 12,5 mm **2 x PhoneStar Twin 10 mm** Timber stud T ≥ 45 mm (Cavity) **2 x PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	110,0	
12	WSH 2.1 OSB beidseitig 2 x Twin	Plasterboard 12,5 mm **2 x PhoneStar Twin 10 mm** OSB 12 mm Timber stud T ≥ 45 mm (Cavity) OSB 12 mm **2 x PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	134,0	
13	WSH 2.2	Plasterboard 12,5 mm **PhoneStar Tri 15 mm** Timber stud T ≥ 45 mm (Cavity) **PhoneStar Tri 15 mm** Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	100,0	
14	WSH 2.2 OSB beidseitig	Plasterboard 12,5 mm **PhoneStar Tri 15 mm** OSB 12 mm Timber stud T ≥ 45 mm (Cavity) OSB 12 mm **PhoneStar Tri 15 mm** Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	124	
15	WSH 2.2 2 x Tri	Plasterboard 12,5 mm **2 x PhoneStar Tri 15 mm** Timber stud T ≥ 45 mm (Cavity) **2 x PhoneStar Tri 15 mm** Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	130,0	

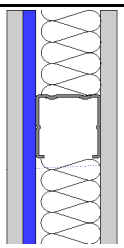
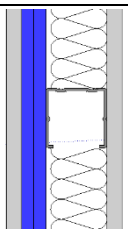
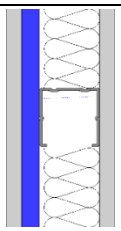
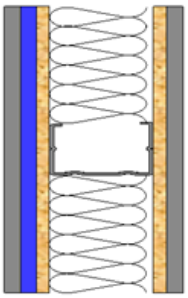
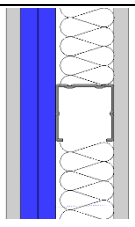
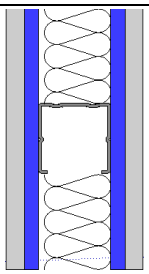
Annex A - Application areas PhoneStar boards

A.2 Timber stud walls

Type	Ref. No	Approved Constructions on **timber stud** walls	Thickness [mm]	System drawing
16	WSH 2.2 OSB beidseitig 2 x Tri	Plasterboard 12,5 mm **2 x PhoneStar Tri 15 mm** OSB 12 mm Timber stud T ≥ 45 mm (Cavity) OSB 12 mm **2 x PhoneStar Tri 15 mm** Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	154	

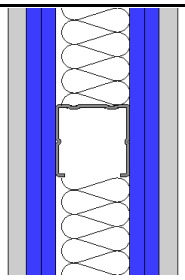
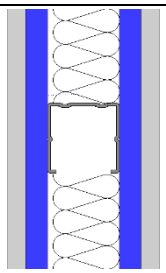
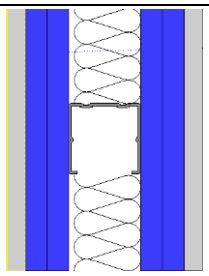
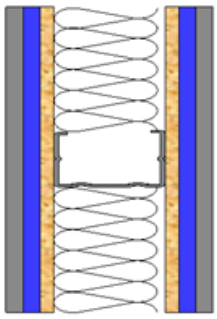
Annex A - Application areas PhoneStar boards

A.3 Steel stud walls

Type	Ref. No	Approved Constructions on **metal stud** walls	Thickness [mm]	System drawing
1	WSM 1.1	Plasterboard 12,5 mm **PhoneStar Twin 10 mm** Steel stud T ≥ 50 mm (Cavity) Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	85,0	
2	WSM 1.1 2 x Twin	Plasterboard 12,5 mm **2 x PhoneStar Twin 10 mm** Steel stud T ≥ 50 mm (Cavity) Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	95,0	
3	WSM 1.2	Plasterboard 12,5 mm **PhoneStar Tri 15 mm** Steel stud T ≥ 50 mm (Cavity) Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	90,0	
4	WSM 1.2 OSB Beidseitig	Plasterboard fire protect 15 mm **1 x PhoneStar Tri 15 mm** 1 x OSB 12 mm Steel stud T ≥ 50 mm (Cavity) 1 x OSB 12 mm Plasterboard fire protect 15 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	169	
5	WSM 1.2 2 x Tri	Plasterboard 12,5 mm **2 x PhoneStar Tri 15 mm** Steel stud T ≥ 50 mm (Cavity) Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	100	
6	WSM 2.1	Plasterboard 12,5 mm **PhoneStar Twin 10 mm** Steel stud T ≥ 50 mm (Cavity) **PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	95,0	

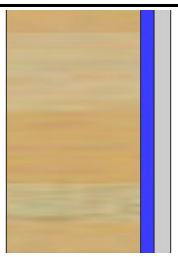
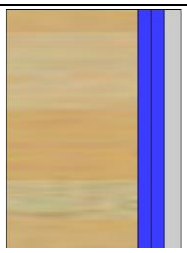
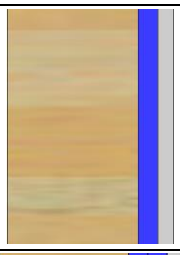
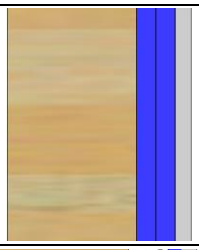
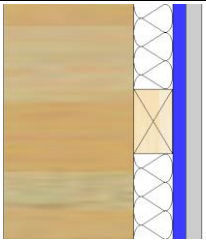
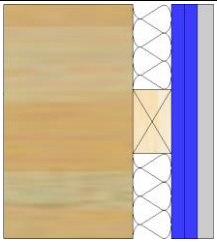
Annex A - Application areas PhoneStar boards

A.3 Steel stud walls

Type	Ref. No	Approved Constructions on **metal stud** walls	Thickness [mm]	System drawing
7	WSM 2.1 2 x Twin	Plasterboard 12,5 mm **2 x PhoneStar Twin 10 mm** Steel stud T ≥ 50 mm (Cavity) **2 x PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	115,0	
8	WSM 2.2	Plasterboard 12,5 mm **PhoneStar Tri 15 mm** Steel stud T ≥ 50 mm (Cavity) **PhoneStar Tri 15 mm** Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	105,0	
9	WSM 2.2 2 x Tri	Plasterboard 12,5 mm **2 x PhoneStar Tri 15 mm** Steel stud T ≥ 50 mm (Cavity) **2 x PhoneStar Tri 15 mm** Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	135,0	
10	WSM 2.2 OSB beidseitig	Plasterboard fire protect 15 mm **1 x PhoneStar Tri 15 mm** 1 x OSB 12 mm Steel stud T ≥ 50 mm (Cavity) 1 x OSB 12 mm **1 x PhoneStar Tri 15 mm** Plasterboard fire protect 15 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	184	

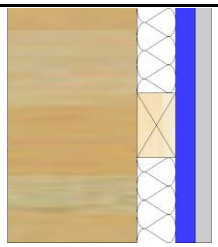
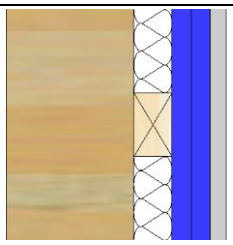
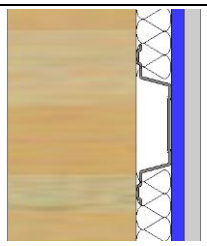
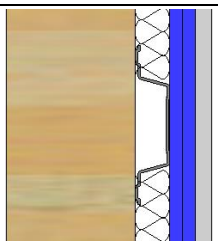
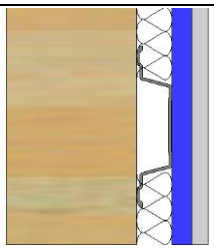
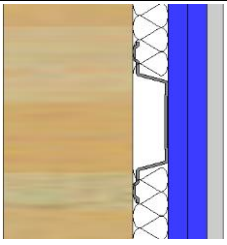
Annex A - Application areas PhoneStar boards

A.4 Solid timber walls

Type	Ref. No	Approved Constructions on **solid timber** walls	Thickness [mm]	System drawing
1	WMH D 1.1	Solid timber wall **PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	22,5	
2	WMH D 1.1 2 x Twin	Solid timber wall **2 x PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	32,5	
3	WMH D 1.2	Solid timber wall **PhoneStar Tri 15 mm** Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	27,5	
4	WMH D 1.2 2 x Tri	Solid timber wall **2 x PhoneStar Tri 15 mm** Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	42,5	
5	WMH L 1.1	Solid timber wall Battens W 50 x T 30 mm **PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	52,5	
6	WMH L 1.1 2 x Twin	Solid timber wall Battens W 50 x T 30 mm **2 x PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	62,5	

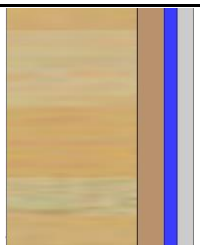
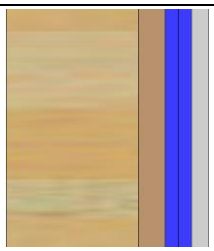
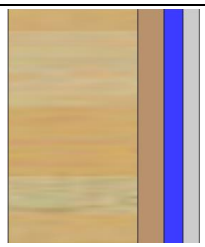
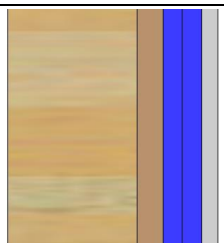
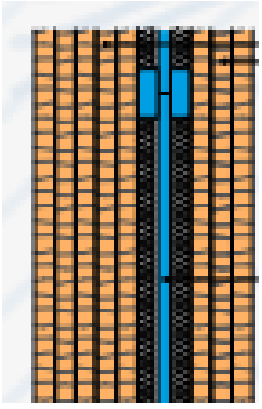
Annex A - Application areas PhoneStar boards

A.4 Solid timber walls

Type	Ref. No	Approved Constructions on **solid timber** walls	Thickness [mm]	System drawing
7	WMH L 1.2	Solid timber wall Battens W 50 x T 30 mm **PhoneStar Tri 15 mm** Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	57,5	
8	WMH L 1.2 2 x Tri	Solid timber wall Battens W 50 x T 30 mm **2 x PhoneStar Tri 15 mm** Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	72,5	
9	WMH H 1.1	Solid timber wall Resilient bars T 27 mm **PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	49,5	
10	WMH H 1.1 2 x Twin	Solid timber wall Resilient bars T 27 mm **2 x PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	59,5	
11	WMH H 1.2	Solid timber wall Resilient bars T 27 mm **PhoneStar Tri 15 mm** Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	54,5	
12	WMH H 1.2 2 x Tri	Solid timber wall Resilient bars T 27 mm **2x PhoneStar Tri 15 mm** Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	69,5	

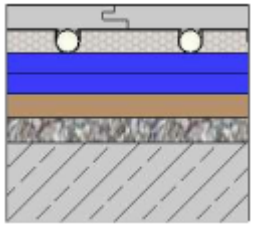
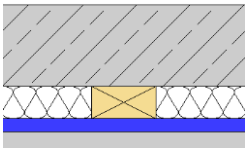
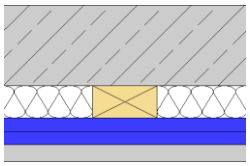
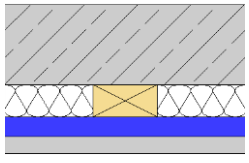
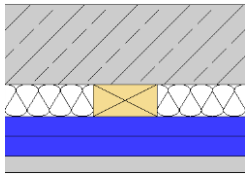
Annex A - Application areas PhoneStar boards

A.4 Solid timber walls

Type	Ref. No	Approved Constructions on **solid timber** walls	Thickness [mm]	System drawing
13	WMH W 1.1	Solid timber wall Wood fibre 20 mm **PhoneStar Twin 10 mm** Plasterboard 12,5 *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	42,5	
14	WMH W 1.1 2 x Twin	Solid timber wall Wood fibre 20 mm **2 x PhoneStar Twin 10 mm** Plasterboard 12,5 *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	52,5	
15	WMH W 1.2	Solid timber wall Wood fibre 20 mm **PhoneStar Tri 15 mm** Plasterboard 12,5 *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	47,5	
16	WMH W 1.2 2 x Tri	Solid timber wall Wood fibre 20 mm **2 x PhoneStar Tri 15 mm** Plasterboard 12,5 *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	62,5	
17	WMH One Block	≥ 75 mm Solid Wood (e.g. Magnum Board) 25 mm PhoneStar Schalli with 20 mm Mineral Wool cavity **15 mm PhoneStar Tri** 25 mm PhoneStar Schalli with 20 mm Mineral Wool cavity ≥ 75 mm Solid Wood (e.g. Magnum Board) *Or 12,5 mm PhoneStar ST Tri*	265,0	

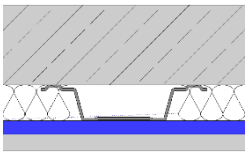
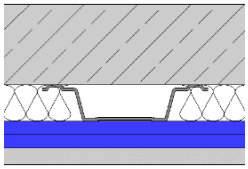
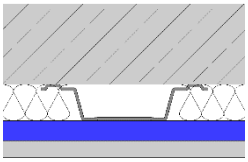
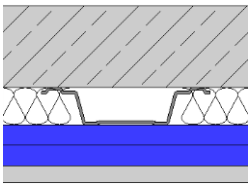
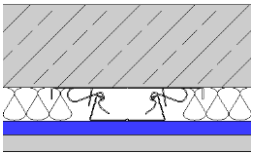
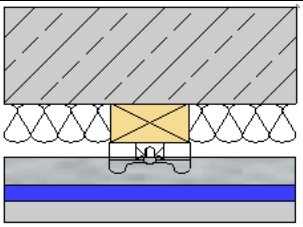
Annex A - Application areas PhoneStar boards

A.5 Solid concrete ceiling

Type	Ref. No	Approved constructions on **solid concrete ceiling**	Thickness [mm]	System drawing
1		Dry screed ≥ 18 mm or ≥ 45 mm wet screed or Wolf decoupling plate, Wolf seperating paper, underfloor heating – PowerFloor Slim/ Light/ Nature/ ÖkoPlus 20 – 30 mm, Wolf Tack 10 – 80 mm **PhoneStar 9 – 30 mm (one or two layer),** Wood or mineral fibre or Wolf Cell 4 – 80 mm, Wolf Cell 4 – 80 mm, mineral-coated wood chips like **Cemwood GmbH** or Perlite like **Strauss-Perlite GmbH** or bounded split 20 – 80, or bounded split 20 – 80 mm or *replaced by PhoneStar 9 – 80 mm (one or several layer)* Solid ceiling	82-282	
2	DM L 1.1	Solid ceiling Battens W 50 x T 30 mm **PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	52,5	
3	DM L 1.1 2 x Twin	Solid ceiling Battens W 50 x T 30 mm **2 x PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	62,5	
4	DM L 1.2	Solid ceiling Battens W 50 x T 30 mm **PhoneStar Tri 15 mm** Plasterboard 12,5 *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	57,5	
5	DM L 1.2 2 x Tri	Solid ceiling Battens W 50 x T 30 mm **2 x PhoneStar Tri 15 mm** Plasterboard 12,5 *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	72,5	

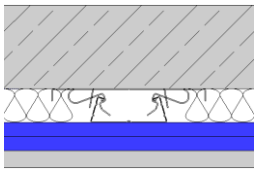
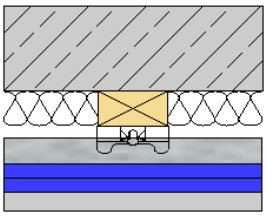
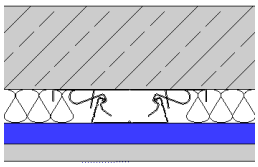
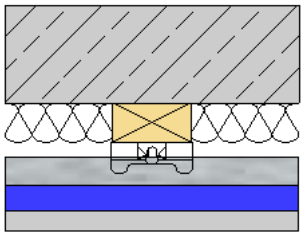
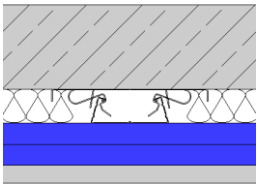
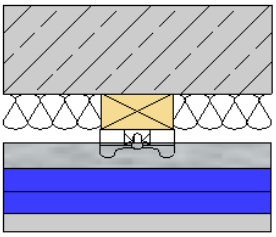
Annex A - Application areas PhoneStar boards

A.5 Solid concrete ceiling

Type	Ref. No	Approved constructions on **solid concrete ceiling**	Thickness [mm]	System drawing
6	DM H 1.1	Solid ceiling Resilient bars T 27 mm **PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	49,5	
7	DM H 1.1 2x Twin	Solid ceiling Resilient bars T 27 mm **2 x PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	59,5	
8	DM H 1.2	Solid ceiling Resilient bars T 27 mm **PhoneStar Tri 15 mm** Plasterboard 12,5 *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	54,5	
9	DM H 1.2 2 x Tri	Solid ceiling Resilient bars T 27 mm **2 x PhoneStar Tri 15 mm** Plasterboard 12,5 *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	69,5	
10	DM TPS 1.1	Solid ceiling Spring clips & CD Profile 25 mm **PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	47,5	
11	DM TPS 1.1 Batten	Solid ceiling Battens W 30-60 x T 30-60 mm Spring clips & CD Profile 25 mm **1 x PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	77,5 – 107,5	

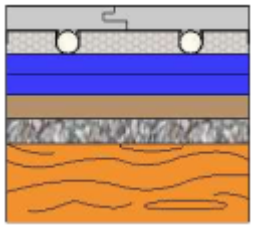
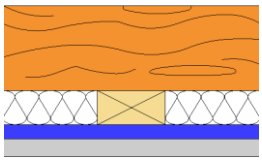
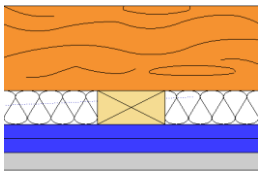
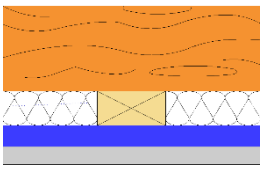
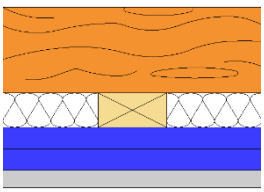
Annex A - Application areas PhoneStar boards

A.5 Solid concrete ceiling

Type	Ref. No	Approved constructions on **solid concrete ceiling**	Thickness [mm]	System drawing
12	DM TPS 1.1 2 x Twin	Solid ceiling Spring clips & CD profile 25 mm **2 x PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	57,5	
13	DM TPS 1.1 Batten 2 x Twin	Solid ceiling Battens W 30-60 x T 30-60 mm Spring clips & CD profile 25 mm **2 x PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	87,5 – 117,5	
14	DM TPS 1.2	Solid ceiling Spring clips & CD profile 25 mm **PhoneStar Tri 15 mm** Plasterboard 12,5 *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	52,5	
15	DM TPS 1.2 Batten	Solid ceiling Battens W 30-60 x T 30-60 mm Spring clips & CD profile 25 mm **1 x PhoneStar Tri 15 mm** Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	82,5 – 112,5	
16	DM TPS 1.2 2 x Tri	Solid ceiling Spring clips & CD profile 25 mm **2 x PhoneStar Tri 15 mm** Plasterboard 12,5 *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	67,5	
17	DM TPS 1.2 Batten 2 x Tri	Solid ceiling Battens W 30-60 x T 30-60 mm Spring clips & CD profile 25 mm **2 x PhoneStar Tri 15 mm** Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*		

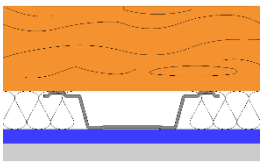
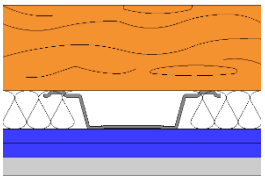
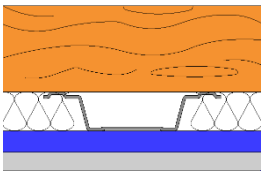
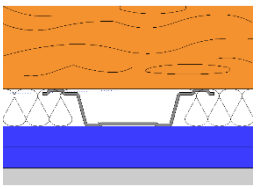
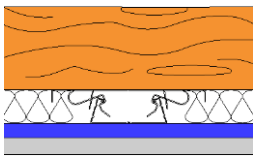
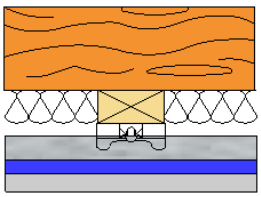
Annex A - Application areas PhoneStar boards

A.6 Timber ceiling

Type	Ref. No	Approved Constructions on **timber joist ceiling & solid timber ceiling**	Thickness [mm]	System drawing
1		Dry screed ≥ 18 mm or ≥ 45 mm wet screed or Wolf decoupling plate, Wolf seperating paper, underfloor heating – PowerFloor Slim/ Light/ Nature/ ÖkoPlus 20 – 30 mm, Wolf Tack 10 – 80 mm **PhoneStar 9 – 30 mm (one or two layer),** Wood or mineral fibre or Wolf Cell 4 – 80 mm, or Wolf Cell 4 – 80 mm, mineral-coated wood chips like **Cemwood GmbH** or Perlite like **Strauss-Perlite GmbH** or bounded split 20 – 80, or Bounded split20-80 mm or *replaced by PhoneStar 9 – 80 mm (one or several layer)* Timber ceiling	82-282	
2	DHG L 1.1	Timber ceiling Battens W 50 x T 30 mm **PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	52,5	
3	DHG L 1.1 2 x Twin	Timber ceiling Battens W 50 x T 30 mm **2 x PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	62,5	
4	DHG L 1.2	Timber ceiling Battens W 50 x T 30 mm **PhoneStar Tri 15 mm** Plasterboard 12,5 *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	57,5	
5	DHG L 1.2 2 x Tri	Wood ceiling Battens W 50 x T 30 mm **2 x PhoneStar Tri 15 mm** Plasterboard 12,5 *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	72,5	

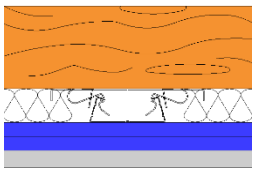
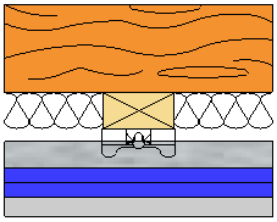
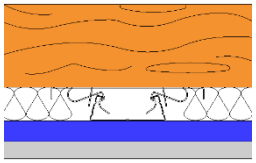
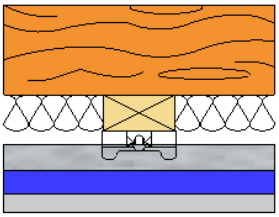
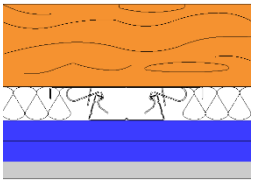
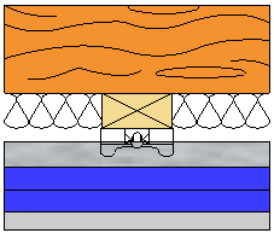
Annex A - Application areas PhoneStar boards

A.6 Timber ceiling

Type	Ref. No	Approved Constructions on **timber joist ceiling & solid timber ceiling**	Thickness [mm]	System drawing
6	DHG H 1.1	Timber ceiling Resilient bars T 27 mm **PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	49,5	
7	DHG H 1.1 2x Twin	Timber ceiling Resilient bars T 27 mm **2 x PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	59,5	
8	DHG H 1.2	Timber ceiling Resilient bars T 27 mm **PhoneStar Tri 15 mm** Plasterboard 12,5 *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	54,5	
9	DHG H 1.2 2 x Tri	Timber ceiling Resilient bars T 27 mm **2 x PhoneStar Tri 15 mm** Plasterboard 12,5 *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	69,5	
10	DHG TPS 1.1	Timber ceiling Spring clips & CD profil 25 mm **PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	47,5	
11	DHG TPS 1.1 Batten	Timber ceiling Battens W 30-60 x T 30-60 mm Spring clips & CD Profile 25 mm **1 x PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	77,5 – 107,5	

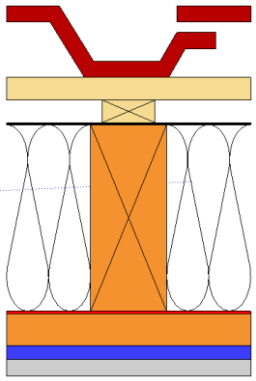
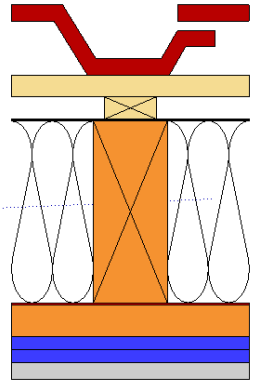
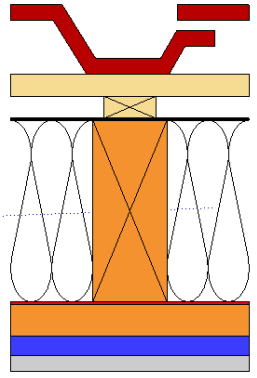
Annex A - Application areas PhoneStar boards

A.6 Timber ceiling

Type	Ref. No	Approved Constructions on **timber joist ceiling & solid timber ceiling**	Thickness [mm]	System drawing
12	DHG TPS 1.1 2 x Twin	Timber ceiling Spring clips & CD profil 25 mm **2 x PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	57,5	
13	DHG TPS 1.1 Batten 2 x Twin	Timber ceiling Battens W 30-60 x T 30-60 mm Spring clips & CD profile 25 mm **2 x PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	87,5 – 117,5	
14	DHG TPS 1.2	Timber ceiling Spring clips & CD profil 25 mm **PhoneStar Tri 15 mm** Plasterboard 12,5 *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	52,5	
15	DHG TPS 1.2 Batten	Timber ceiling Battens W 30-60 x T 30-60 mm Spring clips & CD profile 25 mm **1 x PhoneStar Tri 15 mm** Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	82,5 – 112,5	
16	DHG TPS 1.2 2 x Tri	Timber ceiling Spring clips & CD profil 25 mm **2 x PhoneStar Tri 15 mm** Plasterboard 12,5 *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	67,5	
17	DHG TPS 1.2 Batten 2 x Tri	Timber ceiling Battens W 30-60 x T 30-60 mm Spring clips & CD profile 25 mm **Tri 15 2 x PhoneStar mm** Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	97,5 – 127,5	

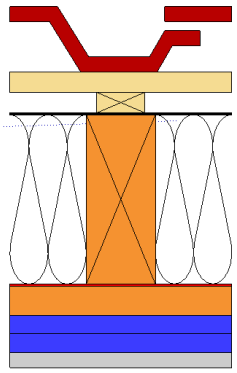
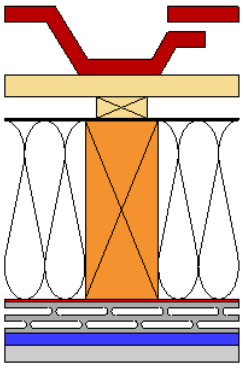
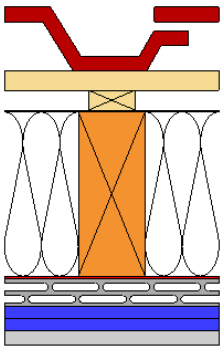
Annex A - Application areas PhoneStar boards

A.7 Timber roof pitch

Type	Ref. No	Approved Constructions on **timber roof pitch**	Thickness [mm]	System drawing
1	DS L 1.1	Roof covering 73 mm Battens W 30 x T 50 mm Battens W 30 x T 50 mm Bottom deck layer 0,45 mm Rafter W 120 x T 220 mm Steam break 0,5 mm Battens W 30 x T 50 mm **PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	22,5	
2	DS L 1.1 2 x Twin	Roof covering 73 mm Battens W 30 x T 50 mm Battens W 30 x T 50 mm Bottom deck layer 0,45 mm Rafter W 120 x T 220 mm Steam break 0,5 mm Battens W 30 x T 50 mm **2 x PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	32,5	
3	DS L 1.2	Roof covering 73 mm Battens W 30 x T 50 mm Battens W 30 x T 50 mm Bottom deck layer 0,45 mm Rafter W 120 x T 220 mm Steam break 0,5 mm Battens W 30 x T 50 mm **PhoneStar Tri 15 mm** Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	27,5	

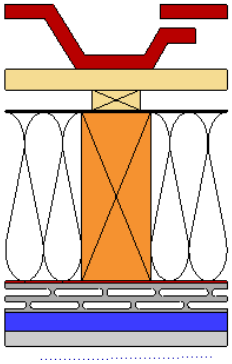
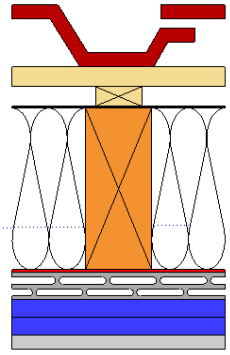
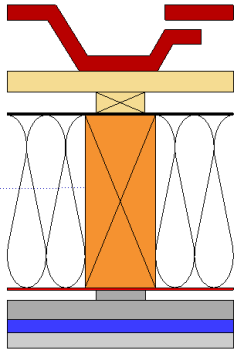
Annex A - Application areas PhoneStar boards

A.7 Timber roof pitch

Type	Ref. No	Approved Constructions on **timber roof pitch**	Thickness [mm]	System drawing
4	DS L 1.2 2 x Tri	Roof covering 73 mm Battens W 30 x T 50 mm Battens W 30 x T 50 mm Bottom deck layer 0,45 mm Rafter W 120 x T 220 mm Steam break 0,5 mm Battens W 30 x T 50 mm **2 x PhoneStar Tri 15 mm** Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	42,5	
5	DS H 1.1	Roof covering 73 mm Battens W 30 x T 50 mm Battens W 30 x T 50 mm Bottom deck layer 0,45 mm Rafter W 120 x T 220 mm Steam break 0,5 mm Resilient bars T 27 mm **PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	49,5	
6	DS H 1.1 2 x Twin	Roof covering 73 mm Battens W 30 x T 50 mm Battens W 30 x T 50 mm Bottom deck layer 0,45 mm Rafter W 120 x T 220 mm Steam break 0,5 mm Resilient bars T 27 mm **2 x PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	59,5	

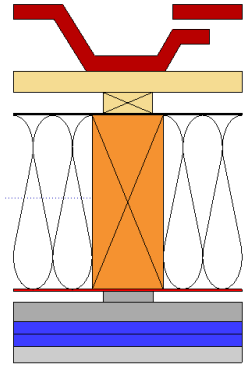
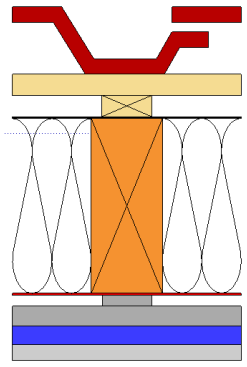
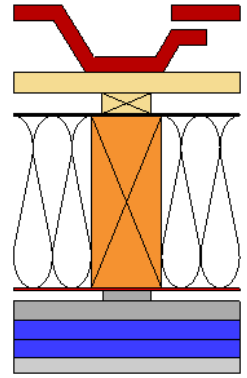
Annex A - Application areas PhoneStar boards

A.7 Timber roof pitch

Type	Ref. No	Approved Constructions on **timber roof pitch**	Thickness [mm]	System drawing
7	DS H 1.2	Roof covering 73 mm Battens W 30 x T 50 mm Battens W 30 x T 50 mm Bottom deck layer 0,45 mm Rafter W 120 x T 220 mm Steam break 0,5 mm Resilient bars T 27 mm **PhoneStar Tri 15 mm** Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	54,5	
8	DS H 1.2 2 x Tri	Roof covering 73 mm Battens W 30 x T 50 mm Battens W 30 x T 50 mm Bottom deck layer 0,45 mm Rafter W 120 x T 220 mm Steam break 0,5 mm Resilient bars T 27 mm **2 x PhoneStar Tri 15 mm** Plasterboard 12,5 mm *Or Phonestar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	69,5	
9	DS TPS 1.1	Roof covering 73 mm Battens W 30 x T 50 mm Battens W 30 x T 50 mm Bottom deck layer 0,45 mm Rafter W 120 x T 220 mm Steam break 0,5 mm Spring clips & CD profil 25 mm **PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	47,5	

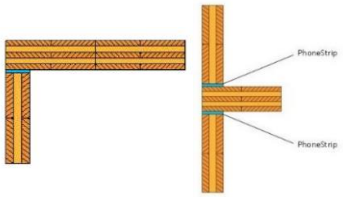
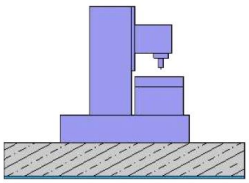
Annex A - Application areas PhoneStar boards

A.7 Timber roof pitch

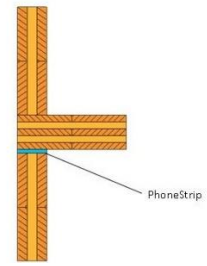
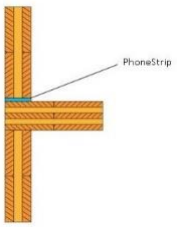
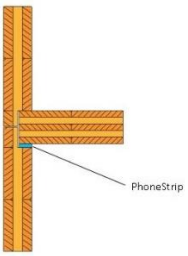
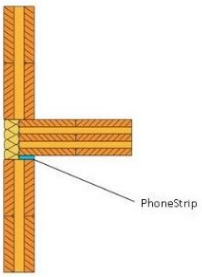
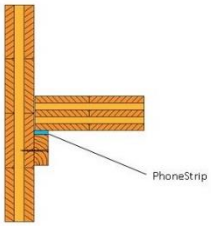
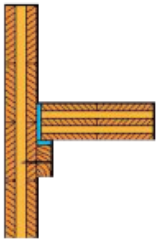
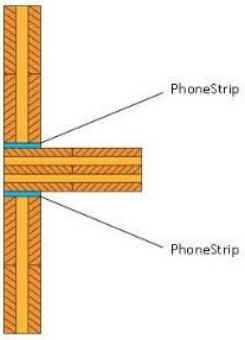
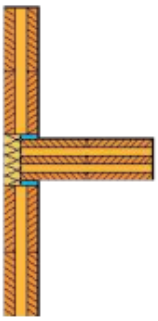
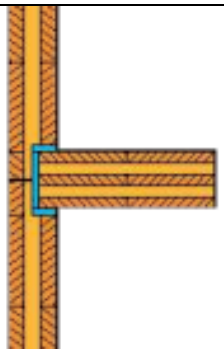
Type	Ref. No	Approved Constructions on **timber roof pitch**	Thickness [mm]	System drawing
10	DS TPS 1.1 2 x Twin	Roof covering 73 mm Battens W 30 x T 50 mm Battens W 30 x T 50 mm Bottom deck layer 0,45 mm Rafter W 120 x T 220 mm Steam break 0,5 mm Spring clips & CD profil 25 mm **2 x PhoneStar Twin 10 mm** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	57,9	
11	DS TPS 1.2	Roof covering 73 mm Battens W 30 x T 50 mm Battens W 30 x T 50 mm Bottom deck layer 0,45 mm Rafter W 120 x T 220 mm Steam break 0,5 mm Spring clips & CD profil 25 mm **PhoneStar Tri 15 mm** Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	52,5	
12	DS TPS 1.2 2 x Tri	Roof covering 73 mm Battens W 30 x T 50 mm Battens W 30 x T 50 mm Bottom deck layer 0,45 mm Rafter W 120 x T 220 mm Steam break 0,5 mm Steam break 0,1 mm Spring clips & CD profil 25 mm **2 x PhoneStar Tri 15 mm** Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	67,5	

Annex B - Application areas PhoneStrip strips

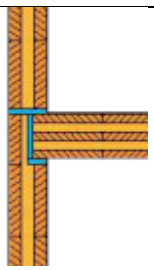
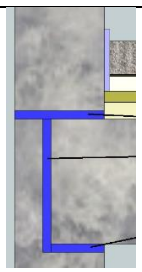
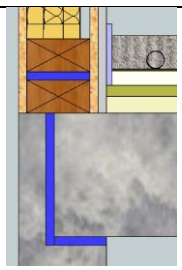
B.1 Application area in general for wood, concrete and steel

		
wood Coefficient of static friction μ = 0,21 Shear stress τ = 0,74 [MPa] Shear strain ε_q = 0,060 Shear moduls G_g = 19,4 [MPa]	**concrete** Coefficient of static friction μ = 0,3 Shear stress τ = 1,07 [MPa] Shear strain ε_q = 0,066 Shear moduls G_g = 28,4 [MPa]	**machine**

B.2 Application area PhoneStrip, examples

		
L – Joint	**L – Joint**	**L – Joint**
		
L – Joint	**L – Joint**	**L – Joint**
		
T - Joint	**T - Joint**	**T - Joint**

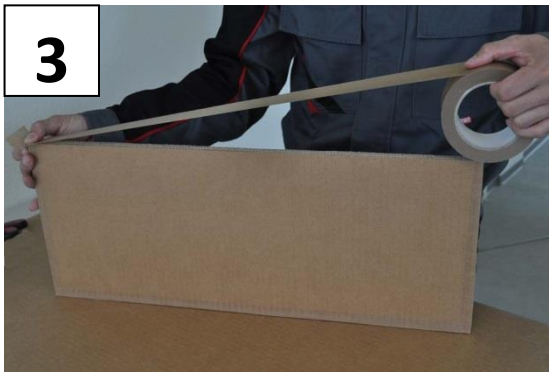
Annex B - Application areas PhoneStrip strips

		
T - Joint	**Concrete solution**	**Concrete/wood solution**

Annex C - Cutting and taping PhoneStar and PhoneStrip

Dimensioning
Measure and mark the cutting line.

Cutting boards
Use a jig saw with metal-ceramic blade or buzz saw with a Widia blade and extraction. When necessarry refill cutting edges with sand.



Taping boards
Tape the cutting edges with Wolf tape only. The tape shall be applied at least 20 mm around the corners.

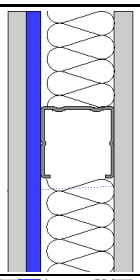
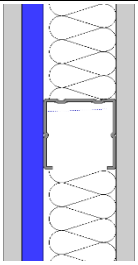
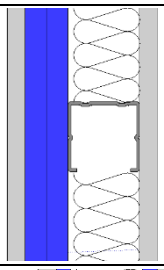
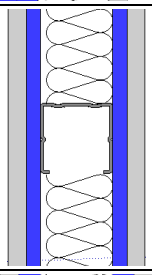
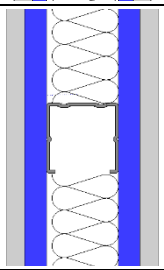
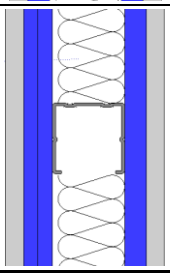
Folding corners
Fold the protruding part of the tape on the edges first and than fold the tape onto the board surface.

Folding longitudinal side
After folding the corners, fold the tape on the longitudinal side and press onto the board surface.

Done

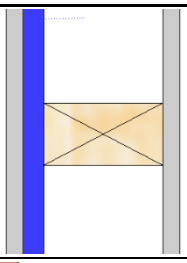
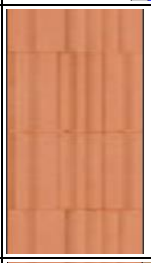
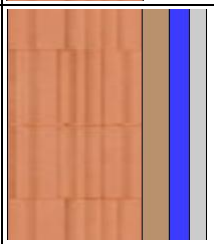
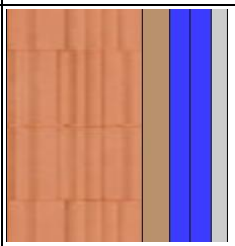
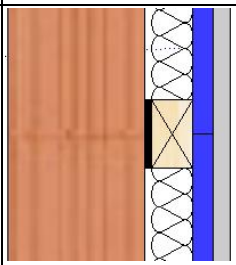
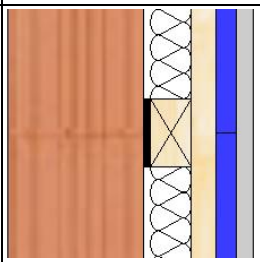
Annex D – Sound insulation PhoneStar

D.1 Airborne sound insulation of walls

Type	Ref. No	Approved Construction	Thickness [mm]	Airborne sound insulation, R_w [dB]	System drawing
1	WSM 1.1	Plasterboard 12,5 mm **PhoneStar Twin 10 mm** Steel stud T 50 mm (Cavity) 40 mm insulation, 105 kg/m³ Plasterboard 12,5 mm	85,0	49 (-4;-11) dB	
2	WSM 1.2	Plasterboard 12,5 mm **PhoneStar Tri 15 mm** Steel stud T 50 mm (Cavity) 40 mm insulation, 105 kg/m³ Plasterboard 12,5 mm	90,0	51 (-3;-10)dB	
3	WSM 1.2 2 x Tri	Plasterboard 12,5 mm **PhoneStar Tri 15 mm** **PhoneStar Tri 15 mm** Steel stud T 45 mm (Cavity) 40 mm insulation, 105 kg/m³ Plasterboard 12,5 mm	105	54 -3;-10) dB	
4	WSM 2.1	Plasterboard 12,5 mm **PhoneStar Twin 10 mm** Steel stud T 50 mm (Cavity) 40 mm insulation, 105 kg/m³ **PhoneStar Twin 10 mm** Plasterboard 12,5 mm	95,0	55 (-4;-11) dB	
5	WSM 2.2	Plasterboard 12,5 mm **PhoneStar Tri 15 mm** Steel stud T 50 mm (Cavity) 40 mm insulation, 105 kg/m³ **PhoneStar Tri 15 mm** Plasterboard 12,5 mm	105,0	59 (-4;-11) dB	
6	WSM 2.1.2 2 x Twin 1 x Tri	Plasterboard 12,5 mm **PhoneStar Twin 10 mm** **PhoneStar Twin 10 mm** Steel stud T 75 mm (Cavity) 60 mm insulation **PhoneStar Tri 15 mm** Plasterboard 12,5 mm	120,0	60 (-1;-5) dB	

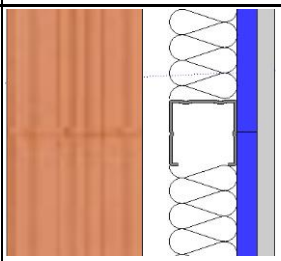
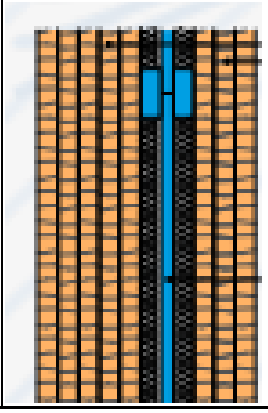
Annex D – Sound insulation PhoneStar

D.1 Airborne sound insulation of walls

Type	Ref. No	Approved Construction	Thickness [mm]	Airborne sound insulation, R_w [dB]	System drawing
7	WSH 1.2	Plasterboard 15,0 mm **PhoneStar Tri 15 mm** Timber stud T 101,6 x 50,8 mm (no Cavity) Plasterboard 15,0 mm	146,6	50 (-1;-5) dB	
	WMZ	Plaster 15 mm Brick 115 mm Plaster 15 mm	145	42 (-2;-4) dB	
8	WMZ W 1.2	Plaster 15 mm Brick 115 mm Plaster 15 mm Soft wood fibre board 12 mm **PhoneStar Tri 15 mm** Plasterboard 12,5 mm	184,5	50 (-1;-5) dB	
9	WMZ W 1.2 2 x Tri	Plaster 15 mm Brick 115 mm Plaster 15 mm Soft wood fibre board 12 mm **PhoneStar Tri 15 mm** **PhoneStar Tri 15 mm** Plasterboard 12,5 mm	199,5	54 (-3;-10) dB	
10	WMZ L 1.2	Plaster 15 mm Brick 115 mm Plaster 15 mm Foam tape 3 mm Battens W 60 x T 40 mm 40 mm mineral wool **PhoneStar Tri 15 mm** Plasterboard 12,5 mm	215,5	59 (-2;-7) dB	
11	WMZ L 1.2 OSB	Plaster 15 mm Brick 115 mm Plaster 15 mm Foam tape 3 mm Battens W 60 x T 40 mm 40 mm mineral wool OSB 18 mm **PhoneStar Tri 15 mm** Plasterboard 12,5 mm	233,5	59 (-2;-6) dB	

Annex D – Sound insulation PhoneStar

D.1 Airborne sound insulation of walls

Type	Ref. No	Approved Construction	Thickness [mm]	Airborne sound insulation, R_w [dB]	System drawing
12	WMZ V 1.2	Plaster 15 mm Brick 115 mm Plaster 15 mm Air cavitiy 10 mm Steel profile CW 50 Mineral Wool 50 mm **PhoneStar Tri 15 mm** Plasterboard 12,5 mm	232,5	66 (-2;-7) dB	
13	WMH One Block	≥ 75 mm Solid Wood (e.g. Magnum Board) 25 mm PhoneStar Schalli with 20 mm Mineral Wool cavity 15 mm PhoneStar Tri er 25 mm PhoneStar Schalli with 20 mm Mineral Wool cavity ≥ 75 mm Solid Wood (e.g. Magnum Board)	265,0	66 (-1; -7) dB	

Annex D – Sound insulation PhoneStar

D.2 Airborne sound insulation and impact sound insulation of timber joist ceilings

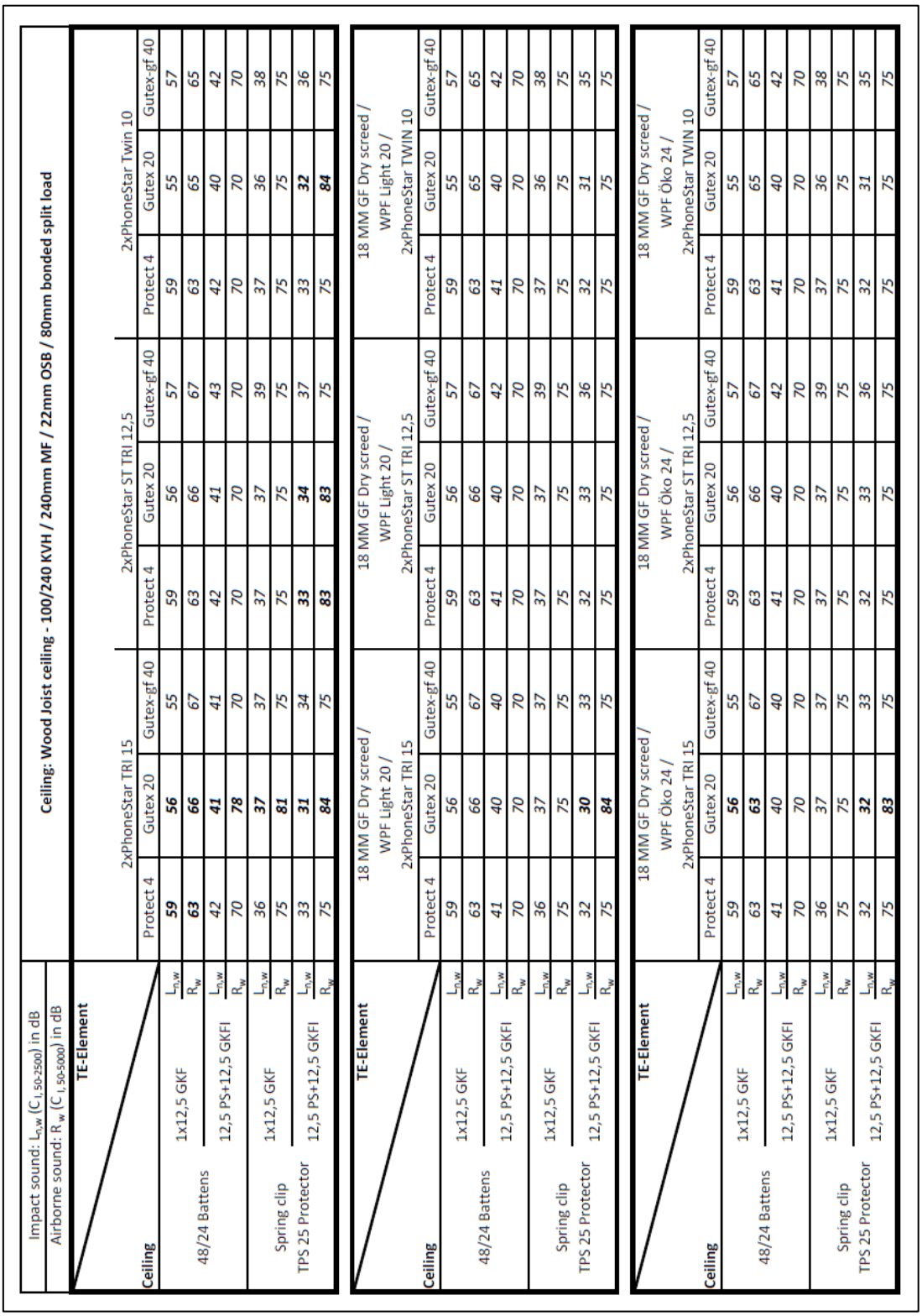
Table D2.1: Product description timber joist ceilings related to table D2.2.

Construction	Description
Wood joist ceiling	80 mm Bouned split 22 mm wooden floor3.6.1 Wooden beams 100 x 240 mm, c.t.c. 625 mm + 2x 120 mm insulation, 20,6 kg/m³
Protect 4	Wolf acoustic plate, ≥ 4 mm, ρ = 800 kg/m³
Gutex 20	Fibreboard, ≥ 20 mm, ρ = 160 kg/m³
Gutexgf-40	Fibreboard, ≥ 40 mm, ρ = 185 kg/m³
SteicoB 20	Fibreboard, ≥ 20 mm, ρ = 250 kg/m³
GF Dry screed	Dry screed with tongue and groove
WPF Licht 20	WOLF-PowerFloor light corrugated cardboard with milled slots for underfloor heating, ≥ 20 mm, ρ = 80 kg/m³
WPF Öko 24	WOLF-PowerFloor Öko fibreboard with milled slots for underfloor heating, ≥ 24 mm, ρ = 270 kg/m³

Annex D – Sound insulation PhoneStar

D.2 Airborne sound insulation and impact sound insulation of timber joist ceilings

Table D2.2: Direct airborne sound (R_w) and impact sound ($L_{n,w}$) insulation for timber joist ceilings



Impact sound: $L_{n,w}$ ($C_{I,50\text{-}2500}$) in dB Airborne sound: R_w ($C_{I,50\text{-}5000}$) in dB		Ceiling: Wood Joist ceiling - 100/240 KVH / 240mm MF / 22mm OSB / 80mm bonded split load									
Ceiling \ TE-Element		2xPhoneStar TRI 15			2xPhoneStar ST TRI 12,5			2xPhoneStar Twin 10			
		Protect 4	Gutex 20	Gutex-gf 40	Protect 4	Gutex 20	Gutex-gf 40	Protect 4	Gutex 20	Gutex-gf 40
48/24 Battens 1x12,5 GKF	$L_{n,w}$	***59***	***56***	*55*	*59*	*56*	*57*	*59*	*55*	*57*
	R_w	***63***	***66***	*67*	*63*	*66*	*67*	*63*	*65*	*65*
48/24 Battens 12,5 PS+12,5 GKFI	$L_{n,w}$	*42*	***41***	*41*	*42*	*41*	*43*	*42*	*40*	*42*
	R_w	*70*	***78***	*70*	*70*	*70*	*70*	*70*	*70*	*70*
Spring clip TPS 25 Protector 1x12,5 GKF	$L_{n,w}$	*36*	***37***	*37*	*37*	*37*	*39*	*37*	*36*	*38*
	R_w	*75*	***81***	*75*	*75*	*75*	*75*	*75*	*75*	*75*
Spring clip TPS 25 Protector 12,5 PS+12,5 GKFI	$L_{n,w}$	*33*	***31***	*34*	***33***	***34***	*37*	*33*	***32***	*36*
	R_w	*75*	***84***	*75*	***83***	***83***	*75*	*75*	***84***	*75*

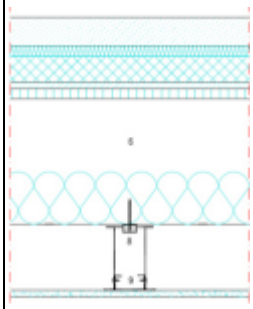
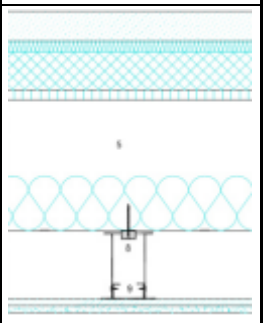
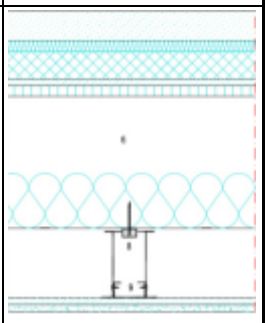
TE-Element		18 MM GF Dry screed / WPF Light 20 / 2xPhoneStar TRI 15			18 MM GF Dry screed / WPF Light 20 / 2xPhoneStar ST TRI 12,5			18 MM GF Dry screed / WPF Light 20 / 2xPhoneStar TWIN 10		
Ceiling		Protect 4	Gutex 20	Gutex-gf 40	Protect 4	Gutex 20	Gutex-gf 40	Protect 4	Gutex 20	Gutex-gf 40
48/24 Battens 1x12,5 GKF	$L_{n,w}$	*59*	*56*	*55*	*59*	*56*	*57*	*59*	*55*	*57*
	R_w	*63*	*66*	*67*	*63*	*66*	*67*	*63*	*65*	*65*
48/24 Battens 12,5 PS+12,5 GKFI	$L_{n,w}$	*41*	*40*	*40*	*41*	*40*	*42*	*41*	*40*	*42*
	R_w	*70*	*70*	*70*	*70*	*70*	*70*	*70*	*70*	*70*
Spring clip TPS 25 Protector 1x12,5 GKF	$L_{n,w}$	*36*	*37*	*37*	*37*	*37*	*39*	*37*	*36*	*38*
	R_w	*75*	*75*	*75*	*75*	*75*	*75*	*75*	*75*	*75*
Spring clip TPS 25 Protector 12,5 PS+12,5 GKFI	$L_{n,w}$	*32*	*30*	*33*	*32*	*33*	*36*	*32*	*31*	*35*
	R_w	*75*	***84***	*75*	*75*	*75*	*75*	*75*	*75*	*75*

TE-Element		18 MM GF Dry screed / WPF Öko 24 / 2xPhoneStar TRI 15			18 MM GF Dry screed / WPF Öko 24 / 2xPhoneStar ST TRI 12,5			18 MM GF Dry screed / WPF Öko 24 / 2xPhoneStar TWIN 10		
Ceiling		Protect 4	Gutex 20	Gutex-gf 40	Protect 4	Gutex 20	Gutex-gf 40	Protect 4	Gutex 20	Gutex-gf 40
48/24 Battens 1x12,5 GKF	$L_{n,w}$	*59*	***56***	*55*	*59*	*56*	*57*	*59*	*55*	*57*
	R_w	*63*	***63***	*67*	*63*	*66*	*67*	*63*	*65*	*65*
48/24 Battens 12,5 PS+12,5 GKFI	$L_{n,w}$	*41*	*40*	*40*	*41*	*40*	*42*	*41*	*40*	*42*
	R_w	*70*	*70*	*70*	*70*	*70*	*70*	*70*	*70*	*70*
Spring clip TPS 25 Protector 1x12,5 GKF	$L_{n,w}$	*36*	*37*	*37*	*37*	*37*	*39*	*37*	*36*	*38*
	R_w	*75*	*75*	*75*	*75*	*75*	*75*	*75*	*75*	*75*
Spring clip TPS 25 Protector 12,5 PS+12,5 GKFI	$L_{n,w}$	*32*	***32***	*33*	*32*	*33*	*36*	*32*	*31*	*35*
	R_w	*75*	***83***	*75*	*75*	*75*	*75*	*75*	*75*	*75*

The distance of the acoustic TPS-hangers was at the measurement 41,7 cm x 31,25 cm. 99 pieces where installed.
Optional text: With reduction of bounded split of 80 mm to 60 mm is an increase of $\Delta_{Ln,w}$ = 3 dB; and with a reduction to 40 mm of $\Delta_{Ln,w}$ = 6 dB to be considered. Without any bounded split is an increase of $\Delta_{Ln,w}$ = 14 dB and on Rw = - 14 dB on batten. At TPS System it is +/- 20 dB corections.

Annex D – Sound insulation PhoneStar

D.2 Airborne sound insulation and impact sound insulation of timber joist ceilings

Type	Ref. No	Approved Construction	Thickness [mm]	Impact sound $L_{n,w}$ Airborne sound insulation, R_w [dB]	System drawing
1		50 mm screed 20 mm mineral wool 50 mm polostiry 12,5 mm PhoneStar ST Tri 19 mm chipboard 240 mm joints 100 mm mineral wool cavity 127 mm direct vibration hanger 12,5 mm plaster board	531,0	$L_{n,w}$ (C_I) = 41 (2) dB R_w (C; Ctr) = 79 (-7; -15) dB	
2		50 mm screed 20 mm mineral wool 70 mm polostiry 19 mm chipboard 240 mm mm joints 100 mm mineral wool cavity 127 mm direct vibration hanger 12,5 mm PhoneStar ST Tri 12,5 mm plaster board	551,0	$L_{n,w}$ (C_I) = 37 (1) dB R_w (C; Ctr) = 81 (-5; -13) dB	
3		50 mm screed 20 mm mineral wool 50 mm polostiry 12,5 mm PhoneStar ST Tri 19 mm chipboard 240 mm mm joints 100 mm mineral wool cavity 127 mm direct vibration hanger 12,5 mm PhoneStar ST Tri 12,5 mm plaster board	544,0	$L_{n,w}$ (C_I) = 32 (2) dB R_w (C; Ctr) = 82 (-4; -11) dB	

Annex D – Sound insulation PhoneStar

D.3 Airborne sound insulation and impact sound insulation of solid wood ceilings

Table D3.1: Product description solid wood ceilings related to table D3.2.

Construction	Description
Solid wood ceiling	80 mm bonded split 140 mm CLT (40/20/20/20/40)
Protect 4	Wolf acoustic board, ≥ 4 mm, ρ = 800 kg/m³
Floor 220	Wood fibreboard, ≥ 20 mm, ρ = 220 kg/m³
Akustic EP 3	Mineral fibreboard, 20 mm, s' ≤ 40 MN/m³
GF Dry screed	18 mm dry screed with tongue and groove
Screed	≥ 45 mm Screed
WPF Light 20	WOLF-PowerFloor Light corrugated cardboard with milled slots for underfloor heating, ≥ 20 mm, ρ = 80 kg/m³
WPF Öko 24 WPF Öko Plus 24	WOLF-PowerFloor Öko / Öko Plus wood fibreboard with milled slots for underfloor heating, ≥ 24 mm, ρ = 270 kg/m³

Table D3.2: Direct airborne sound (R_w) and impact sound (L_{nw}) insulation for solid wood ceilings

Impact sound: $L_{n,w}$ ($C_{I,50-2500}$) in dB Airborne sound: R_w ($C_{I,50-5000}$) in dB			Ceiling: solid wood ceiling - 140 mm / 80 mm bonded split load								
TE-Element / Ceiling			1xPhoneStar TRI 15			1xPhoneStar ST TRI 12,5			1xPhoneStar Twin 10		
			Protect 4	FLOOR 220	Akustic EP 3	Protect 4	FLOOR 220	Akustic EP 3	Protect 4	FLOOR 220	Akustic EP 3
view ceiling		$L_{n,w}$	52	47	**44**	52	47	44	54	49	46
		R_w	57	61	**55**	55	59	59	52	56	56
Batten 60/40	**12,5 PS ST Tri +**	$L_{n,w}$	56	51	48	56	51	48	58	53	50
	12,5 GKB	R_w	53	57	57	51	55	55	48	52	52
Batten 60/40 Spring	**12,5 PS ST Tri +**	$L_{n,w}$	38	33	30	38	33	30	40	35	32
Clips TPS 25	**12,5 GKB**	R_w	68	72	72	66	70	70	63	67	67

TE-Element / Ceiling			2xPhoneStar TRI 15			2xPhoneStar ST TRI 12,5			2xPhoneStar TWIN 10		
			Protect 4	FLOOR 220	Akustic EP 3	Protect 4	FLOOR 220	Akustic EP 3	Protect 4	FLOOR 220	Akustic EP 3
view ceiling		$L_{n,w}$	**49**	**44**	**41**	49	44	**40**	51	46	**43**
		R_w	**64**	**68**	**68**	62	66	**66**	59	63	**63**
Batten 60/40	12,5 PS ST Tri +	$L_{n,w}$	53	48	**45**	53	48	45	55	50	47
	12,5 GKB	R_w	60	64	**64**	58	62	62	55	59	59
Batten 60/40 Spring	12,5 PS ST Tri +	$L_{n,w}$	35	30	**27**	35	30	27	37	32	29
Clips TPS 25	12,5 GKB	R_w	75	75	**79**	73	75	75	70	74	74

TE-Element / Ceiling			18 MM GF Dry screed / 2xPhoneStar TRI 15			18 MM GF Dry screed / 2xPhoneStar ST TRI 12,5			18 MM GF Dry screed / 2xPhoneStar TWIN 10		
			Protect 4	FLOOR 220	Akustic EP 3	Protect 4	FLOOR 220	Akustic EP 3	Protect 4	FLOOR 220	Akustic EP 3
view ceiling		$L_{n,w}$	55	47	**44**	52	47	44	54	49	46
		R_w	62	66	**66**	60	64	64	57	61	61
Batten 60/40	12,5 PS ST Tri +	$L_{n,w}$	56	51	48	56	51	48	58	53	50
	12,5 GKB	R_w	58	62	62	56	60	60	53	57	57
Batten 60/40 Spring	12,5 PS ST Tri +	$L_{n,w}$	35	30	**27**	35	30	27	37	32	29
Clips TPS 25	12,5 GKB	R_w	75	75	**79**	73	75	75	70	74	74

Annex D – Sound insulation PhoneStar

D.3 Airborne sound insulation and impact sound insulation of solid wood ceilings

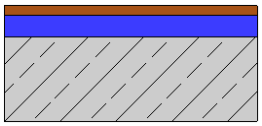
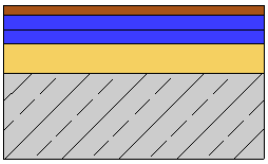
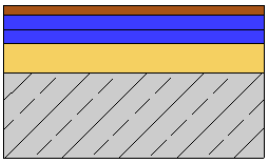
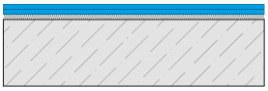
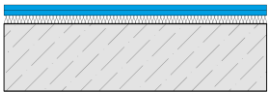
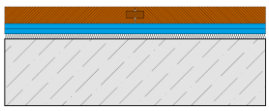
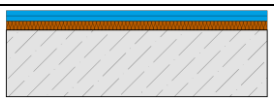
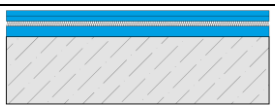
TE-Element / Ceiling			50 mm screed / 2xPhoneStar TRI 15			50 mm screed / 2xPhoneStar ST TRI 12,5			50 mm screed / 2xPhoneStar TWIN 10		
			Protect 4	FLOOR 220	Akustic EP 3	Protect 4	FLOOR 220	Akustic EP 3	Protect 4	FLOOR 220	Akustic EP 3
view ceiling		$L_{n,w}$	53	48	**45**	53	48	45	55	50	47
		R_w	66	70	**70**	64	68	68	61	65	65
Batten 60/40	12,5 PS ST Tri + 12,5 GKB	$L_{n,w}$	57	52	49	57	52	49	59	54	51
		R_w	62	66	66	56	64	64	57	61	61
Batten 60/40 Spring Clips TPS 25	12,5 PS ST Tri + 12,5 GKB	$L_{n,w}$	39	34	31	39	34	31	41	36	33
		R_w	75	75	75	75	75	75	72	75	75

TE-Element / Ceiling			18 MM GF Dry screed / WPF Light 20 oder WPF Öko 24 / 2xPhoneStar TRI 15			18 MM GF Dry screed / WPF Light 20 oder WPF Öko 24 / 2xPhoneStar TRI 15			18 MM GF Dry screed / WPF Light 20 oder WPF Öko 24 / 2xPhoneStar TRI 15		
			Protect 4	FLOOR 220	Akustic EP 3	Protect 4	FLOOR 220	Akustic EP 3	Protect 4	FLOOR 220	Akustic EP 3
view ceiling		$L_{n,w}$	51	46	**43**	51	46	43	53	48	45
		R_w	62	66	**66**	60	64	64	57	61	61
Batten 60/40	12,5 PS ST Tri + 12,5 GKB	$L_{n,w}$	55	50	47	55	50	47	57	52	49
		R_w	58	62	62	56	60	60	53	57	57
Batten 60/40 Spring Clips TPS 25	12,5 PS ST Tri + 12,5 GKB	$L_{n,w}$	36	31	28	36	31	28	38	33	30
		R_w	73	75	75	71	75	75	68	72	72

The distance of spring clibs TPS 25 was at measurement 62.5 cm x 31.25 cm. 102 pieces are installed.
The reduction of bounded split form 80 mm to 60 mm increases Lnw + 3 dB and R w - 3 dB; and reduction to 40 mm increase Lnw + 6 dB and Rw - 6 dB.
No bounded splitt on top of solid wood ceiling increase Lnw + 15 dB and decrease Rw - 14 dB.
The sound values in the matrix can be used at all solid wood ceilings. If you have a solid OSB ceiling the values has to be reduced by 1 dB
In case the solid ceilings and floor systems are thicker and the maintained constructions stays the same you can use the values too.

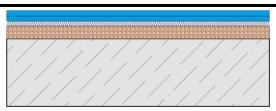
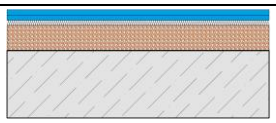
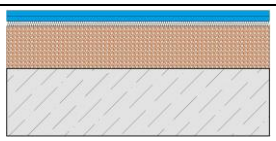
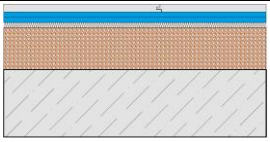
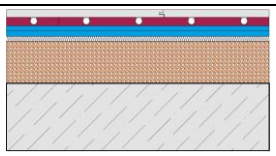
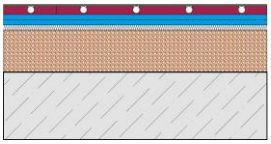
Annex D – Sound insulation PhoneStar

D.4.1 Impact sound insulation of concrete ceilings

Type	Ref. No	Construction	Thickness [mm]	Impact sound insulation, $\Delta L_{n,w}$ [dB]	System drawing
1	BM 1.2	Laminat floor thickness ≥ 8 mm **PhoneStar Tri** Concrete ceiling 140 mm	23,0	22 (-11) dB	
2	BM 1.6	Laminat floor thickness ≥ 8 mm **2 x PhoneStar Tri 15 mm** Wood fiber 20 mm Concrete ceiling 140 mm	58,0	26 (-13) dB	
3	BM 1.5	Laminat floor thickness ≥ 8 mm **2 x PhoneStar Twin 10 mm** Wood fiber 20 mm Concrete ceiling 140 mm	48,0	25 (-14) dB	
4	BM 1.6.2	2 x PhoneStar ST Tri 12,5 mm Mineral fiber 12 mm Concrete ceiling 160 mm	37,0	32 (-12) dB	
5	BM 1.6.3	2 x PhoneStar ST Tri 12,5 mm Mineral fiber 20 mm Concrete ceiling 160 mm	45,0	36 (-12) dB	
6	BM 1.11.2	Dry screed wood fiber, 40 mm 2 x PhoneStar ST Tri 12,5 mm Mineral fiber 12 mm Concrete ceiling 160 mm	77,0	32 (-13) dB	
7	BM 1.6.1	2 x PhoneStar ST Tri 12,5 mm Wood fiber 22 mm Concrete ceiling 160 mm	47,0	24 (-11) dB	
8	BM 1.6.2.1	2 x PhoneStar ST Tri 12,5 mm Mineral fiber 12 mm PhoneStar25 - 25 mm Concrete ceiling 160 mm	62,0	34 (-12) dB	

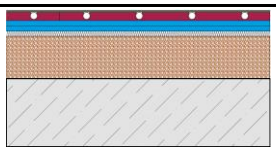
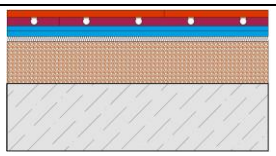
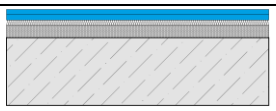
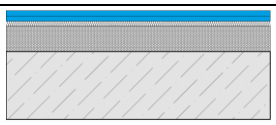
Annex D – Sound insulation PhoneStar

D.4.1 Impact sound insulation of concrete ceilings

Type	Ref. No	Construction	Thickness [mm]	Impact sound insulation, $\Delta L_{n,w}$ [dB]	System drawing
9	BM 1.10.1	2 x PhoneStar ST Tri 12,5 mm Mineral fiber 12 mm dry fill material CW2000, 30mm Concrete ceiling 160 mm	67,0	38 (-13) dB	
10	BM 1.10.2	2 x PhoneStar ST Tri 12,5 mm Mineral fiber 12 mm dry fill material CW2000, 60mm Concrete ceiling 160 mm	97,0	43 (-13) dB	
11	BM 1.10.3	2 x PhoneStar ST Tri 12,5 mm Mineral fiber 12 mm dry fill material CW2000, 100mm Concrete ceiling 160 mm	137,0	43 (-11) dB	
12	BM 1.11.1	Dry screed gypsum fiber, 18 mm 2 x PhoneStar ST Tri 12,5 mm Mineral fiber 12 mm dry fill material CW2000, 100mm Concrete ceiling 160 mm	155,0	39 (-11) dB	
13	BM 1.12.1	Dry screed gypsum fiber, 18 mm Heading floor, WPF Light 20mm 2 x PhoneStar ST Tri 12,5 mm Mineral fiber 12 mm dry fill material CW2000, 100mm Concrete ceiling 160 mm	175,0	40 (-11) dB	
13 14	BM 1.12.2	decoupling board EKP, 4mm Heading floor, WPF Light 20mm 2 x PhoneStar ST Tri 12,5 mm Mineral fiber 12 mm dry fill material CW2000, 100mm Concrete ceiling 160 mm	161,0	42 (-11) dB	

Annex D – Sound insulation PhoneStar

D.4.1 Impact sound insulation of concrete ceilings

Type	Ref. No	Construction	Thickness [mm]	Impact sound insulation, $\Delta L_{n,w}$ [dB]	System drawing
14	BM 1.12.2	decoupling board EKP, 4mm Heading floor, WPF Light 20mm 2 x PhoneStar ST Tri 12,5 mm Mineral fiber 12 mm dry fill material CW2000, 100mm Concrete ceiling 160 mm	161,0	42 (-11) dB	
15	BM 1.12.3	Clay tiles - Tonality, 18 mm Heading floor, WPF Light 20mm 2 x PhoneStar ST Tri 12,5 mm Mineral fiber 12 mm dry fill material CW2000, 100mm Concrete ceiling 160 mm	175,0	39 (-12) dB	
16	BM 1.10.4	2 x PhoneStar ST Tri 12,5 mm Mineral fiber 12 mm dry fill material (perlite),Thermo-Plan, 30mm Concrete ceiling 160 mm	67,0	38 (-13) dB	
17	BM 1.10.5	2 x PhoneStar ST Tri 12,5 mm Mineral fiber 12 mm dry fill material (perlite),Thermo-Plan, 90mm Concrete ceiling 160 mm	127,0	40 (-13) dB	

Annex D – Sound insulation PhoneStar

D.4.2 Airborne sound insulation R_w, impact sound level $L_{n,w}$ and impact sound improvement $\Delta L_{n,w}$ of solid ceilings

Raw Ceiling — 160 mm concrete ceiling

TE-Element / AGL-bulk		2xPhoneStar Tri 15					2xPhoneStar ST Tri 12,5					2xPhonestar Twin 10				
		Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE	Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE	Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE
none	$L_{n,w}$	54	55	40	42	47	52	54	39	41	45	55	56	43	45	48
	R_w	59	68	70	67	66	59	67	69	66	65	58	66	68	65	64
PhoneStar 25	$L_{n,w}$	51	53	38	40	44	50	51	37	39	43	52	54	41	43	46
	R_w	60	69	71	68	67	60	68	70	67	66	59	67	69	66	65
Thermo-Plan 30 mm	$L_{n,w}$	46	47	35	36	40	45	46	33	35	39	48	49	38	39	43
	R_w	63	72	74	71	70	62	70	72	69	68	62	70	72	69	68
Cemmwood 30 mm	$L_{n,w}$	46	48	35	36	40	45	47	33	35	38	48	49	38	39	43
	R_w	64	73	75	72	70	63	71	73	70	69	63	71	73	70	68
Cemmwood 60 mm	$L_{n,w}$	43	45	30	32	36	42	44	29	30	34	45	46	33	34	38
	R_w	66	75	≥75	73	72	65	73	75	72	71	65	73	74	71	70
Thermo-Plan 100 mm	$L_{n,w}$	45	47	33	34	38	43	46	31	33	36	46	48	36	37	40
	R_w	62	71	73	70	69	61	70	72	69	68	61	70	71	69	67
Cemmwood 100 mm	$L_{n,w}$	43	45	29	31	35	41	43	28	30	34	44	46	31	33	37
	R_w	67	≥75	≥75	75	74	66	75	≥75	74	73	66	75	≥75	73	72

raw ceiling — 160 mm concrete ceiling

TE-Element / AGL-bulk		2xPhoneStar Tri 15					2xPhoneStar ST Tri 12,5					2xPhonestar Twin 10				
		Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE	Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE	Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE
none	$\Delta L_{n,w}$	24	22	36	34	30	26	24	38	36	32	23	21	34	32	28
PhoneStar 25	$\Delta L_{n,w}$	26	25	38	36	32	28	26	40	38	34	25	23	36	34	30
Thermo-Plan 30 mm	$\Delta L_{n,w}$	31	30	42	40	37	32	31	43	42	38	29	29	39	38	34
Cemmwood 30 mm	$\Delta L_{n,w}$	31	30	42	41	37	32	31	43	42	38	29	29	39	38	34
Cemmwood 60 mm	$\Delta L_{n,w}$	34	32	46	45	41	36	34	48	46	43	33	31	43	42	39
Thermo-Plan 100 mm	$\Delta L_{n,w}$	33	31	44	43	39	34	32	45	44	40	31	29	41	40	36
Cemmwood 100 mm	$\Delta L_{n,w}$	34	33	48	45	41	36	35	49	47	43	33	32	45	43	39

Annex D – Sound insulation PhoneStar

D.4.2 Airborne sound insulation R_w, impact sound level $L_{n,w}$ and impact sound improvement $\Delta L_{n,w}$ of solid ceilings

raw ceiling — 160 mm concrete ceiling

TE-Element / AGL-bulk		18 mm Wolf Hugo 2xPhoneStar Tri 15					18 mm Wolf Hugo 2xPhoneStar ST Tri 12,5					18 mm Wolf Hugo 2xPhonestar Twin 10				
		Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE	Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE	Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE
none	$L_{n,w}$	63	68	44	47	52	61	66	42	46	50	63	68	45	49	53
	R_w	60	69	71	68	67	59	68	70	67	66	59	67	69	66	65
PhoneStar 25	$L_{n,w}$	60	65	41	45	49	58	64	39	43	47	61	65	43	46	51
	R_w	61	70	72	69	68	60	69	71	68	67	60	68	70	67	66
Thermo-Plan 30 mm	$L_{n,w}$	54	58	37	40	44	53	57	35	38	42	55	55	39	41	45
	R_w	63	72	74	72	70	62	71	73	70	69	62	71	73	70	69
Cemmwood 30 mm	$L_{n,w}$	55	61	37	40	44	53	60	35	39	43	56	61	39	41	45
	R_w	64	73	75	72	71	63	72	74	71	70	63	72	74	71	70
Cemmwood 60 mm	$L_{n,w}$	53	59	33	38	42	52	57	31	36	40	54	59	35	39	43
	R_w	66	75	≥75	74	73	65	74	≥75	73	72	65	74	75	72	71
Thermo-Plan 100 mm	$L_{n,w}$	55	60	35	39	43	54	60	33	38	42	56	61	37	41	44
	R_w	62	71	74	71	70	61	70	73	70	68	61	70	72	69	68
Cemmwood 100 mm	$L_{n,w}$	52	57	33	37	41	50	55	31	35	38	52	57	34	38	42
	R_w	67	≥75	≥75	≥75	75	67	≥75	≥75	75	74	66	75	≥75	74	73

raw ceiling — 160 mm conrete ceiling

TE-Element / AGL-bulk		18 mm Wolf Hugo 2xPhoneStar Tri 15					18 mm Wolf Hugo 2xPhoneStar ST Tri 12,5					18 mm Wolf Hugo 2xPhonestar Twin 10				
		Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE	Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE	Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE
none	$\Delta L_{n,w}$	16	11	34	30	25	17	13	35	32	27	15	11	32	29	24
PhoneStar 25	$\Delta L_{n,w}$	18	14	36	32	28	20	15	37	34	30	17	14	34	31	27
Thermo-Plan 30 mm	$\Delta L_{n,w}$	24	20	40	37	33	25	21	41	39	35	23	19	37	36	31
Cemmwood 30 mm	$\Delta L_{n,w}$	23	18	40	37	33	25	19	42	39	35	22	18	38	36	32
Cemmwood 60 mm	$\Delta L_{n,w}$	25	20	44	40	36	27	22	46	42	38	24	20	42	39	35
Thermo-Plan 100 mm	$\Delta L_{n,w}$	23	19	42	39	34	25	19	44	40	36	23	18	40	37	33
Cemmwood 100 mm	$\Delta L_{n,w}$	26	22	45	41	36	28	24	46	43	39	26	22	43	40	35

Annex D – Sound insulation PhoneStar

D.4.2 Airborne sound insulation R_w, impact sound level $L_{n,w}$ and impact sound improvement $\Delta L_{n,w}$ of solid ceilings

raw ceiling: 160 mm concrete ceiling

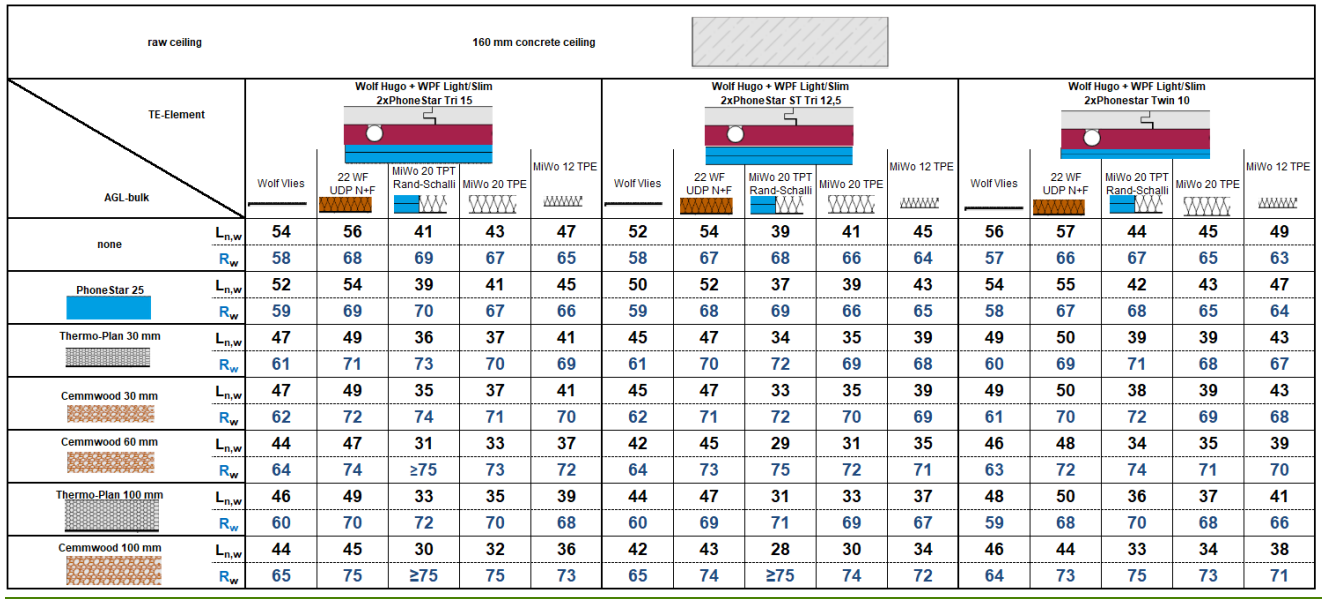
TE-Element / AGL-bulk		AGEPAN Dry-Screed; 40 mm TEP 2xPhoneStar Tri 15					AGEPAN Dry-Screed; 40 mm TEP 2xPhoneStar ST Tri 12,5					AGEPAN Dry-Screed; 40 mm TEP 2xPhonestar Twin 10				
		Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE	Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE	Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE
none	$L_{n,w}$	55	57	41	43	47	53	55	39	41	45	57	58	44	44	49
	R_w	60	69	71	68	67	60	68	70	67	66	59	67	69	66	65
PhoneStar 25	$L_{n,w}$	53	54	39	41	45	51	52	37	39	43	55	55	42	43	47
	R_w	61	70	72	69	68	61	69	71	68	67	60	68	70	67	66
Thermo-Plan 30 mm	$L_{n,w}$	47	49	36	37	41	45	47	34	35	39	49	50	39	39	44
	R_w	64	73	75	72	71	64	72	74	71	70	63	71	73	70	69
Cemmwood 30 mm	$L_{n,w}$	47	50	36	35	41	45	48	34	35	39	49	51	39	39	44
	R_w	65	74	≥75	73	71	65	73	75	72	71	64	72	74	71	70
Cemmwood 60 mm	$L_{n,w}$	45	47	32	32	36	43	45	30	30	35	47	48	35	34	40
	R_w	67	≥75	≥75	75	73	67	75	≥75	74	72	66	74	≥75	73	71
Thermo-Plan 100 mm	$L_{n,w}$	47	49	34	35	39	45	47	32	33	37	49	50	37	37	41
	R_w	63	73	75	72	71	63	72	74	71	70	64	71	73	70	69
Cemmwood 100 mm	$L_{n,w}$	44	46	30	32	36	42	44	27	30	34	46	47	32	34	39
	R_w	68	≥75	≥75	≥75	75	68	≥75	≥75	75	74	67	≥75	≥75	74	73

raw ceiling: 160 mm concrete ceiling

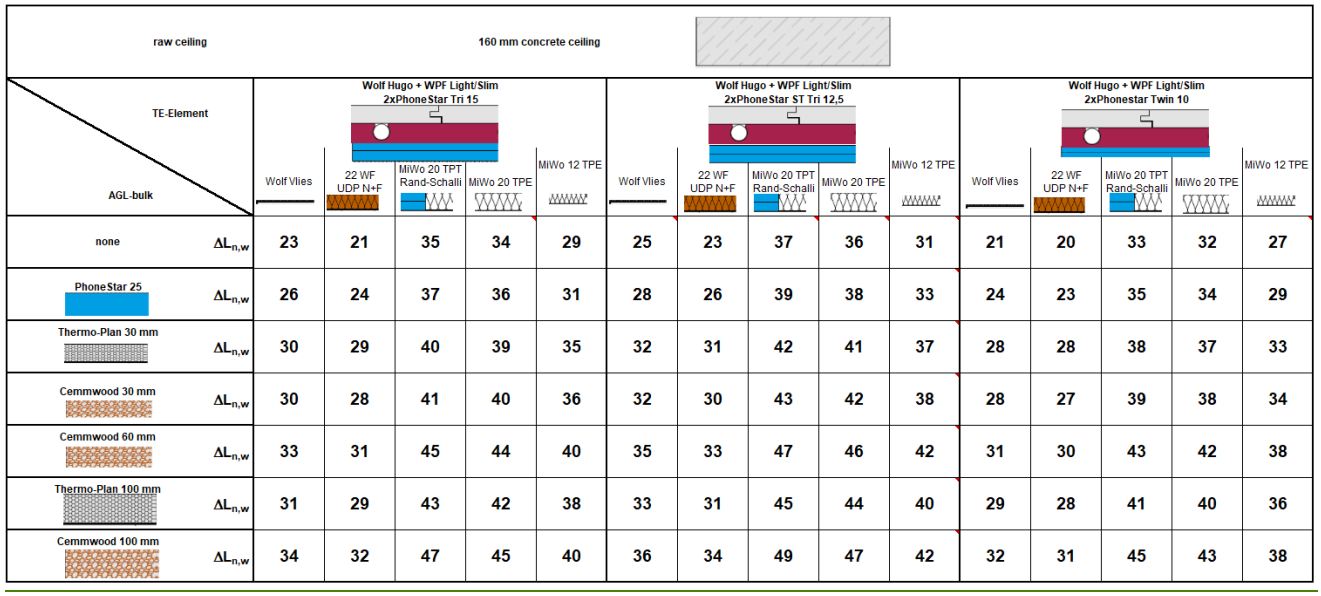
TE-Element / AGL-bulk		AGEPAN Dry-Screed; 40 mm TEP 2xPhoneStar Tri 15					AGEPAN Dry-Screed; 40 mm TEP 2xPhoneStar ST Tri 12,5					AGEPAN Dry-Screed; 40 mm TEP 2xPhonestar Twin 10				
		Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE	Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE	Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE
none	$\Delta L_{n,w}$	23	24	35	34	30	25	23	37	36	32	21	20	33	32	28
PhoneStar 25	$\Delta L_{n,w}$	25	23	38	36	32	27	25	40	38	34	23	22	36	34	30
Thermo-Plan 30 mm	$\Delta L_{n,w}$	30	29	41	40	36	32	31	43	42	38	28	28	39	38	34
Cemmwood 30 mm	$\Delta L_{n,w}$	30	28	41	40	36	32	30	43	42	38	28	27	39	38	34
Cemmwood 60 mm	$\Delta L_{n,w}$	33	31	45	44	40	35	33	47	46	42	31	30	44	42	38
Thermo-Plan 100 mm	$\Delta L_{n,w}$	31	29	43	42	38	33	31	45	44	40	29	28	41	40	36
Cemmwood 100 mm	$\Delta L_{n,w}$	34	32	47	45	41	36	34	49	47	43	32	31	44	43	39

Annex D – Sound insulation PhoneStar

D.4.2 Airborne sound insulation R_w, impact sound level $L_{n,w}$ and impact sound improvement $\Delta L_{n,w}$ of solid ceilings



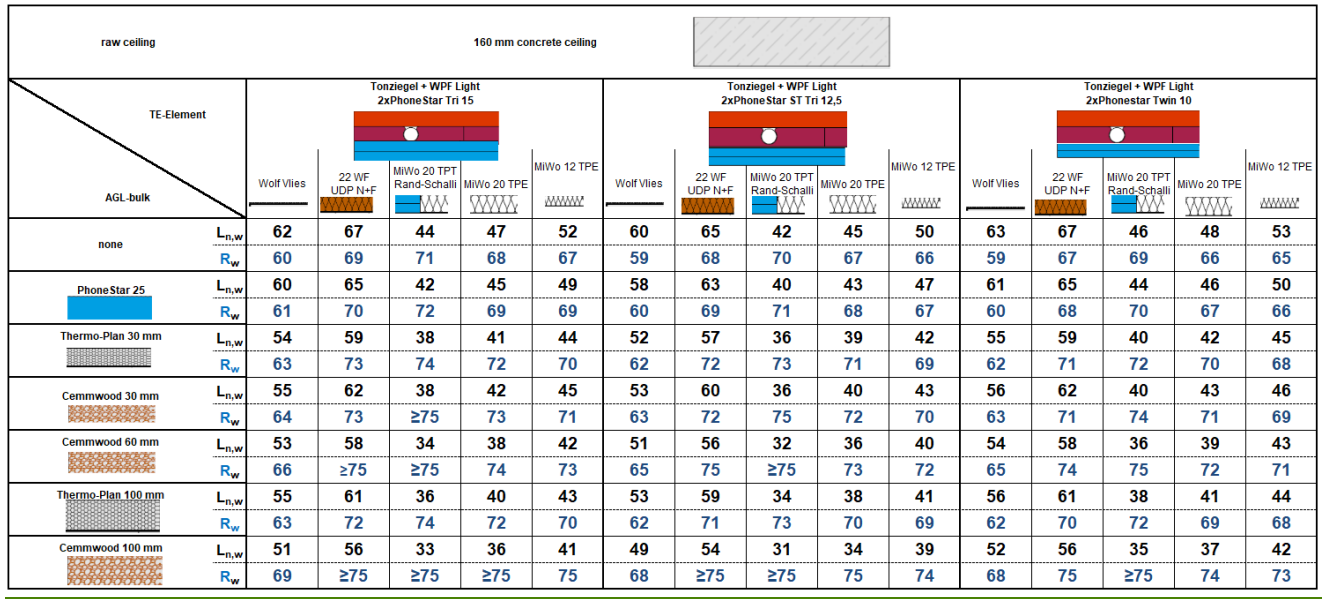
AGL-bulk		Wolf Hugo + WPF Light/Slim 2xPhoneStar Tri 15					Wolf Hugo + WPF Light/Slim 2xPhoneStar ST Tri 12,5					Wolf Hugo + WPF Light/Slim 2xPhonestar Twin 10				
	TE-Element	Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE	Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE	Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE
none	$L_{n,w}$	54	56	41	43	47	52	54	39	41	45	56	57	44	45	49
	R_w	58	68	69	67	65	58	67	68	66	64	57	66	67	65	63
PhoneStar 25	$L_{n,w}$	52	54	39	41	45	50	52	37	39	43	54	55	42	43	47
	R_w	59	69	70	67	66	59	68	69	66	65	58	67	68	65	64
Thermo-Plan 30 mm	$L_{n,w}$	47	49	36	37	41	45	47	34	35	39	49	50	39	39	43
	R_w	61	71	73	70	69	61	70	72	69	68	60	69	71	68	67
Cemmwood 30 mm	$L_{n,w}$	47	49	35	37	41	45	47	33	35	39	49	50	38	39	43
	R_w	62	72	74	71	70	62	71	72	70	69	61	70	72	69	68
Cemmwood 60 mm	$L_{n,w}$	44	47	31	33	37	42	45	29	31	35	46	48	34	35	39
	R_w	64	74	≥75	73	72	64	73	75	72	71	63	72	74	71	70
Thermo-Plan 100 mm	$L_{n,w}$	46	49	33	35	39	44	47	31	33	37	48	50	36	37	41
	R_w	60	70	72	70	68	60	69	71	69	67	59	68	70	68	66
Cemmwood 100 mm	$L_{n,w}$	44	45	30	32	36	42	43	28	30	34	46	44	33	34	38
	R_w	65	75	≥75	75	73	65	74	≥75	74	72	64	73	75	73	71



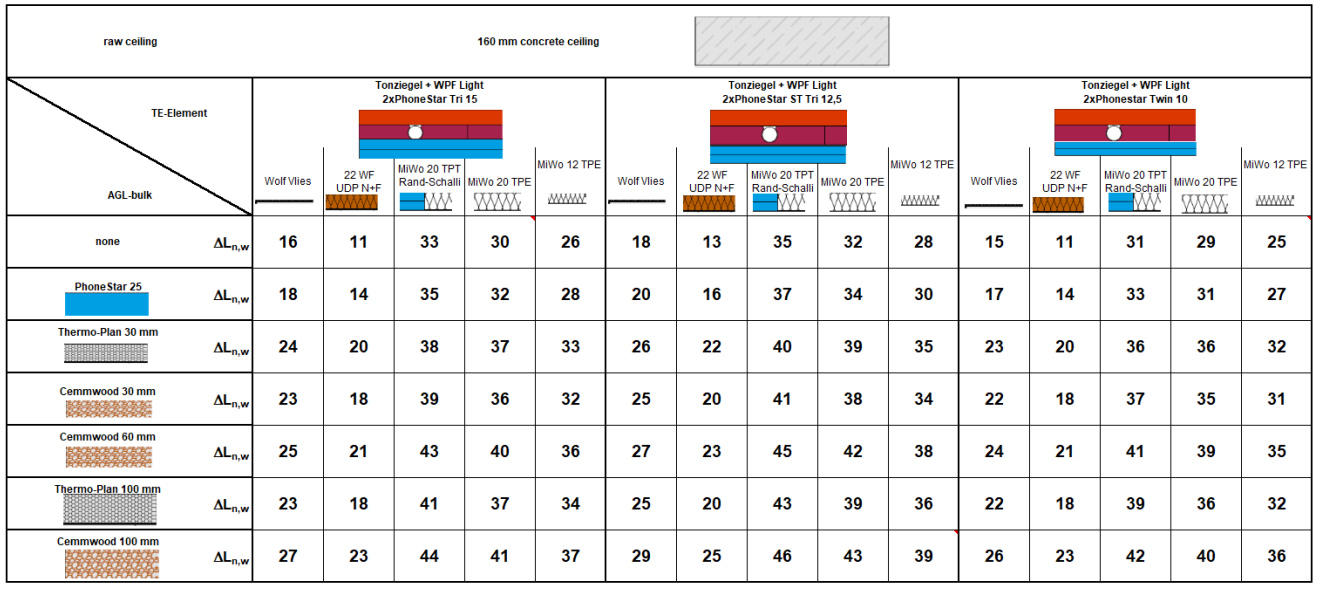
AGL-bulk		Wolf Hugo + WPF Light/Slim 2xPhoneStar Tri 15					Wolf Hugo + WPF Light/Slim 2xPhoneStar ST Tri 12,5					Wolf Hugo + WPF Light/Slim 2xPhonestar Twin 10				
	TE-Element	Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE	Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE	Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE
none	$\Delta L_{n,w}$	23	21	35	34	29	25	23	37	36	31	21	20	33	32	27
PhoneStar 25	$\Delta L_{n,w}$	26	24	37	36	31	28	26	39	38	33	24	23	35	34	29
Thermo-Plan 30 mm	$\Delta L_{n,w}$	30	29	40	39	35	32	31	42	41	37	28	28	38	37	33
Cemmwood 30 mm	$\Delta L_{n,w}$	30	28	41	40	36	32	30	43	42	38	28	27	39	38	34
Cemmwood 60 mm	$\Delta L_{n,w}$	33	31	45	44	40	35	33	47	46	42	31	30	43	42	38
Thermo-Plan 100 mm	$\Delta L_{n,w}$	31	29	43	42	38	33	31	45	44	40	29	28	41	40	36
Cemmwood 100 mm	$\Delta L_{n,w}$	34	32	47	45	40	36	34	49	47	42	32	31	45	43	38

Annex D – Sound insulation PhoneStar

D.4.2 Airborne sound insulation R_w, impact sound level $L_{n,w}$ and impact sound improvement $\Delta L_{n,w}$ of solid ceilings



raw ceiling		160 mm concrete ceiling														
TE-Element / AGL-bulk		Tonziegel + WPF Light 2xPhoneStar Tri 15					Tonziegel + WPF Light 2xPhoneStar ST Tri 12,5					Tonziegel + WPF Light 2xPhonestar Twin 10				
		Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE	Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE	Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE
none	$L_{n,w}$	62	67	44	47	52	60	65	42	45	50	63	67	46	48	53
	R_w	60	69	71	68	67	59	68	70	67	66	59	67	69	66	65
PhoneStar 25	$L_{n,w}$	60	65	42	45	49	58	63	40	43	47	61	65	44	46	50
	R_w	61	70	72	69	69	60	69	71	68	67	60	68	70	67	66
Thermo-Plan 30 mm	$L_{n,w}$	54	59	38	41	44	52	57	36	39	42	55	59	40	42	45
	R_w	63	73	74	72	70	62	72	73	71	69	62	71	72	70	68
Cemmwood 30 mm	$L_{n,w}$	55	62	38	42	45	53	60	36	40	43	56	62	40	43	46
	R_w	64	73	≥75	73	71	63	72	75	72	70	63	71	74	71	69
Cemmwood 60 mm	$L_{n,w}$	53	58	34	38	42	51	56	32	36	40	54	58	36	39	43
	R_w	66	≥75	≥75	74	73	65	75	≥75	73	72	65	74	75	72	71
Thermo-Plan 100 mm	$L_{n,w}$	55	61	36	40	43	53	59	34	38	41	56	61	38	41	44
	R_w	63	72	74	72	70	62	71	73	70	69	62	70	72	69	68
Cemmwood 100 mm	$L_{n,w}$	51	56	33	36	41	49	54	31	34	39	52	56	35	37	42
	R_w	69	≥75	≥75	≥75	75	68	≥75	≥75	75	74	68	75	≥75	74	73



raw ceiling		160 mm concrete ceiling														
TE-Element / AGL-bulk		Tonziegel + WPF Light 2xPhoneStar Tri 15					Tonziegel + WPF Light 2xPhoneStar ST Tri 12,5					Tonziegel + WPF Light 2xPhonestar Twin 10				
		Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE	Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE	Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE
none	$\Delta L_{n,w}$	16	11	33	30	26	18	13	35	32	28	15	11	31	29	25
PhoneStar 25	$\Delta L_{n,w}$	18	14	35	32	28	20	16	37	34	30	17	14	33	31	27
Thermo-Plan 30 mm	$\Delta L_{n,w}$	24	20	38	37	33	26	22	40	39	35	23	20	36	36	32
Cemmwood 30 mm	$\Delta L_{n,w}$	23	18	39	36	32	25	20	41	38	34	22	18	37	35	31
Cemmwood 60 mm	$\Delta L_{n,w}$	25	21	43	40	36	27	23	45	42	38	24	21	41	39	35
Thermo-Plan 100 mm	$\Delta L_{n,w}$	23	18	41	37	34	25	20	43	39	36	22	18	39	36	32
Cemmwood 100 mm	$\Delta L_{n,w}$	27	23	44	41	37	29	25	46	43	39	26	23	42	40	36

Annex D – Sound insulation PhoneStar

D.4.2 Airborne sound insulation R_w, impact sound level $L_{n,w}$ and impact sound improvement $\Delta L_{n,w}$ of solid ceilings

raw ceiling — 160 mm concrete ceiling

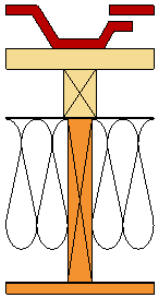
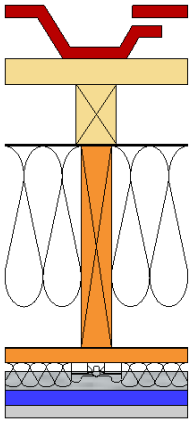
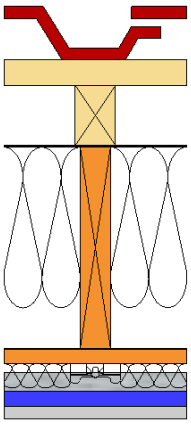
TE-Element / AGL-bulk		Wolf EKP + WPF Light 2xPhoneStar Tri 15					Wolf EKP + WPF Light 2xPhoneStar ST Tri 12,5					Wolf EKP + WPF Light 2xPhonestar Twin 10				
		Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE	Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE	Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE
none	$L_{n,w}$	54	56	41	43	47	52	54	39	41	45	56	57	44	45	49
	R_w	58	68	69	67	65	58	67	68	66	64	57	66	67	65	63
PhoneStar 25	$L_{n,w}$	52	54	39	41	45	50	52	37	39	43	54	55	42	43	47
	R_w	59	69	70	67	66	59	68	69	66	65	58	67	68	65	64
Thermo-Plan 30 mm	$L_{n,w}$	47	49	36	37	41	45	47	34	35	39	49	50	39	39	43
	R_w	61	71	73	70	69	61	70	72	69	68	60	69	71	68	67
Cemmwood 30 mm	$L_{n,w}$	47	49	35	37	41	45	47	33	35	39	49	50	38	39	43
	R_w	62	72	74	71	70	62	71	72	70	69	61	70	72	69	68
Cemmwood 60 mm	$L_{n,w}$	44	47	31	33	37	42	45	29	31	35	46	48	34	35	39
	R_w	64	74	≥75	73	72	64	73	75	72	71	63	72	74	71	70
Thermo-Plan 100 mm	$L_{n,w}$	46	49	33	35	39	44	47	31	33	37	48	50	36	37	41
	R_w	60	70	72	70	68	60	69	71	69	67	59	68	70	68	66
Cemmwood 100 mm	$L_{n,w}$	44	45	30	32	36	42	43	28	30	34	46	44	33	34	38
	R_w	65	75	≥75	75	73	65	74	≥75	74	72	64	73	75	73	71

raw ceiling — 160 mm concrete ceiling

TE-Element / AGL-bulk		Wolf EKP + WPF Light 2xPhoneStar Tri 15					Wolf EKP + WPF Light 2xPhoneStar ST Tri 12,5					Wolf EKP + WPF Light 2xPhonestar Twin 10				
		Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE	Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE	Wolf Vlies	22 WF UDP N+F	MiWo 20 TPT Rand-Schalli	MiWo 20 TPE	MiWo 12 TPE
none	$\Delta L_{n,w}$	23	21	35	34	29	25	23	37	36	31	21	20	33	32	27
PhoneStar 25	$\Delta L_{n,w}$	26	24	37	36	31	28	26	39	38	33	24	23	35	34	29
Thermo-Plan 30 mm	$\Delta L_{n,w}$	30	29	40	39	35	32	31	42	41	37	28	28	38	37	33
Cemmwood 30 mm	$\Delta L_{n,w}$	30	28	41	40	36	32	30	43	42	38	28	27	39	38	34
Cemmwood 60 mm	$\Delta L_{n,w}$	33	31	45	44	40	35	33	47	46	42	31	30	44	42	38
Thermo-Plan 100 mm	$\Delta L_{n,w}$	31	29	43	42	38	33	31	45	44	40	29	28	41	40	36
Cemmwood 100 mm	$\Delta L_{n,w}$	34	32	47	45	40	36	34	49	47	42	32	31	45	43	38

Annex D – Sound insulation PhoneStar

D.5 Direct airborne sound insulation of roofs

Type	Ref. No	Constructions on **wooden roof pitch**	Thickness [mm]	Airborme sound insulation, R_w [dB]	System drawing
1	DS 1.0	Roof covering 50 mm Battens W 25 x T 45 mm Battens W 60 x T 40 mm Bottom deck layer 0,45 mm Rafter W 30 x T 200 mm Glaswool 160 mm between Rafter Steam break 0,5 mm Chip board 14 mm	335	43 (-3;-7) dB	
2	DS TPS 1.2	Roof covering 50 mm Battens W 25 x T 45 mm Battens W 60 x T 40 mm Bottom deck layer 0,45 mm Rafter W 30 x T 200 mm Glaswool 160 mm between Rafter Steam break 0,5 mm Chip board 14 mm TPS Clips 27 mm with 20 mm stone wool PhoneStar Tri 15 mm Plaster board 12,5 mm	390	55 (-5;-11)dB	
3	DS TPS 1.2	Roof covering 50 mm Battens W 25 x T 45 mm Battens W 60 x T 40 mm Bottom deck layer 0,45 mm Rafter W 30 x T 200 mm Glaswool 160 mm between Rafter Steam break 0,5 mm Chip board 14 mm Click - Fix 35 mm with 20 mm stone wool PhoneStar Tri 15 mm Plaster board 12,5 mmDiamant	390	60 (-6;-13) dB	

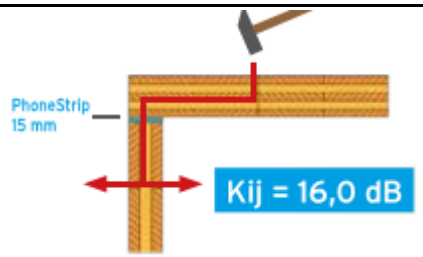
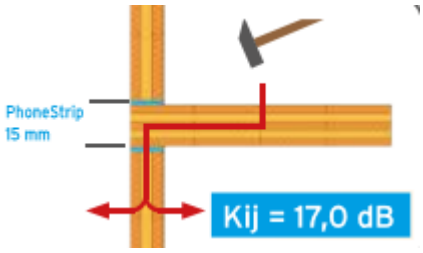
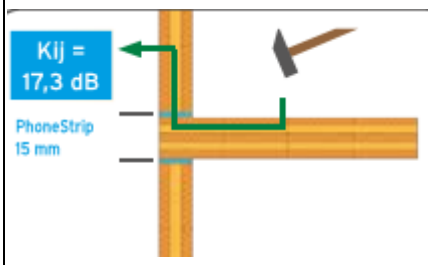
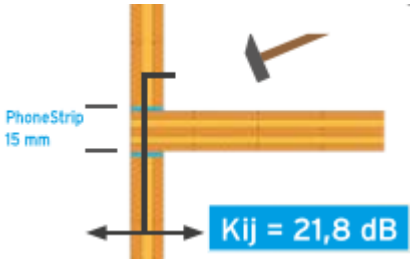
Annex E - Resistance to functional failure from concentrated load

E.1 Type A and B

No	Floor type	Thickness [mm]	Max. point load [kN]			Area of application EN 1991
			Edge	Border	Middle	
A	Klick-laminate, type 31 Living	7	6	7,2	10	A - D, excluding C4 and D3
	PhoneStar Tri	15				
B	P3 particle board	16	6	7,2	10	A - D, excluding C4 and D3
	PhoneStar Tri	15				

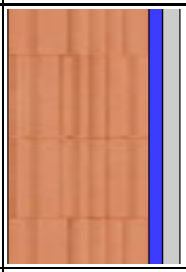
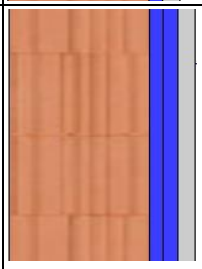
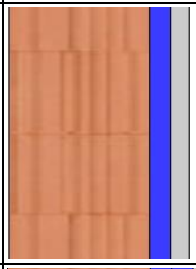
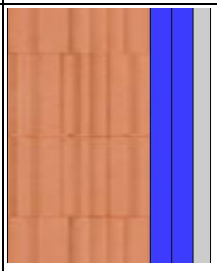
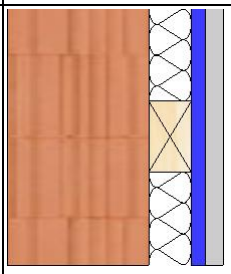
Annex F - Sound insulation PhoneStrip

F.1 Joint sound insulation Kij

Type	Joint Constructions	Joint insulation Kij	Joint	System drawing
1	**Tested build-up** Floor: 140 mm, 5 layer CLT Lower wall: 100 mm, 3 layer CLT **Joint execution and connecting material:** **PhoneStrip 15 mm**; countersunk head screws with full thread 8.0 x 240/230 mm at 300 mm centers	16 dB	L - Joint	
2	**Tested build-up** Upper wall: 100 mm, 3 layer CLT Floor: 140 mm, 5 layer CLT Lower wall: 100 mm, 3 layer CLT **Joint execution and connecting material:** Floor / upper wall: **PhoneStrip 15 mm**; angel joint 105 x105 x 90 mm screwed at 106 cm centers. Floor / lower wall: **PhoneStrip 15 mm**; countersunk head screws with full thread 8.0 x 240/230 mm at 300 mm centers	17 dB	T - Joint	
3	**Tested build-up** Upper wall: 100 mm, 3 layer CLT Floor: 140 mm, 5 layer CLT Lower wall: 100 mm, 3 layer CLT **Joint execution and connecting material:** Floor / upper wall: **PhoneStrip 15 mm**; angel joint 105 x105 x 90 mm screwed at 106 cm centers. Floor / lower wall: **PhoneStrip 15 mm**; countersunk head screws with full thread 8.0 x 240/230 mm at 300 mm centers	17,3 dB	T - Joint	
4	**Tested build-up** Upper wall: 100 mm, 3 layer CLT Floor: 140 mm, 5 layer CLT Lower wall: 100 mm, 3 layer CLT **Joint execution and connecting material:** Floor / upper wall: **PhoneStrip 15 mm**; angel joint 105 x105 x 90 mm screwed at 106 cm centers. Floor / lower wall: **PhoneStrip 15 mm**; countersunk head screws with full thread 8.0 x 240/230 mm at 300 mm centers	21,8 dB	T Joint	

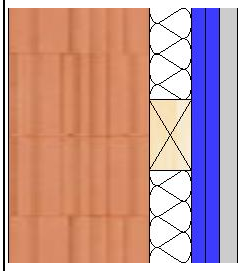
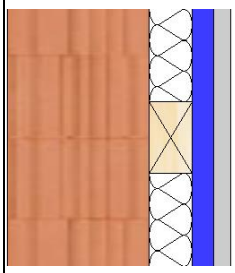
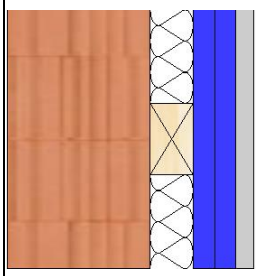
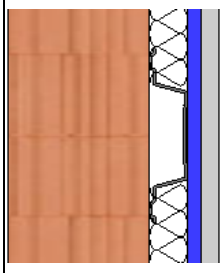
Annex G - Thermal transmittance PhoneStar

G.1 Masonry walls

Type	Ref. No	Approved Constructions on **masonry walls**	Thickness [mm]	U-Value [W/m²K]	System drawing
1	WMZ D 1.1	Gypsum render 10 mm / 0,40 W/mK Brick 120 mm / 0,33 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	152,5	1,30	
2	WMZ D 1.1 2 x Twin	Gypsum render 10 mm / 0,40 W/mK Brick 120 mm / 0,33 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	162,5	1,21	
3	WMZ D 1.2	Gypsum render 10 mm / 0,40 W/mK Brick 120 mm / 0,33 W/mK **PhoneStar Tri 15 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	157,5	1,26	
4	WMZ D 1.2 2 x Tri	Gypsum render 10 mm / 0,40 W/mK Brick 120 mm / 0,33 W/mK **PhoneStar Tri 15 mm/0,17 W/mK** **PhoneStar Tri 15 mm/0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	172,5	1,13	
5	WMZ L 1.2	Gypsum render 10 mm / 0,40 W/mK Brick 120 mm / 0,33 W/mK Battens W 50 x T 30 mm Mineral wool 30 mm / 0,041 W/mK **PhoneStar 10 mm/0,17 W/mK** Plasterboard 12,5 mm/0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	182,5	0,72	

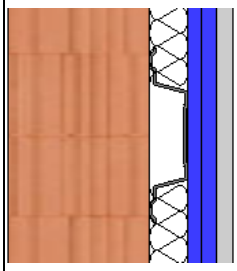
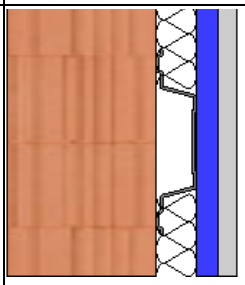
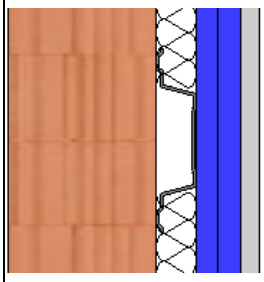
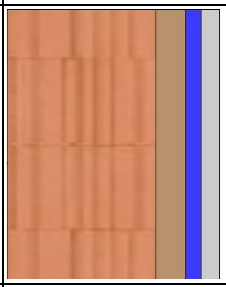
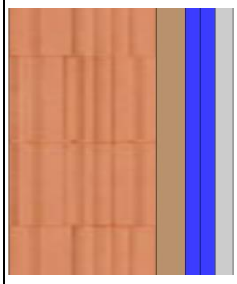
Annex G - Thermal transmittance PhoneStar

G.1 Masonry walls

Type	Ref. No	Approved Constructions on **masonry walls**	Thickness [mm]	U-Value [W/m²K]	System drawing
6	WMZ L 1.2 2 x Twin	Gypsum render 10 mm / 0,40 W/mK Brick 120 mm / 0,33 W/mK Battens W 50 x T 30 mm Mineral wool 30 mm / 0,041 W/mK **PhoneStar Twin 10 mm/0,17 W/mK** **PhoneStar Twin 10 mm/0,17 W/mK** Plasterboard 12,5 mm/0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	192,5	0,69	
7	WMZ L 1.2	Gypsum render 10 mm / 0,40 W/mK Brick 120 mm / 0,33 W/mK Battens W 50 x T 30 mm Mineral wool 30 mm / 0,041W/mK **PhoneStar Tri 15 mm/0,17 W/mK** Plasterboard 12,5 mm 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	187,5	0,70	
8	WMZ L 1.2 2 x Tri	Gypsum render 10 mm / 0,40 W/mK Brick 120 mm / 0,33 W/mK Battens W 50 x T 30 mm Mineral wool 30 mm / 0,041 W/mK **PhoneStar Tri 15 mm/0,17 W/mK** **PhoneStar Tri 15 mm/0,17 W/mK** Plasterboard 12,5 mm/0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	202,5	0,66	
9	WMZ H 1.1	Gypsum render 10 mm / 0,40 W/mK Brick 120 mm / 0,33 W/mK Resilient bars T 27 mm Mineral wool / 0,40 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	179,5	0,69	

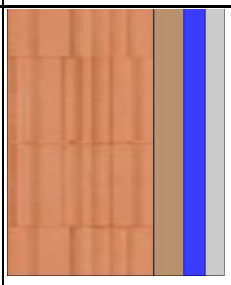
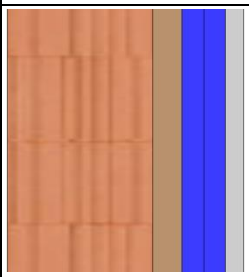
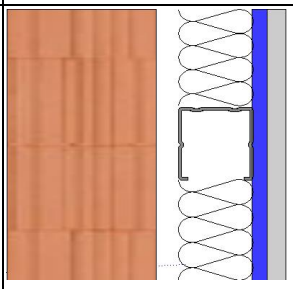
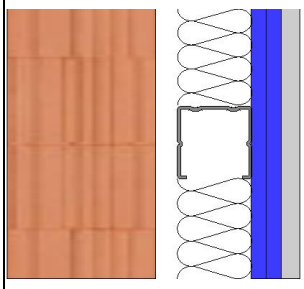
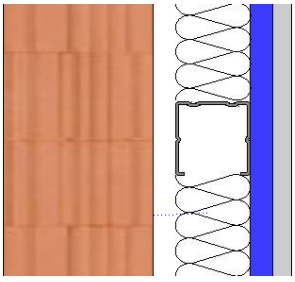
Annex G - Thermal transmittance PhoneStar

G.1 Masonry walls

Type	Ref. No	Approved Constructions on **masonry walls**	Thickness [mm]	U-Value [W/m²K]	System drawing
10	WMZ H 1.1 2 x Twin	Gypsum render 10 mm / 0,40 W/mK Brick 120 mm / 0,33 W/mK Resilient bars T 27 mm Mineral wool / 0,40 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	189,5	0,67	
11	WMZ H 1.2	Gypsum render 10 mm / 0,40 W/mK Brick 120 mm / 0,33 W/mK Resilient bars T 27 mm Mineral wool / 0,40 W/mK **PhoneStar Tri 15 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	184,5	0,68	
12	WMZ H 1.2 2 x Tri	Gypsum render 10 mm / 0,40 W/mK Brick 120 mm / 0,33 W/mK Resilient bars T 27 mm Mineral wool / 0,40 W/mK **PhoneStar Tri 15 mm / 0,17 W/mK** **PhoneStar Tri 15 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	199,5	0,64	
13	WMZ W 1.1	Gypsum render 10 mm / 0,40 W/mK Brick 120 mm / 0,33 W/mK Wood fibre 20 mm / 0,45 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	172,5	0,83	
14	WMZ W 1.1 2 x Twin	Gypsum render 10 mm / 0,40 W/mK Brick 120 mm / 0,33 W/mK Wood fibre 20 mm / 0,45 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	182,5	0,79	

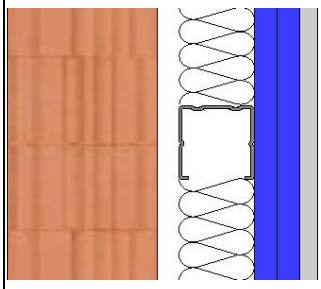
Annex G - Thermal transmittance PhoneStar

G.1 Masonry walls

Type	Ref. No	Approved Constructions on **masonry walls**	Thickness [mm]	U-Value [W/m²K]	System drawing
15	WMZ W 1.2	Gypsum render 10 mm / 0,40 W/mK Brick 120 mm / 0,33 W/mK Wood fibre 20 mm / 0,45 W/mK **PhoneStar Tri 15 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	177,5	0,81	
16	WMZ W 1.2 2 x Tri	Gypsum render 10 mm / 0,40 W/mK Brick 120 mm / 0,33 W/mK Wood fibre 20 mm / 0,45 W/mK **PhoneStar Tri 15 mm / 0,17 W/mK** **PhoneStar Tri 15 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	192,5	0,75	
17	WMZ V 1.1	Gypsum render 10 mm / 0,40 W/mK Brick 120 mm / 0,33 W/mK Metal Stud T 50 mm Mineral wool 50 mm / 0,40 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	212,5	0,41	
18	WMZ V 1.1 2 x Twin	Gypsum render 10 mm / 0,40 W/mK Brick 120 mm / 0,33 W/mK Metal Stud T 50 mm Mineral wool 50 mm / 0,40 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	222,5	0,40	
19	WMZ V 1.2	Gypsum render 10 mm / 0,40 W/mK Brick 120 mm / 0,33 W/mK Metal Stud T 50 mm Mineral wool 50 mm / 0,40 W/mK **PhoneStar Tri 15 mm/0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	217,5	0,41	

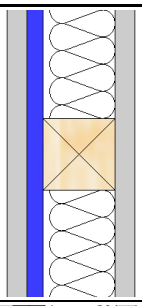
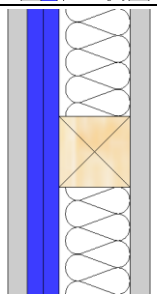
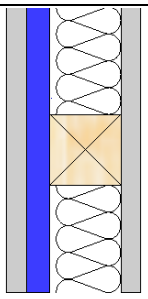
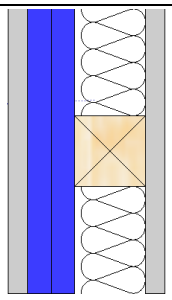
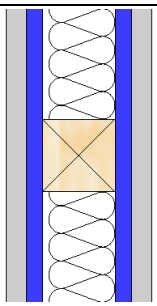
Annex G - Thermal transmittance PhoneStar

G.1 Masonry walls

Type	Ref. No	Approved Constructions on **masonry walls**	Thickness [mm]	U-Value [W/m²K]	System drawing
20	WMZ V 1.2 2 x Tri	Gypsum render 10 mm / 0,40 W/mK Brick 120 mm / 0,33 W/mK Metal Stud T 50 mm Mineral wool 50 mm / 0,40 W/mK **PhoneStar Tri 15 mm/0,17 W/mK** **PhoneStar Tri 15 mm/0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	222,5	0,39	

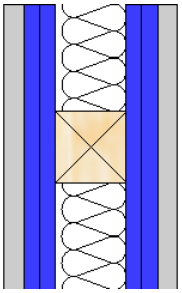
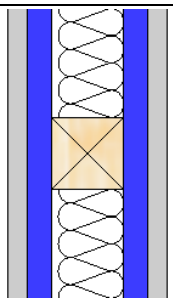
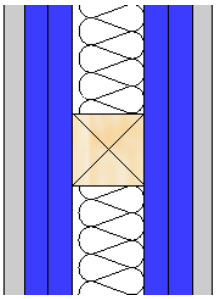
Annex G - Thermal transmittance PhoneStar

G.2 Timber stud walls

Type	Ref. No	Approved Constructions on **timber studs**	Thickness [mm]	U-Value [W/m²K]	System drawing
1	WSH 1.1	Plasterboard 12,5 / 0,21 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** Timber stud T 45 mm Mineral wool 40 mm / 0,037 W/mK Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	80,0	0,69	
2	WSH 1.1 2 x Twin	Plasterboard 12,5 / 0,21 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** **PhoneStar Twin 10 mm / 0,17 W/mK** Timber stud T 45 mm Mineral wool 40 mm / 0,037 W/mK Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	90,0	0,66	
3	WSH 1.2	Plasterboard 12,5 / 0,21 W/mK **PhoneStar Tri 15 mm/0,17 W/mK** Timber stud T 45 mm Mineral wool 40 mm / 0,037 W/mK Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	85,0	0,68	
4	WSH 1.2 2 x Tri	Plasterboard 12,5 / 0,21 W/mK **PhoneStar Tri 15 mm/0,17 W/mK** **PhoneStar Tri 15 mm/0,17 W/mK** Timber stud T 45 mm Mineral wool 40 mm / 0,037 W/mK Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	100,0	0,64	
5	WSH 2.1	Plasterboard 12,5 / 0,21 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** Timber stud T 45 mm Mineral wool 40 mm / 0,037 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	90,0	0,66	

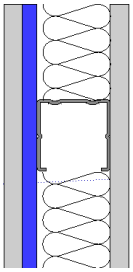
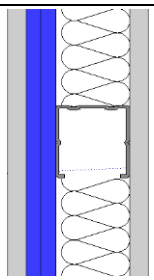
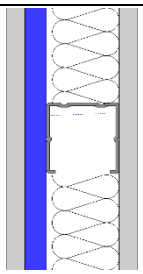
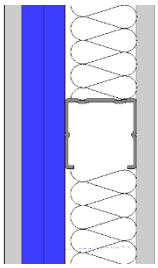
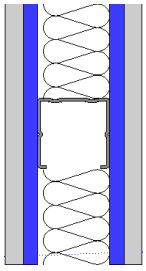
Annex G - Thermal transmittance PhoneStar

G.2 Timber stud walls

Type	Ref. No	Approved Constructions on **timber studs**	Thickness [mm]	U-Value [W/m²K]	System drawing
6	WSH 2.1 2 x Twin	Plasterboard 12,5 / 0,21 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** **PhoneStar Twin 10 mm / 0,17 W/mK** Timber stud T 45 mm Mineral wool 40 mm / 0,037 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	110,0	0,61	
7	WSH 2.2	Plasterboard 12,5 / 0,21 W/mK **PhoneStar Tri 15 mm / 0,17 W/mK** Timber stud T 45 mm Mineral wool 40 mm / 0,037 W/mK **PhoneStar Tri 15 mm/0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	100,0	0,64	
8	WSH 2.2 2 x Tri	Plasterboard 12,5 / 0,21 W/mK **PhoneStar Tri 15 mm/0,17 W/mK** **PhoneStar Tri 15 mm/0,17 W/mK** Timber stud T 45 mm Mineral wool 40 mm / 0,037 W/mK **PhoneStar Tri 15 mm/0,17 W/mK** **PhoneStar Tri 15 mm/0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	130,0	0,57	

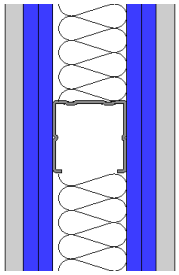
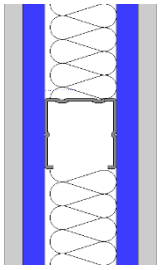
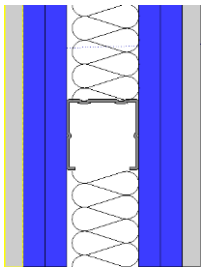
Annex G - Thermal transmittance PhoneStar

G.3 Metal stud walls

Type	Ref. No	Approved Constructions on **steel studs**	Thickness [mm]	U-Value [W/m²K]	System drawing
1	WSM 1.1	Plasterboard 12,5 / 0,21 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** Metal stud T 50 mm Mineral wool 40 mm / 0,037 W/mK Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	85,0	0,59	
2	WSM 1.1 2 x Twin	Plasterboard 12,5 / 0,21 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** **PhoneStar Twin 10 mm / 0,17 W/mK** Metal stud T 50 mm Mineral wool 40 mm / 0,037 W/mK Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	95,0	0,57	
3	WSM 1.2	Plasterboard 12,5 / 0,21 W/mK ***PhoneStar Tri 15 mm/0,17 W/mK*** Metal stud T 50 mm Mineral wool 40 mm / 0,037 W/mK Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	90,0	0,58	
4	WSM 1.2 2 x Tri	Plasterboard 12,5 / 0,21 W/mK **PhoneStar Tri 15 mm/0,17 W/mK** **PhoneStar Tri 15 mm/0,17 W/mK** Metal stud T 50 mm Mineral wool 40 mm / 0,037 W/mK Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	105,0	0,55	
5	WSM 2.1	Plasterboard 12,5 / 0,21 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** Metal stud T 50 mm Mineral wool 40 mm / 0,037 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	95,0	0,57	

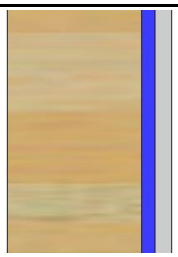
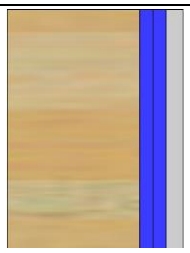
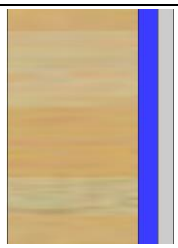
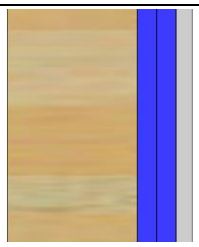
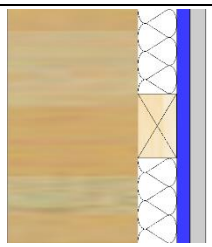
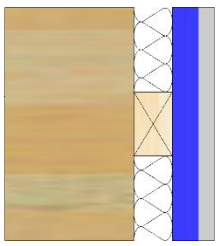
Annex G - Thermal transmittance PhoneStar

G.3 Metal stud walls

Type	Ref. No	Approved Constructions on **steel studs**	Thickness [mm]	U-Value [W/m²K]	System drawing
6	WSM 2.1 2 x Twin	Plasterboard 12,5 / 0,21 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** **PhoneStar Twin 10 mm / 0,17 W/mK** Metal stud T 50 mm Mineral wool 40 mm / 0,037 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	115,0	0,54	
7	WSM 2.2	Plasterboard 12,5 / 0,21 W/mK **PhoneStar Tri 15 mm/0,17 W/mK** Metal stud T 50 mm Mineral wool 40 mm / 0,037 W/mK **PhoneStar Tri 15 mm/0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	105,0	0,55	
8	WSM 2.2 2 x Tri	Plasterboard 12,5 / 0,21 W/mK **PhoneStar Tri 15 mm/0,17 W/mK** **PhoneStar Tri 15 mm/0,17 W/mK** Metal stud T 50 mm Mineral wool 40 mm / 0,037 W/mK **PhoneStar Tri 15 mm/0,17 W/mK** **PhoneStar Tri 15 mm/0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	135,0	0,50	

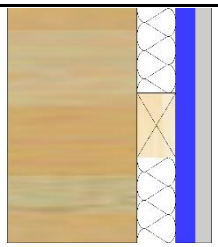
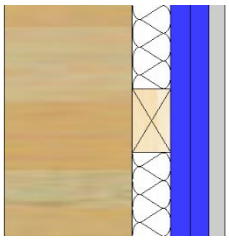
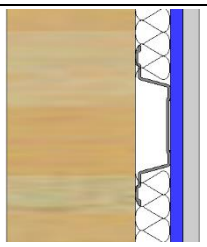
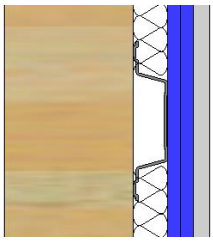
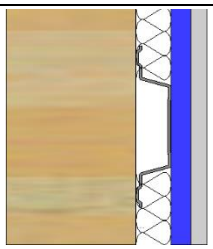
Annex G - Thermal transmittance PhoneStar

G.4 Solid timber walls

Type	Ref. No	Approved Constructions on **solid timber walls**	Thickness [mm]	U-Value [W/m²K]	System drawing
1	WMH D 1.1	Solid Wood 150 mm / 0,12 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	172,5	0,61	
2	WMH D 1.1 2 x Twin	Solid Wood 150 mm / 0,12 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	182,5	0,59	
3	WMH D 1.2	Solid Wood 150 mm / 0,12 W/mK **PhoneStar Tri 15 mm/0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	177,5	0,60	
4	WMH D 1.2 2 x Tri	Solid Wood 150 mm / 0,12 W/mK **PhoneStar Tri 15 mm/0,17 W/mK** **PhoneStar Tri 15 mm/0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	192,5	0,57	
5	WMH L 1.2	Solid Wood 150 mm / 0,12 W/mK Battens W 50 x T 30 mm Mineral wool 30 mm / 0,037 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	222,5	0,43	
6	WMH L 1.2 2 x Twin	Solid Wood 150 mm / 0,12 W/mK Battens W 50 x T 30 mm Mineral wool 30 mm / 0,037 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	212,5	0,42	

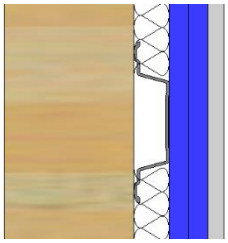
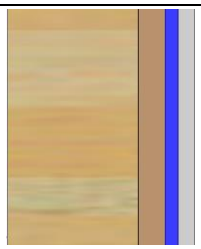
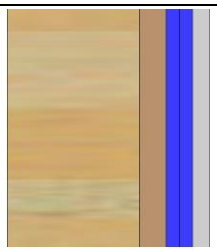
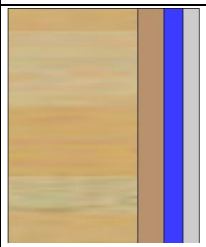
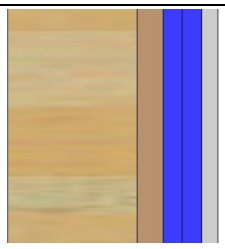
Annex G - Thermal transmittance PhoneStar

G.4 Solid timber walls

Type	Ref. No	Approved Constructions on **solid timber walls**	Thickness [mm]	U-Value [W/m²K]	System drawing
7	WMH L 1.2	Solid Wood 150 mm / 0,12 W/mK Battens W 50 x T 30 mm Mineral wool 30 mm / 0,037 W/mK **PhoneStar Tri 15 mm/0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	207,5	0,43	
8	WMH L 1.2 2 x Tri	Solid Wood 150 mm / 0,12 W/mK Battens W 50 x T 30 mm Mineral wool 30 mm / 0,037 W/mK **PhoneStar Tri 15 mm/0,17 W/mK** **PhoneStar Tri 15 mm/0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	222,5	0,41	
9	WMH H 1.1	Solid Wood 150 mm / 0,12 W/mK Resilient bar T 27 mm Mineral wool 27 mm / 0,037 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	199,5	0,43	
10	WMH H 1.1 2 x Twin	Solid Wood 150 mm / 0,12 W/mK Resilient bar T 27 mm Mineral wool 27 mm / 0,037 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	209,5	0,42	
11	WMH H 1.2	Solid Wood 150 mm / 0,12 W/mK Resilient bar T 27 mm Mineral wool 27 mm / 0,037 W/mK **PhoneStar Tri 15 mm/0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	204,5	0,43	

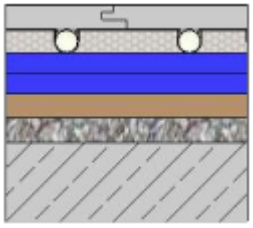
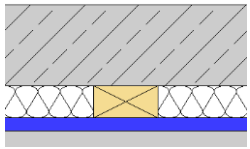
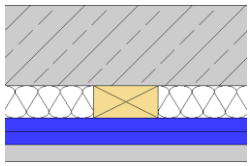
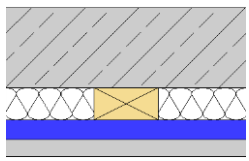
Annex G - Thermal transmittance PhoneStar

G.4 Solid timber walls

Type	Ref. No	Approved Constructions on **solid timber walls**	Thickness [mm]	U-Value [W/m²K]	System drawing
12	WMH H 1.2 2 x Tri	Solid Wood 150 mm / 0,12 W/mK Resilient bar T 27 mm Mineral wool 27 mm / 0,037 W/mK **PhoneStar Tri 15 mm/0,17 W/mK** **PhoneStar Tri 15 mm/0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	219,5	0,41	
13	WMH W 1.1	Solid Wood 150 mm / 0,12 W/mK Wood fibre 20 mm / 0,04 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	192,5	0,48	
14	WMH W 1.1 2 x Twin	Solid Wood 150 mm / 0,12 W/mK Wood fibre 20 mm / 0,04 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 mm *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	202,5	0,47	
15	WMH W 1.2	Solid Wood 150 mm / 0,12 W/mK Wood fibre 20 mm / 0,04 W/mK **PhoneStar Tri 15 mm/0,17 W/mK** Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	197,5	0,48	
16	WMH W 1.2 2 x Tri	Solid Wood 150 mm / 0,12 W/mK Wood fibre 20 mm / 0,04 W/mK **PhoneStar Tri 15 mm/0,17 W/mK** **PhoneStar Tri 15 mm/0,17 W/mK** Plasterboard 12,5 mm *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	212,5	0,46	

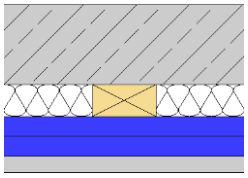
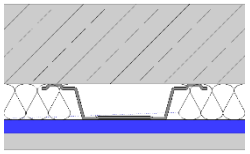
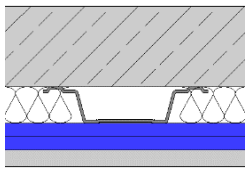
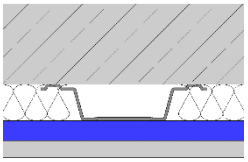
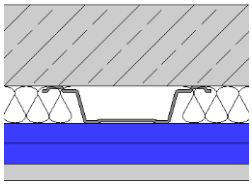
Annex G - Thermal transmittance PhoneStar

G.5 Solid ceiling

Type	Ref. No	Approved Constructions on **solid ceiling**	Thickness [mm]	U-Value [W/m²K]	System drawing
1		Dry screed ≥ 18 mm or ≥ 45 mm wet screed or Wolf decoupling plate, Wolf seperating paper, underfloor heating – PowerFloor Slim/ Light/ Nature/ ÖkoPlus 20 – 30 mm, Wolf Tack 10 – 80 mm **PhoneStar 9 – 30 mm (one or two layer),** Wood or mineral fibre or Wolf Cell 4 – 80 mm, or Wolf cell 40-80 mm mineral-coated wood chips like **Cemwood GmbH** or Perlite like **Strauss-Perlite GmbH** or bounded split 20 – 80, or Bounded split 20 – 80 mm or *replaced by PhoneStar 9 – 80 mm (one or several layer)* Solid ceiling 180 mm	82-282	Slim/Light: 0,74-0,83 Nature, Öko Plus: 0,75-0,86 Wolf Tack: 0,74-0,83	
2	DM L 1.1	Solid ceiling 180 mm Battens W 50 x T 30 mm Mineral wool 27 mm / 0,037 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	52,5	0,88	
3	DM L 1.1 2 x Twin	Solid ceiling 180 mm Battens W 50 x T 30 mm Mineral wool 27 mm / 0,037 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	62,5	0,84	
4	DM L 1.2	Solid ceiling 180 mm Battens W 50 x T 30 mm Mineral wool 27 mm / 0,037 W/mK **PhoneStar Tri 15 mm/0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	57,5	0,86	

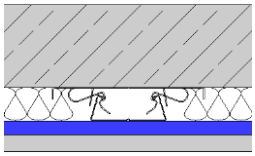
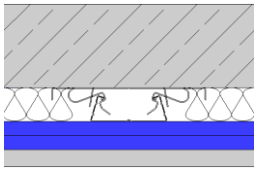
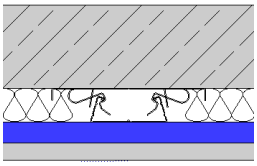
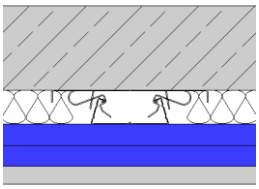
Annex G - Thermal transmittance PhoneStar

G.5 Solid ceiling

Type	Ref. No	Approved Constructions on **solid ceiling**	Thickness [mm]	U-Value [W/m²K]	System drawing
5	DM L 1.2 2 x Tri	Solid ceiling 180 mm Battens W 50 x T 30 mm Mineral wool 27 mm / 0,037 W/mK **PhoneStar Tri 15 mm/0,17 W/mK** **PhoneStar Tri 15 mm/0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	72,5	0,80	
6	DM H 1.1	Solid ceiling 180 mm Resilient bars T 27 mm Mineral wool 27 mm / 0,037 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	49,5	0,85	
7	DM H 1.1 2x Twin	Solid ceiling 180 mm Resilient bars T 27 mm Mineral wool 27 mm / 0,037 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	59,5	0,81	
8	DM H 1.2	Solid ceiling 180 mm Resilient bars T 27 mm Mineral wool 27 mm / 0,037 W/mK **PhoneStar Tri 15 mm/0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	54,5	0,83	
9	DM H 1.2 2 x Tri	Solid ceiling 180 mm Resilient bars T 27 mm Mineral wool 27 mm / 0,037 W/mK **PhoneStar Tri 15 mm/0,17 W/mK** **PhoneStar Tri 15 mm/0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	69,5	0,77	

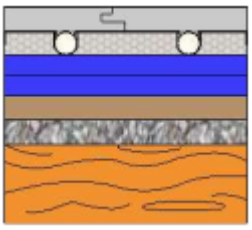
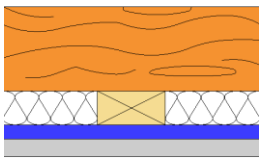
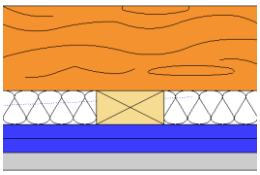
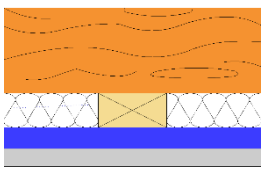
Annex G - Thermal transmittance PhoneStar

G.5 Solid ceiling

Type	Ref. No	Approved Constructions on **solid ceiling**	Thickness [mm]	U-Value [W/m²K]	System drawing
10	DM TPS 1.1	Solid ceiling 180 mm Spring clips & CD profil 25 mm Mineral wool 25 mm / 0,037 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	47,5	1,50	
11	DM TPS 1.1 2 x Twin	Solid ceiling 180 mm Spring clips & CD profil 25 mm Mineral wool 25 mm / 0,037 W/mK **PhoneStar Twin 10 mm / 0,17 W/mK** **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	57,5	1,35	
12	DM TPS 1.2	Solid ceiling 180 mm Spring clips & CD profil 25 mm Mineral wool 25 mm / 0,037 W/mK **PhoneStar Tri 15 mm/0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	52,5	1,42	
13	DM TPS 1.2 2 x Tri	Solid ceiling 180 mm Spring clips & CD profil 25 mm Mineral wool 25 mm / 0,037 W/mK **PhoneStar Tri 15 mm/0,17 W/mK** **PhoneStar Tri 15 mm/0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	67,5	1,24	

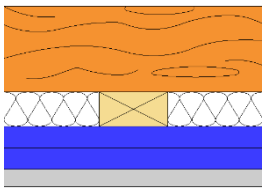
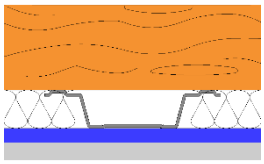
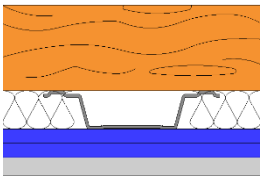
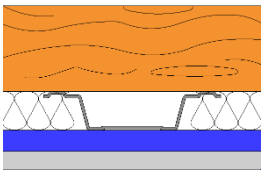
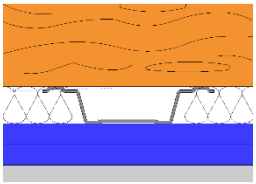
Annex G - Thermal transmittance PhoneStar

G.6 Timber ceiling

Type	Ref. No	Approved Constructions on **Timber ceiling**	Thickness [mm]	U-Value [W/m²K]	System drawing
1		Dry screed ≥ 18 mm or ≥ 45 mm wet screed or Wolf decoupling plate, Wolf seperating paper, underfloor heating – PowerFloor Slim/ Light/ Nature/ ÖkoPlus 20 – 30 mm, Wolf Tack 10 – 80 mm **PhoneStar 9 – 30 mm (one or two layer),** Wood or mineral fibre or Wolf Cell 4 – 80 mm, or Wolf cell 40-80 mm, mineral-coated wood chips like **Cemwood GmbH** or Perlite like **Strauss-Perlite GmbH** or bounded split 20 – 80, or Bounded split 20 – 80 mm or *replaced by PhoneStar 9 – 80 mm (one or several layer)* Solid ceiling 180 mm	82-282	Slim/Light: 0,38-0,40 Nature, Öko Plus: 0,38-0,40 Wolf Tack: 0,38-0,40	
2	DHG L 1.1	Wood ceiling 240 mm Mineral wool 30 mm / 0,041 W/mK Battens W 50 x T 30 mm **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	52,5	0,28	
3	DHG L 1.1 2 x Twin	Wood ceiling 240 mm Mineral wool 30 mm / 0,041 W/mK Battens W 50 x T 30 mm **PhoneStar Twin 10 mm / 0,17 W/mK** **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	62,5	0,28	
4	DHG L 1.2	Wood ceiling 240 mm Mineral wool 30 mm / 0,041 W/mK Battens W 50 x T 30 mm **PhoneStar Tri 15 mm/0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	57,5	0,28	

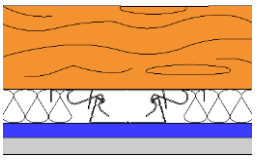
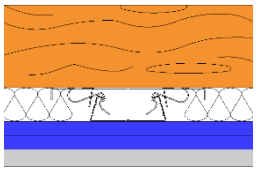
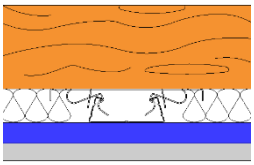
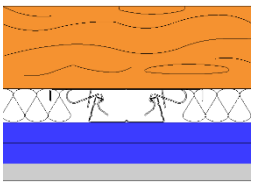
Annex G - Thermal transmittance PhoneStar

G.6 Timber ceiling

Type	Ref. No	Approved Constructions on **Timber ceiling**	Thickness [mm]	U-Value [W/m²K]	System drawing
5	DHG L 1.2 2 x Tri	Wood ceiling 240 mm Mineral wool 30 mm / 0,041 W/mK Battens W 50 x T 30 mm **PhoneStar Tri 15 mm/0,17 W/mK** **PhoneStar Tri 15 mm/0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	72,5	0,27	
6	DHG H 1.1	Wood ceiling 240 mm Mineral wool 27 mm / 0,041 W/mK Resilient bars T 27 mm **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	49,5	0,28	
7	DHG H 1.1 2x Twin	Wood ceiling 240 mm Mineral wool 27 mm / 0,041 W/mK Resilient bars T 27 mm **PhoneStar Twin 10 mm / 0,17 W/mK** **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	59,5	0,32	
8	DHG H 1.2	Wood ceiling 240 mm Mineral wool 27 mm / 0,041 W/mK Resilient bars T 27 mm **PhoneStar Tri 15 mm/0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	54,5	0,33	
9	DHG H 1.2 2 x Tri	Wood ceiling 240 mm Mineral wool 27 mm / 0,041 W/mK Resilient bars T 27 mm *PhoneStar Tri 15 mm/0,17 W/mK* *PhoneStar Tri 15 mm/0,17 W/mK* Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	69,5	0,32	

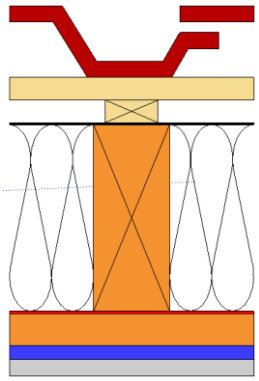
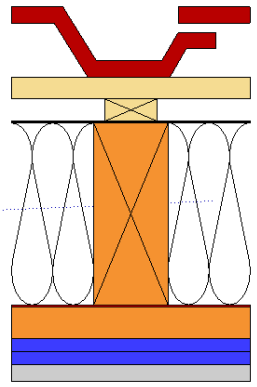
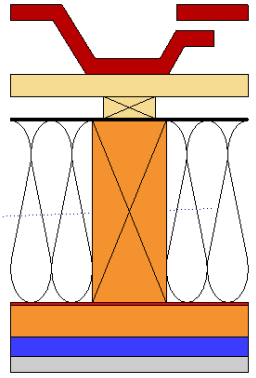
Annex G - Thermal transmittance PhoneStar

G.6 Timber ceiling

Type	Ref. No	Approved Constructions on **Timber ceiling**	Thickness [mm]	U-Value [W/m²K]	System drawing
10	DHG TPS 1.1	Wood ceiling 240 mm Mineral wool 27 mm / 0,041 W/mK Spring clips & CD profil 25 mm **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	47,5	0,20	
11	DHG TPS 1.1 2 x Twin	Wood ceiling 240 mm Mineral wool 27 mm / 0,041 W/mK Spring clips & CD profil 25 mm **PhoneStar Twin 10 mm / 0,17 W/mK** **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	57,5	0,20	
12	DHG TPS 1.2	Wood ceiling 240 mm Mineral wool 27 mm / 0,041 W/mK Spring clips & CD profil 25 mm **PhoneStar 15 mm/0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	52,5	0,20	
13	DHG TPS 1.2 2 x Tri	Wood ceiling 240 mm Mineral wool 27 mm / 0,041 W/mK Spring clips & CD profil 25 mm **PhoneStar Tri 15 mm/0,17 W/mK** **PhoneStar Tri 15 mm/0,17 W/mK** Plasterboard 12,5 / 0,21 W/mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	67,5	0,20	

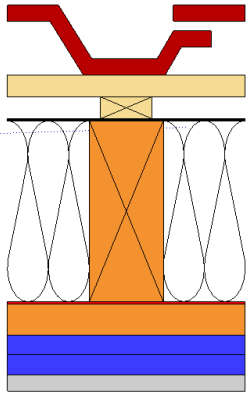
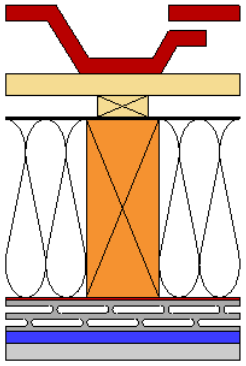
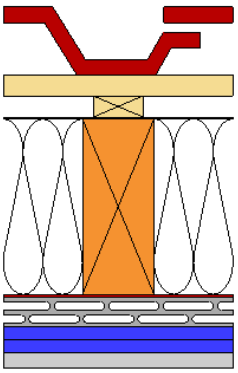
Annex G - Thermal transmittance PhoneStar

G.7 Wooden roof pitch

Type	Ref. No	Approved Constructions on **wooden roof pitch**	Thickness [mm]	U-Value [W/m²K]	System drawing
1	DS L 1.1	Roof covering 73 mm / 0,750 Battens W 50 x T 30 mm / 0,13 W / mK Battens W 50 x T 30 mm / 0,13 W / mK Bottom deck layer 0,45 mm / 0,23 W/mK Rafter W 120 x T 220 mm / 0,13 W / mK Mineral wool 220 mm / 0,04 W/mK Steam break 0,5 mm / 0,22 W / mK Battens W 50 x T 30 mm / 0,13 W / mK **PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 mm / 0,25 W / mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	22,5	0,19	
2	DS L 1.1 2 x Twin	Roof covering 73 mm / 0,750 Battens W 50 x T 30 mm / 0,13 W / mK Battens W 50 x T 30 mm / 0,13 W / mK Bottom deck layer 0,45 mm / 0,23 W/mK Rafter W 120 x T 220 mm / 0,13 W / mK Mineral wool 220 mm / 0,04 W/mK Steam break 0,5 mm / 0,22 W / mK Battens W 50 x T 30 mm / 0,13 W / mK **2 x PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 mm / 0,25 W / mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	32,5	0,19	
3	DS L 1.2	Roof covering 73 mm / 0,750 Battens W 50 x T 30 mm / 0,13 W / mK Battens W 50 x T 30 mm / 0,13 W / mK Bottom deck layer 0,45 mm / 0,23 W/mK Rafter W 120 x T 220 mm / 0,13 W / mK Mineral wool 220 mm / 0,04 W/mK Steam break 0,5 mm / 0,22 W / mK Battens W 50 x T 30 mm / 0,13 W / mK **PhoneStar Tri 15 mm / 0,17 W / mK** Plasterboard 12,5 mm / 0,25 W / mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	27,5	0,19	

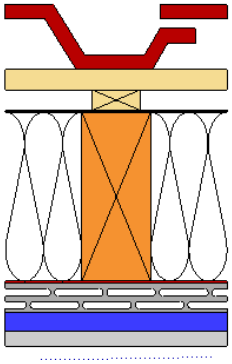
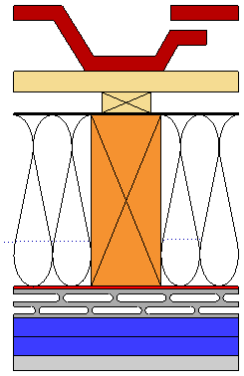
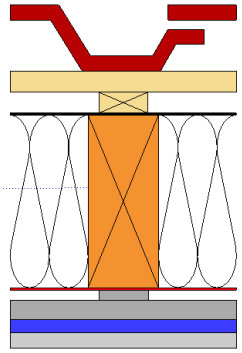
Annex G - Thermal transmittance PhoneStar

G.7 Wooden roof pitch

Type	Ref. No	Approved Constructions on **wooden roof pitch**	Thickness [mm]	U-Value [W/m²K]	System drawing
4	DS L 1.2 2 x Tri	Roof covering 73 mm / 0,750 Battens W 50 x T 30 mm / 0,13 W / mK Battens W 50 x T 30 mm / 0,13 W / mK Bottom deck layer 0,45 mm / 0,23 W/mK Rafter W 120 x T 220 mm / 0,13 W / mK Mineral wool 220 mm / 0,04 W/mK Steam break 0,5 mm / 0,22 W / mK Battens W 50 x T 30 mm / 0,13 W / mK **2 x PhoneStar Tri 15 mm / 0,17 W / mK** Plasterboard 12,5 mm / 0,25 W / mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	42,5	0,19	
5	DS H 1.1	Roof covering 73 mm / 0,750 Battens W 50 x T 30 mm / 0,13 W / mK Battens W 50 x T 30 mm / 0,13 W / mK Bottom deck layer 0,45 mm / 0,23 W/mK Rafter W 120 x T 220 mm / 0,13 W / mK Mineral wool 220 mm / 0,04 W/mK Steam break 0,5 mm / 0,22 W / mK Resilient bars T 27 mm **PhoneStar Twin 10 mm / 0,17 W / mK** Plasterboard 12,5 mm / 0,25 W / mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	49,5	0,21	
6	DS H 1.1 2 x Twin	Roof covering 73 mm / 0,750 Battens W 50 x T 30 mm / 0,13 W / mK Battens W 50 x T 30 mm / 0,13 W / mK Bottom deck layer 0,45 mm / 0,23 W/mK Rafter W 120 x T 220 mm / 0,13 W / mK Mineral wool 220 mm / 0,04 W/mK Steam break 0,5 mm / 0,22 W / mK Resilient bars T 27 mm **2 x PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 mm / 0,25 W / mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	59,5	0,21	

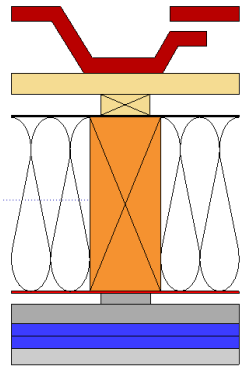
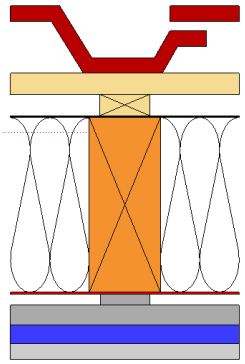
Annex G - Thermal transmittance PhoneStar

G.7 Wooden roof pitch

Type	Ref. No	Approved Constructions on **wooden roof pitch**	Thickness [mm]	U-Value [W/m²K]	System drawing
7	DS H 1.2	Roof covering 73 mm / 0,750 Battens W 50 x T 30 mm / 0,13 W / mK Battens W 50 x T 30 mm / 0,13 W / mK Bottom deck layer 0,45 mm / 0,23 W/mK Rafter W 120 x T 220 mm / 0,13 W / mK Mineral wool 220 mm / 0,04 W/mK Steam break 0,5 mm / 0,22 W / mK Resilient bars T 27 mm **PhoneStar Tri 15 mm / 0,17 W / mK** Plasterboard 12,5 mm / 0,25 W / mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	54,5	0,21	
8	DS H 1.2 2 x Tri	Roof covering 73 mm / 0,750 Battens W 50 x T 30 mm / 0,13 W / mK Battens W 50 x T 30 mm / 0,13 W / mK Bottom deck layer 0,45 mm / 0,23 W/mK Rafter W 120 x T 220 mm / 0,13 W / mK Mineral wool 220 mm / 0,04 W/mK Steam break 0,5 mm / 0,22 W / mK Resilient bars T 27 mm **2 x PhoneStar Tri 15 mm / 0,17 W / mK** Plasterboard 12,5 mm / 0,25 W / mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	69,5	0,20	
9	DS TPS 1.1	Roof covering 73 mm / 0,750 Battens W 50 x T 30 mm / 0,13 W / mK Battens W 50 x T 30 mm / 0,13 W / mK Bottom deck layer 0,45 mm / 0,23 W/mK Rafter W 120 x T 220 mm / 0,13 W / mK Mineral wool 220 mm / 0,04 W/mK Steam break 0,5 mm / 0,22 W / mK Steam break 0,1 mm Spring clips & CD profil 25 mm **PhoneStar Twin 10 mm / 0,17 W / mK** Plasterboard 12,5 mm / 0,25 W / mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	47,5	0,21	

Annex G - Thermal transmittance PhoneStar

G.7 Wooden roof pitch

Type	Ref. No	Approved Constructions on **wooden roof pitch**	Thickness [mm]	U-Value [W/m²K]	System drawing
10	DS TPS 1.1 2 x Twin	Roof covering 73 mm / 0,750 Battens W 50 x T 30 mm / 0,13 W / mK Battens W 50 x T 30 mm / 0,13 W / mK Bottom deck layer 0,45 mm / 0,23 W/mK Rafter W 120 x T 220 mm / 0,13 W / mK Mineral wool 220 mm / 0,04 W/mK Steam break 0,5 mm / 0,22 W / mK Spring clips & CD profil 25 mm **2 x PhoneStar Twin 10 mm / 0,17 W/mK** Plasterboard 12,5 mm / 0,25 W / mK *Or PhoneStar ST Twin 9 mm* *Or PhoneStar Plus Twin 10 mm*	57,9	0,21	
11	DS TPS 1.2	Roof covering 73 mm / 0,750 Battens W 50 x T 30 mm / 0,13 W / mK Battens W 50 x T 30 mm / 0,13 W / mK Bottom deck layer 0,45 mm / 0,23 W/mK Rafter W 120 x T 220 mm / 0,13 W / mK Mineral wool 220 mm / 0,04 W/mK Steam break 0,5 mm / 0,22 W / mK Spring clips & CD profil 25 mm **PhoneStar Tri 15 mm / 0,17 W / mK** Plasterboard 12,5 mm / 0,25 W / mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	52,5	0,21	
12	DS TPS 1.2 2 x Tri	Roof covering 73 mm / 0,750 Battens W 50 x T 30 mm / 0,13 W / mK Battens W 50 x T 30 mm / 0,13 W / mK Bottom deck layer 0,45 mm / 0,23 W/mK Rafter W 120 x T 220 mm / 0,13 W / mK Mineral wool 220 mm / 0,04 W/mK Steam break 0,5 mm / 0,22 W / mK Spring clips & CD profil 25 mm **2 x PhoneStar Tri 15 mm / 0,17 W / mK** Plasterboard 12,5 mm / 0,25 W / mK *Or PhoneStar ST Tri 12,5 mm* *Or PhoneStar Plus Tri 15 mm*	67,5	0,20