ETA-Danmark A/S
Göteborg Plads 1
DK-2150 Nordhavn
Tel. +45 72 24 59 00
Fax +45 72 24 59 04
Internet www.etadanmark.dk

Authorised and notified according to Article 29 of the Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011

European Technical Assessment ETA-17/0619 of 16/08/2017

I General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: ETA-Danmark A/S	
Trade name of the construction product:	ROCKPANEL Uni 6 mm
Product family to which the above construction product belongs:	Prefabricated mineral wool boards with organic or inorganic finish and with specified fastening system
Manufacturer:	ROCKWOOL B.V. Konstruktieweg 2 NL-6045 JD Roermond Tel. +31 475 353 000 Fax +31 475 353 550
Manufacturing plant:	ROCKWOOL B.V. / Rockpanel Konstruktieweg 2 NL-6045 JD Roermond
This European Technical Assessment contains:	15 pages including 3 annexes which form an integral part of the document
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of:	European Assessment Document (EAD) no. EAD 090001-00-0404 for Prefabricated compressed mineral wool boards with organic or inorganic finish and with specified fastening system
This version replaces:	-

II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of product and intended use

Technical description of the product
General
ROCKPANEL Uni 6 mm are prefabricated compressed mineral wool boards with thermo-setting synthetic binders. The boards are fastened to timber subframes. Fastening to the timber subframes is carried out with corrosion resistant nails or screws. Mechanical fasteners, joint strips and aluminium profiles are specified by the ETA-holder.

The ROCKPANEL Uni panels are surface treated with a four-layer water-borne polymer emulsion coating on one side, in a range of colours.

The physical properties of the panels are indicated in table 1.

Table 1	**Physical properties ROCKPANEL Uni boards**
Property	**Value**
Thickness, nominal	6 mm
Length, max	3050 mm
Width, max	1250 mm
Density, nominal	1050 kg/m^3
Bending strength, length and width	$f_{05} \geq 24$ N/mm^2
Modulus of elasticity	m(E) $\geq$ 3567 N/mm^2
Thermal conductivity	0,37 W/(m • K)
Coefficient of thermal expansion, length and width	α = 10,5 10^{-6} °K^{-1}
Coefficient of moisture expansion 23 °C/50 %RH to 92 %RH	0,303 mm/m after 4 days

Finishes
The finish is indicated in table 2. The paints are provided in a number of colours.

Table 2	**Finish ROCKPANEL Durable boards**
ROCKPANEL Uni: (water-borne polymer emulsion coating)	Colourpaint

The colourfastness of the panels is indicated in table 3.

Table 3	**Colourfastness ROCKPANEL UNI**
Property	**Value (ISO 105 A02)**
Colour fastness after 5000 hours artificial weathering	ROCKPANEL Uni: 3 or better

Subframes
The panels are attached to the building by fixing to a timber subframe.
The vertical battens should have a minimum thickness of 28 mm.

Appropriate preservative treatment of subframes
Use the appropriate part of EN 335 to identify the "use class" of a given service environment and geographical location. Table 1 in EN 335 will assist in determining the biological agents that can attack timber in certain situations. The user can then consider the type and duration of performance required select an appropriate level of durability and ensure that the timber or wood-based product specified has either, as a natural (see EN 350-2) or an acquired characteristic durability as the result of appropriate preservative treatment (see EN 351-1).

Joints
Horizontal joints
Option 1: The horizontal joints between the panels can be open in the case of a ventilated construction (subframe protection appears from table 4). Open joints are not watertight and the construction behind the battens shall establish the water tightness of the structure.
Option 2: The horizontal joints between the panels are made with a ROCKPANEL “A” extruded aluminium chair profile or equivalent in the case of panels mechanically fixed on timber battens. The chair profile has an overlap of at least 15 mm on the board above the profile. See annex 1.

Vertical joints
A 3 mm thick EPDM foam gasket (self-adhering backside) is fixed to the timber battens. If the horizontal joint is closed with an aluminium chair profile, the vertical joint is backed with the 60 mm wide gasket and for the intermediate battens the 36 mm gasket is used.

In the case of open horizontal joints the width of the gasket is 15 mm at both sides wider than the batten.

Fasteners
The panels are mechanically fixed either to vertical timber battens or vertical timber battens with intermediate ROCKPANEL strips. The mechanical fastening to timber battens is carried out with either ROCKPANEL stainless steel screws 4,5 × 35 mm no

1.4401 or 1.4578 (EN 10088) with heads in the colour of the panels or Rockpanel ring shank nails 2,7/2,9 × 32 mm or 40 mm no 1.4401 or 1.4578 (EN 10088) with heads in the colour of the panels. See annex 3, table 8.1 and 8.2.

The maximum fixing distances, hole diameter and the design value of the axial load appears from annex 2, tables 5.1, 6.1, 6.2, 7.1 and 7.2.
The installation method with the use of fixed points and moving points appears from table 5.2 and 5.3.

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

The boards are intended for external cladding and for fascias and soffits. The cladding on vertical timber battens with mechanically fixed boards can be carried out with or without ventilated cavities at the back.

The provisions made in this European Technical Assessment are based on an assumed intended working life of the kit of 50 years.

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

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

Characteristic	Assessment of characteristic
3.2 Safety in case of fire (BWR 2)	
Reaction to fire	Classification of panels: See table 4
3.3 Hygiene, health and the environment (BWR 3)	
Dangerous substances	The kit does not contain/release dangerous substances specified in TR 034, dated April 2013*), except Formaldehyde concentration 0,0105 mg/m^3 Formaldehyde class E1 The used fibres are not potential carcinogenic No biocides are used in the ROCKPANEL boards No flame retardant is used in the boards No cadmium is used in the boards.
Water vapour permeability	**Uni:** s_d < **1,80 m** at 23°C and 85% RH The designer shall consider the relevant needs for ventilation and the critical moisture content for all the integrated materials.
Water permeability incl. joints for non-ventilated applications	No Performance determined
3.4 Safety in use (BWR 4)	
In absence of national regulations the design values X_d may be calculated as indicated in the ETA (see tables 6.1, 6.2, 7.1 and 7.2). Below is mentioned the safety factors which has been used in the calculation of the design values.	
Fixing position and design value X_d of the axial load M/E/C (Middle/Edge/Corner) of mechanical fixings corresponding to the wind load resistance (load acting perpendicular to the façade) *Remark:* Design value X_d obtained by dividing the characteristic value X_k by a partial factor γ_M : $X_d = X_k / \gamma_M$	**Rockpanel screws:** Design value X_d depends on the modification factor k_{mod} , the strength class of the wood and the different material factors γ_M See Annex 2 Table 6.1 and 6.2, row (25), (26) and (27) **Rockpanel nails:** Design value X_d depends on the modification factor k_{mod} , the strength class of the wood and the different material factors γ_M See Annex 2 Table 7.1 and 7.2, row (25), (26) and (27) (for edge distances and distances between fasteners: see annex 2, Table 5.1)
Shear strength mechanical fixings Characteristic values	**RockPanel nails:** Failure load: 944 **N** Deformation: **12 mm** **RockPanel screws:** Failure load: **1050 N** Deformation: **8 mm**
Impact resistance	No performance assessed

Characteristic		Assessment of characteristic
	Dimensional stability Cumulative dimensional change % Coefficient of thermal expansion 10^{-6} °K $^{-1}$ coefficient of moisture expansion 42% RH difference after 4 days mm/m	 Length: **0,085** % Width: **0,084** % Length: 10,5.10^{-6} Width: 10,5.10^{-6} Length: 0,288 Width: 0,317
	Wind load resistance M/E/C	Characteristic strength Screws : 801/322/197 N Nails : 636/279/233 N Failure load: Screws: 4426/4810/4930 N/m² Nails : 2704/3027/4576 N/m²
	Mechanical resistance of panels	**See section 1, table 1**
3.7	**Sustainable use of natural resources (BWR 7)**	No performance determined
3.8	**Related aspects of durability and serviceability**	
	Resistance to Hygrothermal cycles	**Pass**
	Resistance to Xenon Arc exposure	**Pass**

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

Table 4 Reaction to fire classification
The panels have been classified in accordance with EN 13501-1 with the following parameters:

Fixing method	**Ventilated or non-ventilated**	**Vertical wooden battens**
		Rockpanel Uni
Mechanically fixed	Ventilated with gasket on the batten [a]	**B-s2,d0** open 6 mm horizontal joint
	Ventilated with RockPanel strips 6 or 8 mm on the battens [b]	**B-s2,d0** open 6 mm horizontal joint
	Non-ventilated Cavity filled with mineral wool	**B-s1,d0** closed horizontal joint

[a] width of the gasket 15 mm at both sides wider than the batten
[b] width of the strip 15 mm at both sides wider than the batten

Field of application
Further to the limitations described in section 1 of the ETA, the following field of application applies.

Euroclass classification
The classification mentioned in table 4 is valid for the following end use conditions:

Mounting:
- Mechanically fixed as described in table 4, which are attached to the subframe mentioned below

Substrates:
- The results are also valid for a wall made of timber frame (see "Insulation" for the backing of the panels)
- Test results are also valid for the same type of panel used without insulation, if the substrate chosen is made with Euro-class A1 or A2

Insulation:
- The panels are backed with minimal 50 mm mineral wool insulation with density 30-70 kg/m^3 according to EN 13162 with a cavity between the panels and the insulation (all constructions with the exception of 'non-ventilated')
- Results are also valid for all greater thickness

of mineral wool insulation layer with the same density and the same or better reaction to fire classification

Subframe:

- Test results are also valid for the same type of panel with aluminium or steel frame

Fixings:

- Results are also valid with higher density of the fixing devices
- Test results are also valid for the same type of panel fixed by rivets made of the same material of screws and vice versa

Cavity:

- The depth of the cavity is minimum 28 mm
- Unfilled or filled with insulation of mineral wool with a density 30-70 kg/m^3 according to EN 13162
- Test results are also valid for other higher thickness of air space between the back of the board and the insulation

Joints:

- Vertical joints are with an EPDM foam gasket backing or Rockpanel strip backing as described in table 4 and horizontal joints can be open or with an aluminium profile.
- The result from a test with an open horizontal joint is also valid for the same type of panel used in applications with horizontal joints closed by steel or aluminium profiles

The classification is also valid for the following product parameters:

Thickness:

- Nominal 6 mm

Density

- Nominal 1050 kg/m^3

Aspects related to the performance of the product

All materials shall be manufactured by ROCKWOOL B.V. or by subcontractors under the responsibility of ROCKWOOL B.V.

The European Technical Assessment is issued for the product on the basis of agreed data/information, deposited with ETA-Danmark, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to ETA-Danmark before the changes are introduced. ETA-Danmark will decide whether or not such changes affect the ETA and consequently the validity of the CE marking on the basis of the ETA and if so whether further assessment or alterations to the ETA, shall be necessary.

Installation details and application details for the man on site are given by ROCKWOOL B.V. / Rockpanel in the manufacturer's application guide technical dossier which forms part of the documentary material for this ETA. On every pallet label and/or on the protective film of every board the website is printed which guides the end user to the most actual information.

For non-ventilated use, the substrate shall be airtight.

The boards are in general mounted with a joint width of 6 mm.

If the joints are to be sealed, only durable sealants should be used with a good adhesion on the edges of the boards and a good UV-stability. To prevent sticking to the subframe, a PE-film or tape can be used.

The boards for external cladding shall not be fixed over building or settlement joints. Where settlement joints are located in the building the same movements of the building and substructure shall be possible in the external cladding.

The water diffusion resistance of the boards is declared as a means for the designer to decide whether they are sufficiently vapour permeable, especially when used for cladding without ventilated cavities at the back. The designer can then establish that condensation in the entire wall as a result of water vapour diffusion will not occur or will occur only to an extent where damage is not caused during the condensation period and the wall will dry out again during the evaporation period. The designer shall consider the critical moisture content for all the integrated materials.

For non-ventilated intended use, the pressure level preceding the pressure level where leakage occurs is declared as a means for the designer to decide on the necessity of the use of a vapour control membrane.

The panels should not be taken into account when designing a timber stud wall to resist racking forces.

The holes for the fixings are drilled into the panels not less than 15 mm from a vertical edge and 50 mm from a horizontal edge (see Annex 2). The panels are fixed making sure that the screws are not over-tightened.

4 Attestation and verification of constancy of performance (AVCP)

4.1 AVCP system

According to the decision 2003/640/EC of the European Commission as amended, the system(s) of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) is 1, since there is a clearly identifiable stage in their production which results in an improvement of fire performance due to the limiting of organic material.

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

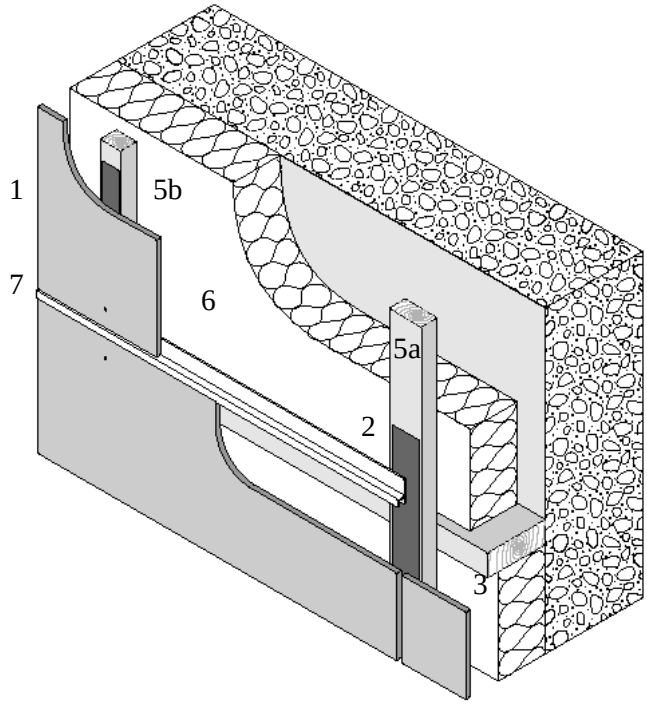
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at ETA-Danmark prior to CE marking.

Issued in Copenhagen on 2017-08-11 by

Thomas Bruun
Managing Director, ETA-Danmark

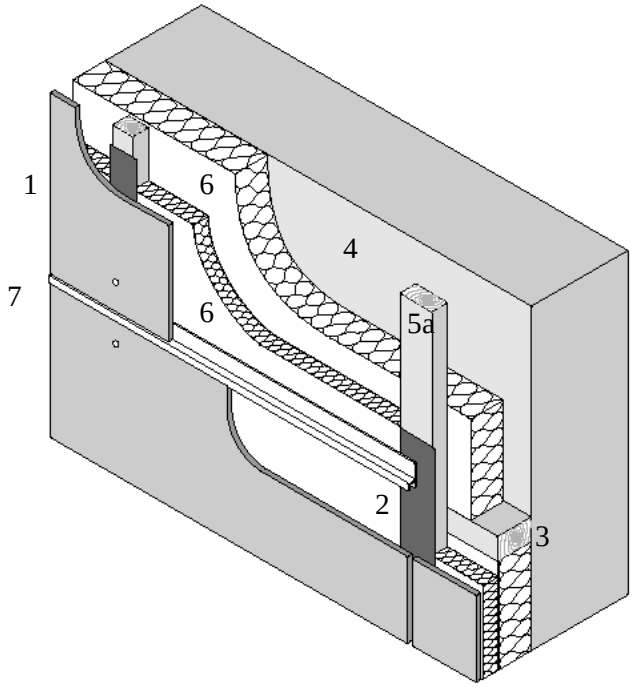
Annex 1
Pre-fabricated compressed mineral wool boards with organic or inorganic finish

Figure 1. Ventilated intended use



1. Compressed mineral wool board with organic or inorganic finish
2. EPDM foam gasket
3. Timber beam
4. Vapour barrier
5. Batten: a - joint and b - intermediate
6. Insulation
7. ROCKPANEL “A” – 6 mm extruded aluminium chairprofile or equivalent

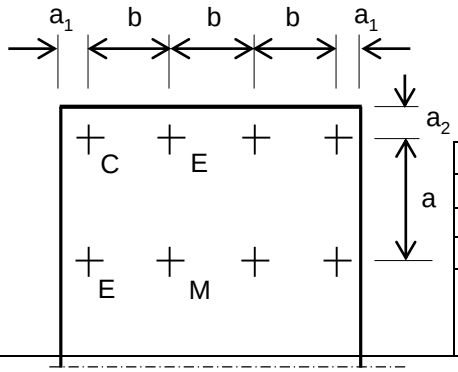
Figure 2. Non-ventilated intended use



Annex 2

Maximum edge distances, hole diameter and maximum design value of the axial load X_d

Table 5.1 Minimum edge distances, maximum distances between fastenings and hole diameter of fixing points in mm

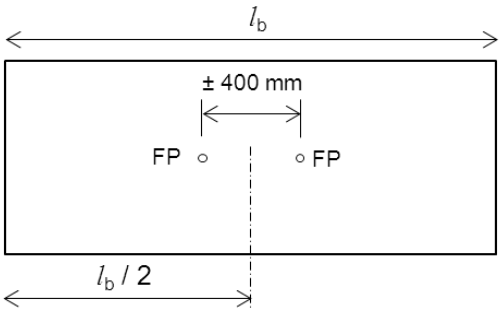


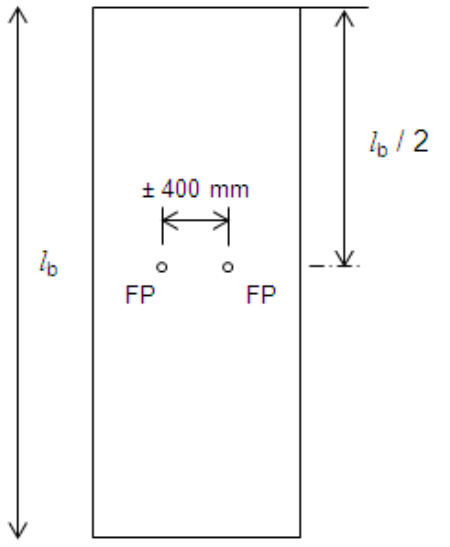
C: Fixing in corner
E: Fixing at edge
M: Fixing at intermediate position

Fixing	distances				Hole diameter fixing		
type	b_{max}	a_{max}	a_1	a_2	fixed	moving	slotted
screw	400	300	≥ 15	≥ 50	3,2	6,0	3,4*6,0
nail	480	300	≥ 15	≥ 50	2,5	4,0 [a]	2,8*4,0

[a] : board length considered : 1600 mm; In the case of a larger panel length, and certain climatic conditions, a tension between shaft and panel-hole may occur

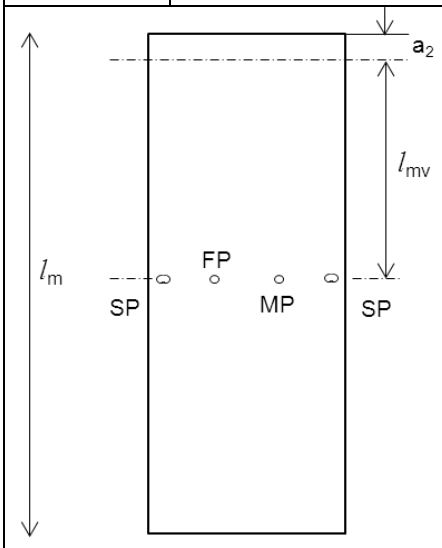
Table 5.2 Installation method with the use of two fixed points vertically and horizontally positioned

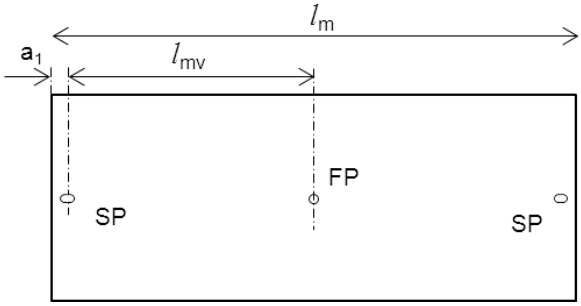




FP – fixed point; l_b = length board
All the other fixing points are 'moving points'

Table 5.3 Installation method with the use of a fixed point and two slotted points





FP – fixed point
SP – slotted point
MP – moving point
All the other fixing points are 'moving points'
l_{mv} = apt l_m / 2

FP	Fixed points may be realized by the use of a metal (aluminium or stainless steel) sleeve in a hole with the diameter of a moving point
SP	Slotted points may be realized by the use of a metal (aluminium or stainless steel) side sleeve in a hole with the diameter of a moving point

Design values X_d of the **mechanical** fixings screw and nail.

In absence of national regulations, the design values X_d may be calculated as indicated in the ETA (see tables 6 and 7). In these tables the safety factors are mentioned which have been used in the calculation of the design values.

Table 6.1	Characteristic axial load X_k and **design** value of the axial load $\boldsymbol{X_d} = X_k / \gamma_M$ for the combination **screw** and 6 mm Uni boards (with the use of gaskets), with $\alpha \geq 30°$ [e]				
board thickness			6 mm (with the use of a gasket)		(1)
location of the fixing in the board			M-middle	E-edge	C-corner (2)
pull-through N					(3)
characteristic pull-through N			*593*	*408*	*302* (4)
material factor Rockpanel γ_M (manufacturers declaration)			*2,0*	*2,0*	*2,0* (5)
design value X_d of the pull-through N			296	204	151 (6)
wind suction					(7)
average wind load in N/m²			4426	4810	4930 (8)
average strength N			*801*	*322*	*197* (9)
material factor Rockpanel γ_M (manufacturers declaration)			*2,0*	*2,0*	*2,0* (10)
design value X_d of the pull-through N			400	161	98 (12)
withdrawal capacity					(13)
characteristic withdrawal capacity $F_{ax,k,Rk}$ [b] [c] [d]					(14)
strength class wood (EN 338)	C18	ρ_k = 320 kg/m³	963 [b]	963 [b]	963 [b] (15)
	C24	ρ_k = 350 kg/m³	1035 [b]	1035 [b]	1035 [b] (16)
modification factor for k_{mod}			k_{mod} [a]		(17)
axial withdrawal capacity $F_{ax,k,Rk} \cdot k_{mod}$ [a] [b] [c] [d]					(18)
strength class wood (EN 338)	C18	ρ_k = 320 kg/m³	963 • k_{mod}	963 • k_{mod}	963 • k_{mod} (19)
	C24	ρ_k = 350 kg/m³	1035 • k_{mod}	1035 • k_{mod}	1035 • k_{mod} (20)
material factor (NA to) EN 1995-1-1:2004+A1:2008			γ_M = 1,30 [withdrawal capacity]		(21)
design value X_d of the axial withdrawal capacity N					(22)
strength class wood (EN 338)	C18	ρ_k = 320 kg/m³	741•k_{mod}	741•k_{mod}	741•k_{mod} (23)
	C24	ρ_k = 350 kg/m³	796•k_{mod}	796•k_{mod}	796•k_{mod} (24)
design value of the axial load $\boldsymbol{X_d} = X_k / \gamma_M$ N			**minimum value of the rows:**		(25)
strength class wood (EN 338)	C18	ρ_k = 320 kg/m³	**(6) (12) (23)**	**(6) (12) (23)**	**(6) (12) (23)** (26)
	C24	ρ_k = 350 kg/m³	**(6) (12) (24)**	**(6) (12) (24)**	**(6) (12) (24)** (27)
board span b			400		(28)
fixing distance a			300		(29)

[a]: modification factor k_{mod} depends on the service class (humidity conditions) and the load-duration class according to the National Annex of EN 1995-1-1

[b]: with reduced thread diameter to fulfil the minimum l_{ef} demand ($d = l_{ef} / 6 = 26,25/6 = 4,30$ mm) ;

[c]: angle α between shaft and the wood grain: $\alpha \geq 30°$

[d]: calculation in accordance with EN 1995-1-1+C1+A1:2008 formula (8.38), (8.39) and (8.40)

[e]: α is the angle between the screw axis and the grain direction

Table 6.2	Characteristic axial load X_k and **design** value of the axial load $\boldsymbol{X_d} = X_k / \gamma_M$ for the combination **screw** and 6 mm Uni boards (with the use of 6 mm strips), with $\alpha \geq 30°$ [e]					
board thickness				6 mm (with the use of a 6 mm strip)		(1)
location of the fixing in the board				M-middle	E-edge	C-corner (2)
pull-through N						(3)
characteristic pull-through N				*593*	*408*	*302* (4)
material factor Rockpanel γ_M (manufacturers declaration)				*2,0*	*2,0*	*2,0* (5)
design value X_d of the pull-through N				296	204	151 (6)
wind suction						(7)
average wind load in N/m²				4426	4810	4930 (8)
average strength N				*801*	*322*	*197* (9)
material factor Rockpanel γ_M (manufacturers declaration)				*2,0*	*2,0*	*2,0* (10)
design value X_d of the pull-through N				400	161	98 (12)
withdrawal capacity						(13)
characteristic withdrawal capacity $F_{ax,k,Rk}$ [b] [c] [d]						(14)
strength class	C18	ρ_k = 320 kg/m³		588 [b]	588 [b]	588 [b] (15)
wood (EN 338)	C24	ρ_k = 350 kg/m³		632 [b]	632 [b]	632 [b] (16)
modification factor for k_{mod}				k_{mod} [a]		(17)
axial withdrawal capacity $F_{ax,k,Rk} \cdot k_{mod}$ [a] [b] [c] [d]						(18)
strength class	C18	ρ_k = 320 kg/m³		588 • k_{mod}	588 • k_{mod}	588 • k_{mod} (19)
wood (EN 338)	C24	ρ_k = 350 kg/m³		632 • k_{mod}	632 • k_{mod}	632 • k_{mod} (20)
material factor (NA to) EN 1995-1-1:2004+A1:2008				γ_M = 1,30 [withdrawal capacity]		(21)
design value X_d of the axial withdrawal capacity N						(22)
strength class	C18	ρ_k = 320 kg/m³		452 • k_{mod}	452 • k_{mod}	452 • k_{mod} (23)
wood (EN 338)	C24	ρ_k = 350 kg/m³		486 • k_{mod}	486 • k_{mod}	486 • k_{mod} (24)
design value of the axial load $\boldsymbol{X_d} = X_k / \gamma_M$ N				**minimum value of the rows:**		(25)
strength class	C18	ρ_k = 320 kg/m³		**(6) (12) (23)**	**(6) (12) (23)**	**(6) (12) (23)** (26)
wood (EN 338)	C24	ρ_k = 350 kg/m³		**(6) (12) (24)**	**(6) (12) (24)**	**(6) (12) (24)** (27)
board span b				400		(28)
fixing distance a				300		(29)

[a]: modification factor k_{mod} depends on the service class (humidity conditions) and the load-duration class according to the National Annex of EN 1995-1-1

[b]: with reduced thread diameter to fulfil the minimum l_{ef} demand ($d = l_{ef} / 6 = 21,15/6 = 3,52$ mm) ;

[c]: angle α between shaft and the wood grain: $\alpha \geq 30°$

[d]: calculation in accordance with EN 1995-1-1+C1+A1:2008 formula (8.38), (8.39) and (8.40)

[e]: α is the angle between the screw axis and the grain direction

Characteristic axial load –
Nail 32 mm / Uni 6 mm / gasket / subframe wood

Table 7.1	Characteristic axial load X_k and **design** value of the axial load $\boldsymbol{X_d} = X_k / \gamma_M$ for the combination 32 mm **nail** and 6 mm Uni boards (with the use of gaskets)						
board thickness				6 mm (with the use of a gasket)			(1)
location of the fixing in the board				M-middle	E-edge	C-corner	(2)
pull-through N							(3)
characteristic pull-through N				*404*	*332*	*276*	(4)
material factor Rockpanel γ_M (manufacturers declaration)				*2,0*	*2,0*	*2,0*	(5)
design value X_d of the pull-through N				202	166	138	(6)
wind suction							(7)
average wind load in N/m²				2704	3027	4576	(8)
average strength N				*636*	*279*	*233*	(9)
material factor Rockpanel γ_M (manufacturers declaration)				*2,0*	*2,0*	*2,0*	(10)
design value X_d of the pull-through N				318	139	116	(12)
withdrawal capacity							(13)
characteristic withdrawal capacity $F_{ax,k,Rk}$ [b] [d]							(14)
strength class	C18	ρ_k = 320 kg/m³		217	217	217	(15)
wood (EN 338)	C24	ρ_k = 350 kg/m³		259	259	259	(16)
modification factor for k_{mod}				k_{mod} [a]			(17)
axial withdrawal capacity $F_{ax,k,Rk} \cdot k_{mod}$ [a] [b] [d]							(18)
strength class	C18	ρ_k = 320 kg/m³		217 • k_{mod}	217 • k_{mod}	217 • k_{mod}	(19)
wood (EN 338)	C24	ρ_k = 350 kg/m³		259 • k_{mod}	259 • k_{mod}	259 • k_{mod}	(20)
material factor (NA to) EN 1995-1-1:2004+A1:2008				γ_M = 1,30 [withdrawal capacity]			(21)
design value X_d of the axial withdrawal capacity N							(22)
strength class	C18	ρ_k = 320 kg/m³		167 • k_{mod}	167 • k_{mod}	167 • k_{mod}	(23)
wood (EN 338)	C24	ρ_k = 350 kg/m³		199 • k_{mod}	199 • k_{mod}	199 • k_{mod}	(24)
design value of the axial load $\boldsymbol{X_d} = \boldsymbol{X_k} / \boldsymbol{\gamma_M}$ N				**minimum value of the rows:**			(25)
strength class	C18	ρ_k = 320 kg/m³		**(6) (12) (23)**	**(6) (12) (23)**	**(6) (12) (23)**	(26)
wood (EN 338)	C24	ρ_k = 350 kg/m³		**(6) (12) (24)**	**(6) (12) (24)**	**(6) (12) (24)**	(27)
board span b				480			(28)
fixing distance a				300			(29)

[a]: modification factor k_{mod} depends on the service class (humidity conditions) and the load-duration class according to the National Annex of EN 1995-1-1

[b]: with reduced thread diameter to fulfil the minimum l_{ef} demand ($d = l_{ef} / 8 = 18,4/8 = 2,30$ mm) ;

[d]: calculation in accordance with EN 1995-1-1:2004 + AC:2006 + A1:2008 formula (8.23 a)

Characteristic axial load –
Nail 40 mm / Uni 6 mm / ROCKPANEL strip / subframe wood

Table 7.2 Characteristic axial load X_k and **design** value of the axial load $\boldsymbol{X_d} = X_k / \gamma_M$ for the combination 40 mm **nail** and 6 mm Uni boards (with the use of strips)

board thickness				6 mm (with the use of 6 mm strips)			(1)
location of the fixing in the board				M-middle	E-edge	C-corner	(2)
pull-through N							(3)
characteristic pull-through N				*404*	*332*	*276*	(4)
material factor Rockpanel γ_M (manufacturers declaration)				*2,0*	*2,0*	*2,0*	(5)
design value X_d of the pull-through N				202	166	138	(6)
wind suction							(7)
average wind load in N/m²				2704	3027	4576	(8)
average strength N				*636*	*279*	*233*	(9)
material factor Rockpanel γ_M (manufacturers declaration)				*2,0*	*2,0*	*2,0*	(10)
design value X_d of the pull-through N				318	139	116	(12)
withdrawal capacity							(13)
characteristic withdrawal capacity $F_{ax,k,Rk}$ [b] [d]							(14)
strength class	C18	ρ_k = 320 kg/m³		271	271	271	(15)
wood (EN 338)	C24	ρ_k = 350 kg/m³		325	325	325	(16)
modification factor for k_{mod}				k_{mod} [a]			(17)
axial withdrawal capacity $F_{ax,k,Rk} \cdot k_{mod}$ [a] [b] [d]							(18)
strength class	C18	ρ_k = 320 kg/m³		271 • k_{mod}	271 • k_{mod}	271 • k_{mod}	(19)
wood (EN 338)	C24	ρ_k = 350 kg/m³		325 • k_{mod}	325 • k_{mod}	325 • k_{mod}	(20)
material factor (NA to) EN 1995-1-1:2004+A1:2008				γ_M = 1,30 [withdrawal capacity]			(21)
design value X_d of the axial withdrawal capacity N							(22)
strength class	C18	ρ_k = 320 kg/m³		209 • k_{mod}	209 • k_{mod}	209 • k_{mod}	(23)
wood (EN 338)	C24	ρ_k = 350 kg/m³		250 • k_{mod}	250 • k_{mod}	250 • k_{mod}	(24)
design value of the axial load $\boldsymbol{X_d} = \boldsymbol{X_k} / \boldsymbol{\gamma_M}$ N				**minimum value of the rows:**			(25)
strength class	C18	ρ_k = 320 kg/m³		**(6) (12) (23)**	**(6) (12) (23)**	**(6) (12) (23)**	(26)
wood (EN 338)	C24	ρ_k = 350 kg/m³		**(6) (12) (24)**	**(6) (12) (24)**	**(6) (12) (24)**	(27)
board span b				480			(28)
fixing distance a				300			(29)

[a]: modification factor k_{mod} depends on the service class (humidity conditions) and the load-duration class according to the National Annex of EN 1995-1-1

[b]: with reduced thread diameter to fulfil the minimum l_{ef} demand ($d = l_{ef} / 8 = 20,6/8 = 2,57$ mm) ;

[d]: calculation in accordance with EN 1995-1-1:2004 + AC:2006 + A1:2008 formula (8.23 a)

Annex 3
Fastener specification for wooden subframes

Table 8.1 Ring-shank nail 2,7/2,9 x 32 and 2,7/2,9 x 40 mm

Stainless steel in accordance with EN 10088 - Material number 1.4401 or 1.4578
Definitions in accordance with EN 14592:2008+A1:2012

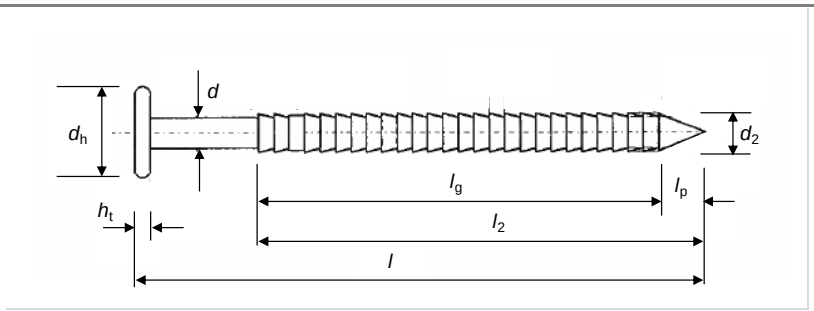
d = 2,6 – 2,8 d_2 = 2,8 – 3,0 l for nail 32 = 31 – 32,5 l for nail 40 = 39 – 40,5 l_2 for nail 32 = 24 – 26 l_2 for nail 40 = 32 – 34 l_p = ≤ 4,8 l_g = l_2 - l_p d_h = 5,8 – 6,3 h_t = 0,8 – 1,0	

Table 8.2 Torx screws 4,5 x 35 mm

Stainless steel in accordance with EN 10088 - Material number 1.4401 or 1.4578
Definitions in accordance with EN 14592:2008+A1:2012

d = 4,3 – 4,6 d_s = 3,3 – 3,4 d_h = 9,6 - 0,4 l = 35 -1,25 l_g = 26,25 – 28,5