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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

MEMBER OF EOTA

# European Technical Assessment ETA-13/0204 of 10/11/2015

**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 Lines²** , 8 mm and 10 mm tongue and groove panels finish Colours/Rockclad |
| **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.<br>Konstruktieweg 2<br>NL-6045 JD Roermond<br>Tel. +31 475 353 000<br>Fax +31 475 353 550 |
| **Manufacturing plant:** | ROCKWOOL B.V. / ROCKPANEL Group<br>Konstruktieweg 2<br>NL-6045 JD Roermond |
| **This European Technical Assessment contains:** | 24 pages including 8 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:** | The previous ETA with the same number and validity from 2013-04-22 to 2019-04-22 |

# II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

## 1 Technical description of product and intended use

**Technical description of the product**
**General**
ROCKPANEL Lines² tongue and groove panels, thicknesses 8 and 10 mm, finish Colours/Rockclad is made from prefabricated compressed mineral wool panels with thermo-hardening synthetic binders. The tongue and groove panels are fastened to timber subframes. Fastening of the 8 mm panels to the timber subframe is carried out with corrosion resistant fixing clips with screws.
Fastening of the 10 mm panels to the timber subframe is carried out with corrosion resistant nails or screws.
Mechanical fasteners and aluminum profiles are specified by the ETA-holder.

The ROCKPANEL Lines² panels are surface treated with a two-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** | |
|---|---|
| **Property** | **Value** |
| Thickness and tolerances | 8 ± 0,5 mm /<br>10 ± 0,5 mm |
| Length, max | 3050 mm |
| Panel width / working width | S 8 : 164/151-156 [a]<br>XL 8 : 295/282-287 [a]<br>S 10 : 164/146<br>XL 10 : 295/277 |
| Panel width tolerances | Nominal ± 1 mm |
| Density, nominal and tolerances | 1050 kg/m$^3$ -150 / +150 |
| Bending strength, length and width | $f_{05} \geq 27$ N/mm$^2$ |
| Modulus of elasticity | m(E) ≥ 4015 N/mm$^2$ |
| Cumulative dimensional change according to EN 438-2 | Length: ≤ 0,085 %<br>Width: ≤ 0,084 % |
| Thermal conductivity | 0,37 W/(m • K) |
| Coefficient of thermal expansion, length and width | $\alpha = 10,5 \cdot 10^{-6}$ [K$^{-1}$] |
| Coefficient of moisture expansion 23 °C/50 %RH to 92 %RH | ≤ 0,302 ~~0,317~~ mm/m after 4 days |

[a] : min/max working width

**Finish**
The finish is indicated in Table 2. The coatings are provided in a number of colours.

| **Table 2** | |
|---|---|
| ROCKPANEL Lines² | Colourpaint (water-borne polymer emulsion coating) |

The colourfastness of the panels is indicated in Table 3.

| **Table 3** | |
|---|---|
| **Property** | **Value (EN 20105-A02)** |
| Colour fastness after 5000 hours artificial weathering | RockPanel Lines² :<br>3-4 or better |

**Subframes**
The panels are attached to the building by fixing to a subframe of wood.
The vertical battens should have a minimum thickness of 28 mm (solid wood).
Also LVL battens (Laminated Veneer Lumber) with a minimum thickness of 27 mm, according to EN 14374, can be used (Ultralam R, CE 0672-CPD-I)

***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**
The horizontal seams are automatically covered by the overlaid board.
Horizontal application Lines² 8 mm and 10 mm:
If all the joints of the tongue and groove panels are located between the vertical battens of the subframe, a gasket on the subframe is not required. In the case vertical joints are collected on the subframe, the durability of the timber has either as a natural or an acquired characteristic durability as the result of appropriate preservative treatment.

**Aluminum profiles**
A ROCKPANEL starting profile "K" (Figure 1) can be used for placement of the lowest section of Lines².

In vertical use of Lines² 10 mm, the horizontal joints between the panels are made with a ROCKPANEL "A" extruded chair profile or equivalent. The chair profile has an overlap of at least 15 mm on the board above the profile.

The Lines² 8 mm cannot be used in vertical applications.

**Foam gasket**

Lines[2] 10 mm: If all the joints of the tongue and groove panels are located between the vertical battens of the subframe, a gasket on the subframe is not required.
Lines[2] 8 mm: no requirement for the use of gaskets.

**Fasteners Lines[2] 10 mm**
The panels are mechanically fixed to a vertical or a horizontal timber subframe. The mechanical fastening to timber battens is carried out with either stainless steel flat-top screws 3,5 × 30 mm no 1.4301, 1.4401 or 1.4578 (EN 10088) or Rockpanel ring shank nails 2,1/2,7 × 27 mm no 1.4401 or 1.4578 (EN 10088); see Table 15 and Table 14.

**Fasteners Lines[2] 8 mm**
The panels are mechanically fixed to a vertical timber subframe. The mechanical fastening to timber battens is carried out with stainless steel clips no 1.4310, fixed with round-top screws 3,5 x 25 mm no 1.4301; see Table 16.
*Remark: In the case a ROCKPANEL strip is used between the back of the clip and the front of the batten, the length of the screw shall be increased with the thickness of the strip.*

The maximum fixing distances and edge distances appear from the tables in Annex 2 and 3, the hole diameter from Table 13. The design load and characteristic load appears from annex 2 and 3 of the ETA.

**Intended use**
The panels are intended for external cladding according to Figure 1 and for fascias and soffits. The cladding on vertical or horizontal timber battens with mechanically fixed panels can be carried out with ventilated cavities at the back.

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

The boards are intended for external cladding according to Figure 1 and for fascias and soffits.

The provisions made in this European Technical Assessment are based on an assumed intended working life of the kit of 50 years, provided that they are subject to appropriate use and maintenance.

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

| 3.2 | Safety in case of fire (BWR 2) | |
|---|---|---|
| | **Characteristic** | **Assessment of characteristic** |
| | **Reaction to fire of the board in its intended use as a cladding kit** | The aluminum or steel profiles are classified as **Euroclass A1** |
| | | Classification of panels: see Table 4 |

The panels have been classified in accordance with EN 13501-1 with the following parameters:

**Table 4**. Euroclass classification of different constructions with ROCKPANEL Lines² panels

| **Fixing method** | **Ventilated or non-ventilated** | **Vertical wooden subframe Lines² in the thicknesses** | | |
|---|---|---|---|---|
| | | **8 mm** [a] | **10 mm** | **8 mm** |
| Mechanically fixed | Ventilated | **B-s2,d0** | | **C-s2,d0** |

[a] With the use of 8 mm ROCKPANEL strips on the vertical battens; 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 to a wooden subframe
- The boards are backed with min. 40 mm mineral wool insulation density 30-70 kg/m³ according to EN 13162 with a cavity between the back of the board and the insulation

Substrates:
- Concrete walls, masonry walls

Insulation:
- The panels are backed with min. 40 mm mineral wool insulation with density 30-70 kg/m³ according to EN 13162 between the battens and min. 50 mm with density 30-70 kg/m³ according to EN 13162 kg/m³ behind the battens without air gap
- 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
- The test result of a test with mineral wool insulation shall be valid, without test, for the same type of panel used without insulation, if the substrate chosen according to EN 13238 is made of panel with Euro-class A1 or A2 (e.g. fibres-cement panel).

Subframe:
- Vertical softwood battens without fire retardant treatment, thickness minimum 28 mm
- Test results are also valid for the same type of panel with aluminum or steel frame
- Test results are also valid for the same type of panel with vertical LVL battens, without fire retardant treatment, thickness minimum 27 mm

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:
- Unfilled
- The depth of the cavity is minimum 28 mm
- Test results are also valid for other higher thickness of air space between the back of the board and the insulation behind the subframe

Joints:
Horizontal application Lines² 8 mm and 10 mm
- Vertical joints are open without gasket backing or ROCKPANEL strip backing as described in Table 4; the horizontal seams are automatically covered by the overlaid board.

Vertical application of Lines² 10 mm
- An open horizontal joint is also valid for the same type of panel used in applications with horizontal joints closed by steel or aluminum profiles

The classification is also valid for the following product parameters:

Thickness:
- Nominal 8 mm, individual tolerances ± 0,5 mm
- Nominal 10 mm, individual tolerances ± 0,5 mm

Density
- Nominal 1050 kg/m$^3$ , individual tolerances -150 / +150 kg/m$^3$

| **3.3 Hygiene, health and the environment (BWR 3)** | |
|---|---|
| **Characteristic** | **Assessment of characteristic** |
| **Content, emission and/or release of dangerous substances** | Use category: Outdoor S/W2<br>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<br><br>The used fibres are not potential carcinogenic<br>No biocides are used in the ROCKPANEL boards<br>No flame retardant is used in the boards<br>No cadmium is used in the boards |
| Water vapour permeability | $s_d$ declared : ≤ **1,8 m at 23° C and 85% RH**<br><br>The designer shall consider the relevant needs for ventilation, heating and insulation to minimise condensation in service. |
| Water tightness of joints | No performance determined |
| Drainability | See section 'Aspects related to the performance of the product' |

| **3.4 Safety and accessibility in use (BWR 4)** | |
|---|---|
| **Characteristic** | **Assessment of characteristic** |
| **Wind load resistance** | |
| **Mechanical properties of panels** | See section 1, Table 1 |
| **Design value of axial loads** | |
| In absence of national regulations the design values $X_d$ may be calculated as indicated in the ETA (see Tables 6 up to and including 11). Below is mentioned the safety factor which has been used in the calculation of the design values. | |
| Fixing position and design value $X_d$ of the axial load M/C (Middle/Corner) of mechanical fixings corresponding to the wind load resistance (load acting perpendicular to the façade)<br>*Remark:*<br>Design value $X_d$ obtained by dividing the characteristic value $X_k$ by a partial factor $\gamma_M$ : $X_d = X_k / \gamma_M$<br>The design value $X_d$ of a material property can be expressed in general terms as<br>$X_d = \eta \times X_k / \gamma_m$; | **Lines[2] 8 mm - clip with screw fixing:**<br>Fastener specification according to Table 16.<br>Table 10 and 11, row (27) and (28) contain the design value of the axial load $\boldsymbol{X_d} = X_k / \gamma_M$ for the different fixing locations.<br>Tables include wind suction results according to "wind suction and pressure resistance" row (9) and (10).<br><br>**Lines[2] 10 mm with screw fixing:**<br>Fastener specification according to Table 15.<br>Table 6 and 7, row (26) and (27) contain the design value of the axial load $\boldsymbol{X_d} = X_k / \gamma_M$ for the different fixing locations and board thicknesses.<br>Tables include wind suction results according to "wind suction and pressure resistance" row (9) and (10). |

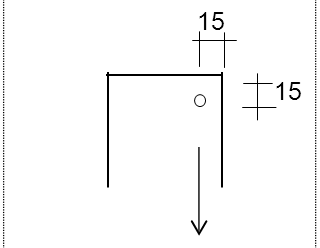
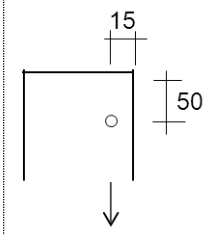
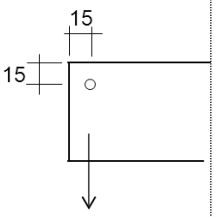
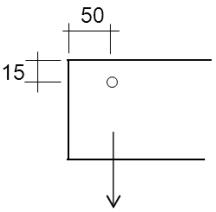
| | | |
|---|---|---|
| | $\gamma_m$ ROCKPANEL = 1,6<br>Conversion factor $\eta = 0{,}8$ (aged bending strength divided by the $f_{05}$ (Table 17, Annex 6) | **Lines² 10 mm with nail fixing:**<br>Fastener specification according to Table 14.<br>Table 8 and 9, row (26) and (27) contain the design value of the axial load $\boldsymbol{X_d} = X_k / \gamma_M$ for the different fixing locations and board thicknesses.<br>Tables include wind suction results according to "wind suction and pressure resistance" row (9) and (10). |

| | **Characteristic** | **Assessment of characteristic** |
|---|---|---|
| | **Wind load resistance** | |
| | **Pull/out and pull/through resistance of fasteners and mechanical resistance of boards** | |
| | Pull-out resistance of fasteners | **Lines² 8 mm - clip with screw fixing:**<br>Fastener specification according to Table 16.<br>Table 10 and 11 row (15) and (16) contain the characteristic withdrawal capacity $F_{ax}$ for both strength classes C18 and C24 according to EN 338.<br>Design value $X_d$ depends on the modification factor $k_{mod}$ , the strength class of the wood and the material factor $\gamma_M$ .<br>Row (27) and (28) contain the design value $X_d$ of the axial withdrawal capacity for both strength classes C18 and C24. |
| | | **Lines² 10 mm with screw fixing:**<br>Fastener specification according to Table 15.<br>Table 6 and 7 row (15) and (16) contain the characteristic withdrawal capacity $F_{ax}$ for both strength classes C18 and C24 according to EN 338.<br>Design value $X_d$ depends on the modification factor $k_{mod}$ , the strength class of the wood and the material factor $\gamma_M$ .<br>Row (26) and (27) contain the design value $X_d$ of the axial withdrawal capacity for both strength classes C18 and C24. |
| | Pull-out resistance of fasteners | **Lines² 10 mm with nail fixing:**<br>Fastener specification according to Table 14.<br>Table 8 and 9 row (15) and (16) contain the characteristic withdrawal capacity $F_{ax}$ for both strength classes C18 and C24 according to EN 338.<br>Design value $X_d$ depends on the modification factor $k_{mod}$ , the strength class of the wood and the material factor $\gamma_M$ .<br>Row (26) and (27) contain the design value $X_d$ of the axial withdrawal capacity for both strength classes C18 and C24. |
| | Pull-off resistance of panels | **Lines² 8 mm - clip with screw fixing:**<br>Fastener specification according to Table 16.<br>Table 10 and 11, row (4) contain the characteristic pull-off for six different fixing locations.<br>Row (7) contains the design value of the pull-off resistance for the different fixing locations. |

| | |
|---|---|
| Pull-through resistance of panels | **Lines² 10 mm with screw fixing:**<br>Fastener specification according to Table 15<br>Table 6 and 7, row (5) contain the characteristic pull-through for two different fixing locations.<br>Row (7) contains the design value of the pull-through resistance for the different fixing locations. |
| | **Lines² 10 mm with nail fixing:**<br>Fastener specification according to Table 14<br>Table 8 and 9, row (5) contain the characteristic pull-through for two different fixing locations.<br>Row (7) contains the design value of the pull-through resistance for the different fixing locations. |

| **Characteristic** | **Assessment of characteristic** |
|---|---|
| **Wind load resistance** | |
| **Wind suction and pressure resistance** | |
| Resistance to wind load M/C or A/B/C or D/E/F corrected for $f_{05}$ declared (27 N/mm²). | |
| Average strength (N)<br>Lines² 8 mm - clip with screw fixing | Lines² S - Annex 3.1 Table 10: location A/B/C: 168/168/168<br>location D/E/F: 312/312/312<br>Lines² XL - Annex 3.2 Table 11: location A/B/C: 184/184/184<br>location D/E/F: 272/272/272 |
| Average strength (N)<br>Lines² 10 mm with single screw fixing | Lines² S - Annex 2.1 Table 6: location M/C: 574/170<br>Lines² XL - Annex 2.1 Table 6: location M/C: 596/231 |
| Average strength (N)<br>Lines² 10 mm with double screw fixing | Lines² S - Annex 2.2 Table 7: location M/C: 592/170<br>Lines² XL - Annex 2.2 Table 7: location M/C: 714/231 |
| Average strength (N)<br>Lines² 10 mm with single nail fixing | Lines² S - Annex 2.3 Table 8: location M/C: 325/241<br>Lines² XL - Annex 2.3 Table 8: location M/C: 377/297 |
| Average strength (N)<br>Lines² 10 mm with double nail fixing | Lines² S - Annex 2.4 Table 9): location M/C: 562/241<br>Lines² XL - Annex 2.4 Table 9: location M/C: 695/297 |
| Average failure load N/m²<br>Lines² 8 mm - clip with screw fixing | Lines² S - Annex 3.1 Table 10: location A/B/C: 3156<br>location D/E/F: 2426<br>Lines² XL - Annex 3.2 Table 11: location A/B/C: 1914<br>location D/E/F: 1171 |
| Average failure load N/m²<br>Lines² 10 mm with single screw fixing | Annex 2.1 Table 6<br>Lines² S: location M/C: 5110/3700<br>Lines² XL: location M/C: 2797/2647 |
| Average failure load N/m²<br>Lines² 10 mm with double screw fixing | Annex 2.2 Table 7<br>Lines² S: location M/C: 5272/3700<br>Lines² XL: location M/C: 3351/2647 |
| Average failure load N/m²<br>Lines² 10 mm with single nail fixing | Annex 2.3 Table 8<br>Lines² S: location M/C: 2895/5243<br>Lines² XL: location M/C: 1768/3400 |
| Average failure load N/m²<br>Lines² 10 mm with double nail fixing | Annex 2.4 Table 9<br>Lines² S: location M/C: 5006/5243<br>Lines² XL: location M/C: 3264/3400 |

| Characteristic | Assessment of characteristic |
|---|---|
| **Mechanical resistance** | |
| Shear strength | |
| Lines[2] 10 mm mechanical fixings - Average values | |

| |  |  |  |  |
|---|---|---|---|---|
| Nail 2,1/2,3x27 | 795 | 914 | 838 | 866 |
| Screw 3,5x30 | 822 | 1083 | 1124 | 1074 |

Lines[2] 8 mm: Deformation of the clip due to three times the own weight of type XL: <0,1 mm

| Characteristic | Assessment of characteristic |
|---|---|
| **Impact resistance** [a] | |

**Table 5** Shatter properties – Degrees of exposure in use

| | | | product 'Lines[2]' 8 and 10 mm | | | |
|---|---|---|---|---|---|---|
| | | energy J | category IV | category III | category II | category I |
| impact by hard body | 0,5 kg | 1 | Pass | ----- | | |
| | 0,5 kg | 3 | ---- | Pass | Pass | Pass |
| | 1 kg | 10 | ---- | ---- | damaged by impact at the bottom | |

[a] For 'definition of use category' see Table 20

| Characteristic | Assessment of characteristic |
|---|---|
| **Hygrothermal behaviour** | |
| **Resistance to Hygro-thermal cycles** | **Pass** |
| **Dimensional stability** | See Section 1, Table 1 |
| **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 EU Construction Products Directive, these requirements need also to be complied with, when and where they apply.

**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. / ROCKPANEL Group

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 Group in the manufacturer's application guide technical dossier which forms part of the documentary material for this ETA. On every pallet label 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 between 5 and 8 mm (and a minimum of 3 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 cladding kit shall be designed and installed so that water which penetrates in the air space or condensation water shall be drained out of the installed kit without accumulation or moisture damage or leakage into the substrate or the wall cladding kit

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 15 mm from a horizontal edge (see Tables 6, 7, 8, 9 and 12) The panels are fixed making sure that the screws are not over-tightened.

Panel fixing with fixed points and moving points in accordance with Table 13.

# 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

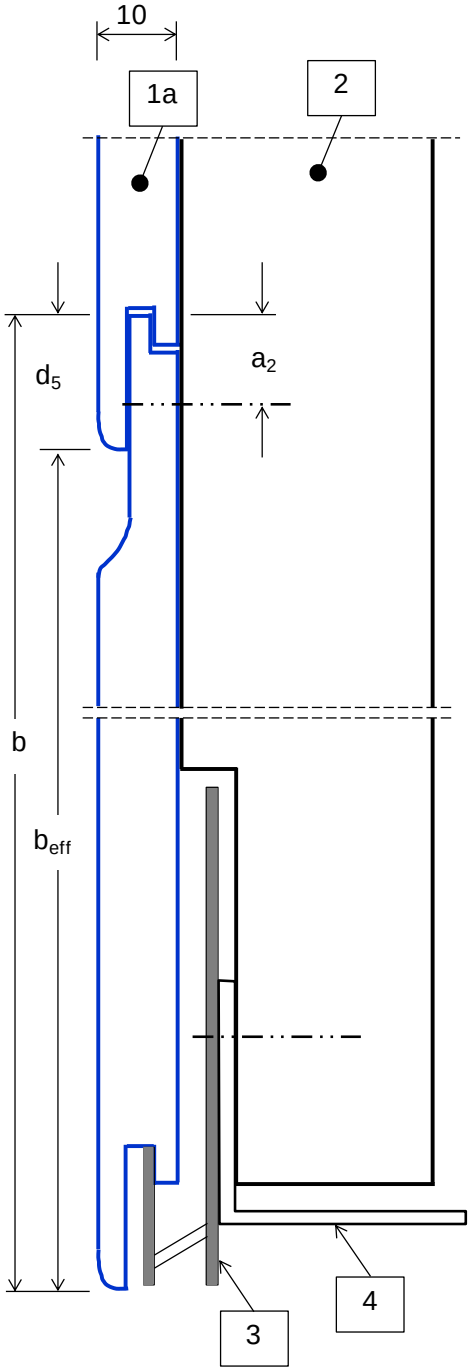
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at ETA-Danmark

Issued in Copenhagen on 2015-11-10 by

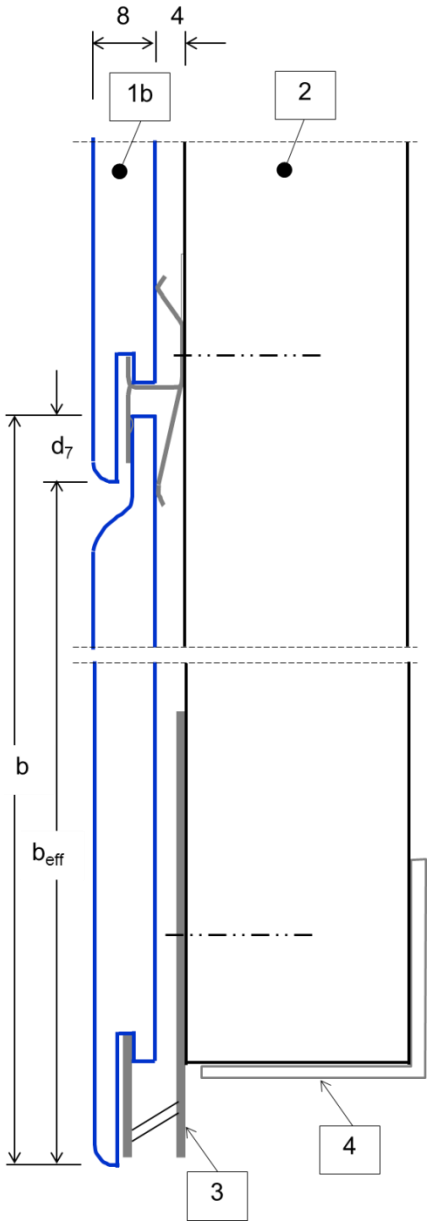
Thomas Bruun
Managing Director, ETA-Danmark

**Annex 1**

**Figure 1** . Mounting details and fixing dimensions ROCKPANEL Lines[2]




| | |
|---|---|
| 1a | Lines[2] S 10 or XL 10 |
| 2 | Subframe |
| 3 | Aluminum starter trim ‘K’ |
| 4 | Ventilation strip |
| b | S 10: 164 mm; XL 10: 295 mm |
| $b_{eff}$ | S 10: 146 mm; XL 10: 277 mm |
| $d_5$ | 18 mm |
| $a_2$ | 15 mm |




| | |
|---|---|
| 1b | Lines[2] S 8 or XL 8 |
| 2 | Subframe |
| 3 | Aluminum starter trim ‘K’ |
| 4 | Ventilation strip |
| b | S 8: 164 mm; XL 8: 295 mm |
| $b_{eff}$ | S 8: 151 to 156 mm; XL 8: 282 to 287 mm |
| $d_7$ | 8 – 13 mm |

**Annex 2.1**

**Table 6: Lines² 10 mm** - Characteristic axial load $X_k$ and **design** value of the axial load $\boldsymbol{X_d} = X_k / \gamma_M$ for the combination flat-top **screw** 3,5x30 and tongue 6,3 mm, with $\alpha \geq 30°$ [e] corrected for $f_{05}$ declared (27 N/mm²).

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Tongue of Lines² 10 mm | | | | 6,3 mm | | | (1) |
| location of the fixing in the panel | | | | M-centre (1 screw) | | C-corner (1 screw) | (2) |
| Panel type | | | | S | XL | S | XL (3) |
| pull-through N *(corrected for $f_{05}$ = 27 N/mm² )* | | | | | | | (4) |
| characteristic pull-through N | | | | *407* | *407* | *438* | *438* (5) |
| material factor ROCKPANEL $\gamma_M$ (manufacturers declaration) | | | | *2,0* | | *2,0* | (6) |
| **design** value $X_d$ of the pull-through N | | | | 204 | 204 | 219 | 219 (7) |
| wind suction *(corrected for $f_{05}$ = 27 N/mm² )* single screw | | | | | | | (8) |
| average wind load in N/m² | | | | 5110 | 2797 | 3700 | 2647 (9) |
| average strength N | | | | *574* | *596* | *170* | *231* (10) |
| material factor ROCKPANEL $\gamma_M$ (manufacturers declaration) | | | | *2,0* | | *2,0* | (11) |
| **design** value $X_d$ of the pull-through N | | | | 287 | 298 | 85 | 116 (12) |
| withdrawal capacity | | | | | | | (13) |
| characteristic withdrawal capacity $F_{ax,k,Rk}$ [b] [c] [d] | | | | | | | (14) |
| strength class | C18 | $\rho_k$ = 320 kg/m³ | | 538 [b] | | 538 [b] | (15) |
| wood (EN 338) | C24 | $\rho_k$ = 350 kg/m³ | | 578 [b] | | 578 [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 | $\rho_k$ = 320 kg/m³ | | 538 • $k_{mod}$ | | 538 • $k_{mod}$ | (19) |
| wood (EN 338) | C24 | $\rho_k$ = 350 kg/m³ | | 578 • $k_{mod}$ | | 578 • $k_{mod}$ | (20) |
| material factor (NA to) EN 1995-1-1 §2.4.1 | | | | $\gamma_M$ = 1,30 [withdrawal capacity] | | | (21) |
| **design** value $X_d$ of the axial withdrawal capacity N | | | | | | | (22) |
| strength class | C18 | $\rho_k$ = 320 kg/m³ | | 414 • $k_{mod}$ | | 414 • $k_{mod}$ | (23) |
| wood (EN 338) | C24 | $\rho_k$ = 350 kg/m³ | | 445 • $k_{mod}$ | | 445 • $k_{mod}$ | (24) |
| **design value of the axial load $\boldsymbol{X_d} = X_k / \gamma_M$ N** | | | | **minimum value of the rows:** | | | (25) |
| strength class | C18 | $\rho_k$ = 320 kg/m³ | | **(7)(12)(23)** | **(7)(12)(23)** | **(7)(12)(23)** | **(7)(12)(23)** (26) |
| wood (EN 338) | C24 | $\rho_k$ = 350 kg/m³ | | **(7)(12)(24)** | **(7)(12)(24)** | **(7)(12)(24)** | **(7)(12)(24)** (27) |
| board span b | | | | 600 | | | (28) |
| fixing distance a (corresponds with $b_{eff}$ in Fig. 1) | | | | Type S: 146 / XL : 277 | | | (29) |

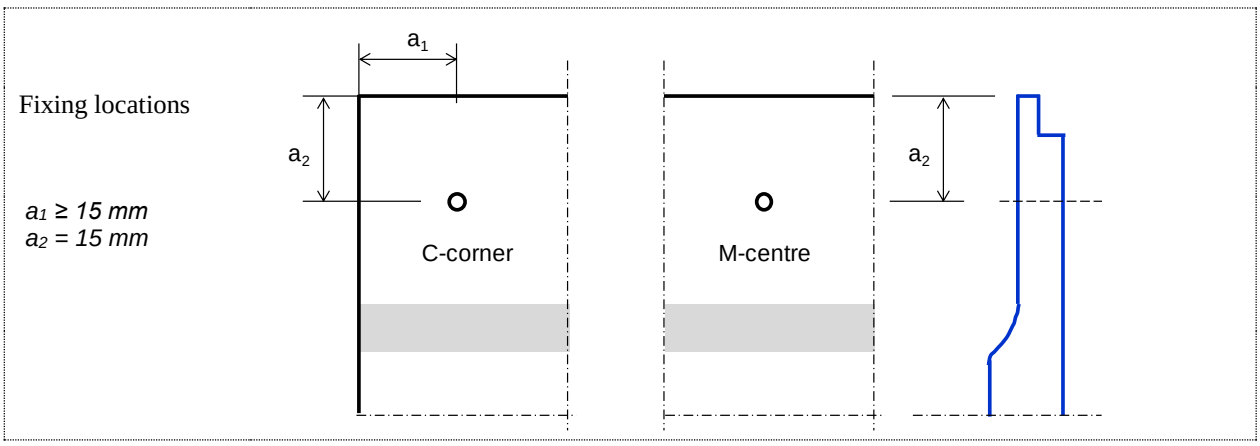
*[a]: modification factor $k_{mod}$ depends on the serviceclass (humidity conditions) and the load-duration class according to the National Annex of EN 1995-1-1*

*[b]: with reduced thread diameter to fulfil the minimum $l_{ef}$ demand ( d = $l_{ef}$ / 6 = 22,5/6 =3,2 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]: $\alpha$ is the angle between the screw axis and the grain direction*



**Annex 2.2**

**Table 7: Lines² 10 mm -** Characteristic axial load $X_k$ and **design** value of the axial load $\boldsymbol{X_d} = X_k / \gamma_M$ for the combination flat-top **screw** 3,5x30 and tongue 6,3 mm, with $\alpha \geq 30°$ [e] corrected for $f_{05}$ declared (27 N/mm²).

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Tongue of Lines² 10 mm | | | | 6,3 mm | | | (1) |
| location of the fixing in the panel | | | | M-centre (2 screws) | | C-corner (1 screw) | (2) |
| Panel type | | | | S | XL | S | XL (3) |
| pull-through N *(corrected for $f_{05}$ = 27 N/mm² )single screw* | | | | | | | (4) |
| characteristic pull-through N | | | | *407* | *407* | *438* | *438* (5) |
| material factor ROCKPANEL $\gamma_M$ (manufacturers declaration) | | | | *2,0* | | *2,0* | (6) |
| **design** value $X_d$ of the pull-through N | | | | 204 | 204 | 219 | 219 (7) |
| wind suction *(corrected for $f_{05}$ = 27 N/mm² )* with double screw | | | | | | | (8) |
| average wind load in N/m² | | | | 5272 | 3351 | 3700 | 2647 (9) |
| average strength N | | | | *592* | *714* | *170* | *231* (10) |
| material factor ROCKPANEL $\gamma_M$ (manufacturers declaration) | | | | *2,0* | | *2,0* | (11) |
| **design** value $X_d$ of the pull-through N | | | | 296 | 357 | 85 | 116 (12) |
| withdrawal capacity | | | | | | | (13) |
| characteristic withdrawal capacity $F_{ax,k,Rk}$ [b] [c] [d] | | | | | | | (14) |
| strength class | C18 | $\rho_k$ = 320 kg/m³ | | 538 [b] | | 538 [b] | (15) |
| wood (EN 338) | C24 | $\rho_k$ = 350 kg/m³ | | 578 [b] | | 578 [b] | (16) |
| modification factor for $k_{mod}$ | | | | $k_{mod}$ [a] | | | (17) |
| axial withdrawal capacity $F_{ax,k,Rk} . k_{mod}$ [a] [b] [c] [d] | | | | | | | (18) |
| strength class | C18 | $\rho_k$ = 320 kg/m³ | | 538 • $k_{mod}$ | | 538 • $k_{mod}$ | (19) |
| wood (EN 338) | C24 | $\rho_k$ = 350 kg/m³ | | 578 • $k_{mod}$ | | 578 • $k_{mod}$ | (20) |
| material factor (NA to) EN 1995-1-1 §2.4.1 | | | | $\gamma_M$ = 1,30 [withdrawal capacity] | | | (21) |
| **design** value $X_d$ of the axial withdrawal capacity N | | | | | | | (22) |
| strength class | C18 | $\rho_k$ = 320 kg/m³ | | 414 • $k_{mod}$ | | 414 • $k_{mod}$ | (23) |
| wood (EN 338) | C24 | $\rho_k$ = 350 kg/m³ | | 445 • $k_{mod}$ | | 445 • $k_{mod}$ | (24) |
| **design value of the axial load $\boldsymbol{X_d} = X_k / \gamma_M$ N** | | | | **minimum value of the rows:** | | | (25) |
| strength class | C18 | $\rho_k$ = 320 kg/m³ | | **(7)(13)(24)** | **(7)(13)(24)** | **(7)(13)(24)** | **(7)(13)(24)** (26) |
| wood (EN 338) | C24 | $\rho_k$ = 350 kg/m³ | | **(7)(13)(25)** | **(3)(7)(16)** | **(3)(7)(16)** | **(3)(7)(16)** (27) |
| board span b | | | | 600 | | | (28) |
| fixing distance a (corresponds with $b_{eff}$ in Fig. 1) | | | | Type S: 146 / XL : 277 | | | (29) |

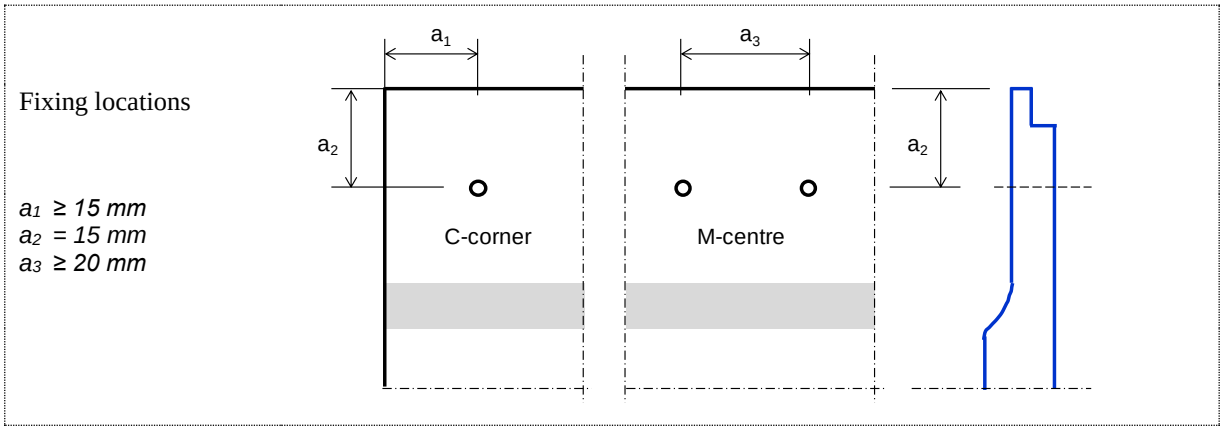
*[a]: modification factor $k_{mod}$ depends on the serviceclass (humidity conditions) and the load-duration class according to the National Annex of EN 1995-1-1*

*[b]: with reduced thread diameter to fulfil the minimum $l_{ef}$ demand ( d = $l_{ef}$ / 6 = 22,5/6 =3,2 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*



**Annex 2.3**

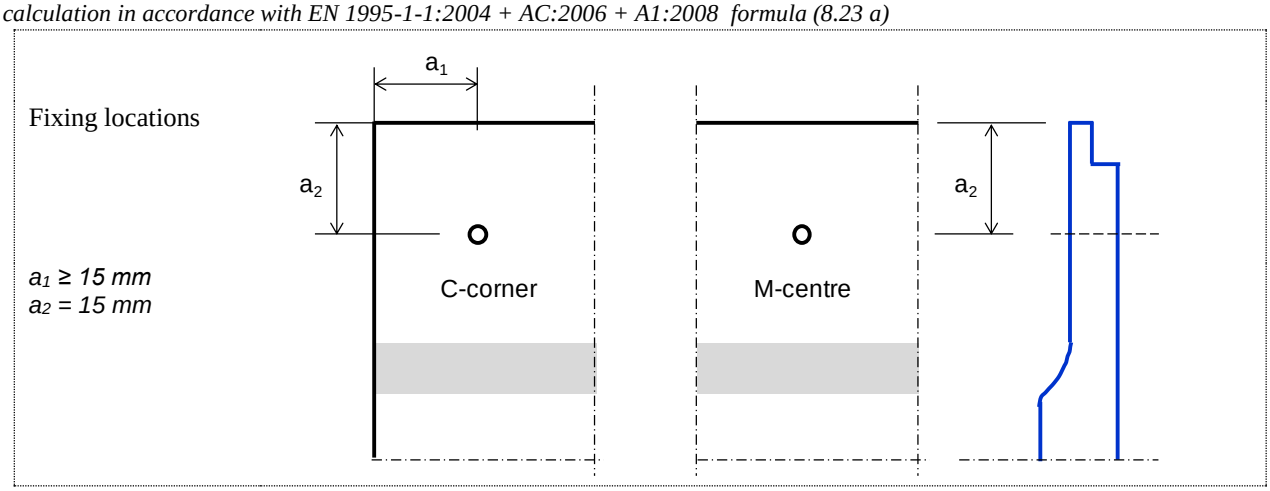
**Table 8: Lines² 10 mm -** Characteristic axial load $X_k$ and **design** value of the axial load $\boldsymbol{X_d} = X_k / \gamma_M$ for the combination **nail** 2,7x27 and tongue 6,3 mm, with $\alpha \geq 30°$ [e] corrected for $f_{05}$ declared (27 N/mm²).

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Tongue of Lines² 10 mm | | | | 6,3 mm | | | | (1) |
| location of the fixing in the panel | | | | M-centre (1 nail) | | C-corner (1 nail) | | (2) |
| Panel type | | | | S | XL | S | XL | (3) |
| pull-through N *(corrected for $f_{05}$ = 27 N/mm² )* | | | | | | | | (4) |
| characteristic pull-through N | | | | *385* | *385* | *408* | *408* | (5) |
| material factor ROCKPANEL $\gamma_M$ (manufacturers declaration) | | | | *2,0* | | *2,0* | | (6) |
| **design** value $X_d$ of the pull-through N | | | | 193 | 193 | 204 | 204 | (7) |
| wind suction *(corrected for $f_{05}$ = 27 N/mm² )* single nail | | | | | | | | (8) |
| average wind load in N/m² | | | | 2895 | 1768 | 5243 | 3400 | (9) |
| average strength N | | | | *325* | *377* | *241* | *297* | (10) |
| material factor ROCKPANEL $\gamma_M$ (manufacturers declaration) | | | | *2,0* | | *2,0* | | (11) |
| **design** value $X_d$ of the pull-through N | | | | 163 | 189 | 121 | 149 | (12) |
| withdrawal capacity (for the calculation see Annex D-1) | | | | | | | | (13) |
| characteristic withdrawal capacity $F_{ax,k,Rk}$ [b] [d] | | | | | | | | (14) |
| strength class | C18 | $\rho_k$ = 320 kg/m³ | | 154 [b] | | 154 [b] | | (15) |
| wood (EN 338) | C24 | $\rho_k$ = 350 kg/m³ | | 184 [b] | | 184 [b] | | (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 | $\rho_k$ = 320 kg/m³ | | 154 • $k_{mod}$ | | 154 • $k_{mod}$ | | (19) |
| wood (EN 338) | C24 | $\rho_k$ = 350 kg/m³ | | 184 • $k_{mod}$ | | 184 • $k_{mod}$ | | (20) |
| material factor (NA to) EN 1995-1-1 §2.4.1 | | | | $\gamma_M$ = 1,30 [withdrawal capacity] | | | | (21) |
| **design** value $X_d$ of the axial withdrawal capacity N | | | | | | | | (22) |
| strength class | C18 | $\rho_k$ = 320 kg/m³ | | 119 • $k_{mod}$ | | 119 • $k_{mod}$ | | (23) |
| wood (EN 338) | C24 | $\rho_k$ = 350 kg/m³ | | 142 • $k_{mod}$ | | 142 • $k_{mod}$ | | (24) |
| **design value of the axial load $\boldsymbol{X_d} = X_k / \gamma_M$ N** | | | | **minimum value of the rows:** | | | | (25) |
| strength class | C18 | $\rho_k$ = 320 kg/m³ | | **(7)(13)(24)** | **(7)(13)(24)** | **(7)(13)(24)** | **(7)(13)(24)** | (26) |
| wood (EN 338) | C24 | $\rho_k$ = 350 kg/m³ | | **(7)(13)(25)** | **(7)(13)(25)** | **(7)(13)(25)** | **(7)(13)(25)** | (27) |
| board span b | | | | 600 | | | | (28) |
| fixing distance a (corresponds with $b_{eff}$ in Fig. 1) | | | | Type S: 146 / XL : 277 | | | | (29) |

*[a]: modification factor $k_{mod}$ depends on the serviceclass (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 = 15,5 / 8 = 1,94 mm ) ;*

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



**Annex 2.4**

**Table 9: Lines² 10 mm -** Characteristic axial load $X_k$ and **design** value of the axial load $\boldsymbol{X_d} = X_k / \gamma_M$ for the combination **nail** 2,7x27 and tongue 6,3 mm, with $\alpha \geq 30°$ [e] corrected for $f_{05}$ declared (27 N/mm²).

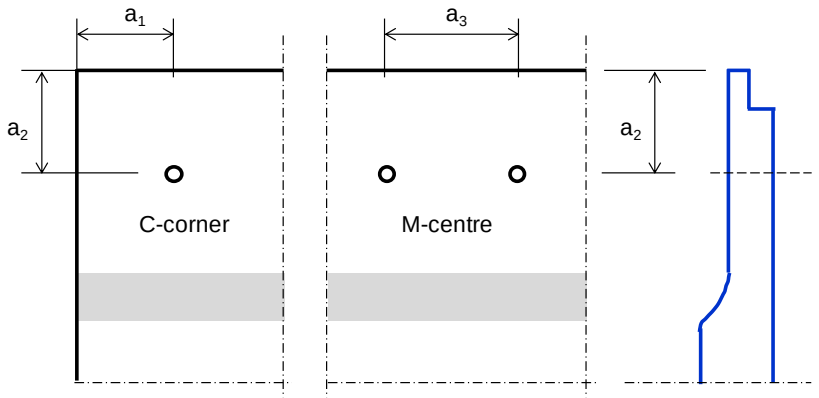
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Tongue of Lines² 10 mm | | | | 6,3 mm | | | | (1) |
| location of the fixing in the panel | | | | M-centre (2 nails) | | C-corner(1 nail) | | (2) |
| Panel type | | | | S | XL | S | XL | (3) |
| pull-through N *(corrected for $f_{05}$ = 27 N/mm² )* single nail | | | | | | | | (4) |
| characteristic pull-through N | | | | *385* | *385* | *408* | *408* | (5) |
| material factor ROCKPANEL $\gamma_M$ (manufacturers declaration) | | | | *2,0* | | *2,0* | | (6) |
| **design** value $X_d$ of the pull-through N | | | | 193 | 193 | 204 | 204 | (7) |
| wind suction *(corrected for $f_{05}$ = 27 N/mm² )* with double nail | | | | | | | | (8) |
| average wind load in N/m² | | | | 5006 | 3264 | 5243 | 3400 | (9) |
| average strength N | | | | *562* | *695* | *241* | *297* | (10) |
| material factor ROCKPANEL $\gamma_M$ (manufacturers declaration) | | | | *2,0* | | *2,0* | | (11) |
| **design** value $X_d$ of the pull-through N | | | | 281 | 348 | 121 | 149 | (12) |
| withdrawal capacity | | | | | | | | (13) |
| characteristic withdrawal capacity $F_{ax,k,Rk}$ [b] [d] | | | | | | | | (14) |
| strength class | C18 | $\rho_k$ = 320 kg/m³ | | 154 [b] | | 154 [b] | | (15) |
| wood (EN 338) | C24 | $\rho_k$ = 350 kg/m³ | | 184 [b] | | 184 [b] | | (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 | $\rho_k$ = 320 kg/m³ | | 154 • $k_{mod}$ | | 154 • $k_{mod}$ | | (19) |
| wood (EN 338) | C24 | $\rho_k$ = 350 kg/m³ | | 184 • $k_{mod}$ | | 184 • $k_{mod}$ | | (20) |
| material factor (NA to) EN 1995-1-1 §2.4.1 | | | | $\gamma_M$ = 1,30 [withdrawal capacity] | | | | (21) |
| **design** value $X_d$ of the axial withdrawal capacity N | | | | | | | | (22) |
| strength class | C18 | $\rho_k$ = 320 kg/m³ | | 119 • $k_{mod}$ | | 119 • $k_{mod}$ | | (23) |
| wood (EN 338) | C24 | $\rho_k$ = 350 kg/m³ | | 142 • $k_{mod}$ | | 142 • $k_{mod}$ | | (24) |
| **design value of the axial load $\boldsymbol{X_d} = X_k / \gamma_M$ N** | | | | **minimum value of the rows:** | | | | (25) |
| strength class | C18 | $\rho_k$ = 320 kg/m³ | | **(7)(12)(23)** | **(7)(12)(23)** | **(7)(12)(23)** | **(7)(12)(23)** | (26) |
| wood (EN 338) | C24 | $\rho_k$ = 350 kg/m³ | | **(7)(12)(24)** | **(7)(12)(24)** | **(7)(12)(24)** | **(7)(12)(24)** | (27) |
| board span b | | | | 600 | | | | (28) |
| fixing distance a (corresponds with $b_{eff}$ in Fig. 1) | | | | Type S: 146 / XL : 277 | | | | (29) |

*[a]: modification factor $k_{mod}$ depends on the serviceclass (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 ( $d = l_{ef} / 8 = 15,5 / 8 = 1,94$ mm ) ;*

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

Fixing locations




*$a_1 \geq 15$ mm*
*$a_2 = 15$ mm*
*$a_3 \geq 20$ mm*

**Annex 3.1**

**Table 10**: **Lines² S 8** - Characteristic axial load $X_k$ and **design** value of the axial load $X_d = X_k / \gamma_M$ for the combination **Lines² S 8** , **clip** and round-top **screw** 3,5x25 [b], with $\alpha \geq 30°$ [e] corrected for $f_{05}$ declared (27 N/mm²).

| | | | | Edge of panel | | | Middle of panel | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| location of the clips | | | | A | B | C | D | E | F | (2) |
| pull-off N *(corrected for $f_{05}$ = 27 N/mm² )* | | | | | | | | | | (3) |
| characteristic pull-off N | | | | *69* | *184* | *77* | *90* | *226* | *120* | (4) |
| material factor $\gamma_M$ | ROCKPANEL (manufacturers declaration) | | | | *2* | *2* | | *2* | *2* | (5) |
| | clip | | | *1,3* | | | *1,3* | | | (6) |
| **design** value $X_d$ of the pull-off N | | | | 53 | 92 | 39 | 69 | 113 | 60 | (7) |
| wind suction *(corrected for $f_{05}$ = 27 N/mm² )* | | | | | | | | | | (8) |
| average wind load in N/m² | | | | 3156 | | | 2426 | | | (9) |
| average strength N | | | | *168* | *168* | *168* | *312* | *312* | *312* | (10) |
| material factor ROCKPANEL $\gamma_M$ | | | | *2,0* (manufacturers declaration) | | | | | | (11) |
| **design** value $X_d$ of the pull-through N | | | | 84 | 84 | 84 | 156 | 156 | 156 | (12) |
| withdrawal capacity | | | | | | | | | | (13) |
| characteristic withdrawal capacity $F_{ax,k,Rk}$ [c] [d] | | | | | | | | | | (14) |
| strength class wood (EN 338) | C18 | $\rho_k$ = 320 kg/m³ | | 511 [b] | | | | | | (15) |
| | C24 | $\rho_k$ = 350 kg/m³ | | 549 [b] | | | | | | (16) |
| modification factor for $k_{mod}$ | | | | $k_{mod}$ [a] | | | | | | (17) |
| axial withdrawal capacity $F_{ax,k,Rk} \cdot k_{mod}$ [a] [c] [d] | | | | | | | | | | (18) |
| strength class wood (EN 338) | C18 | $\rho_k$ = 320 kg/m³ | | 511 • $k_{mod}$ | | | | | | (19) |
| | C24 | $\rho_k$ = 350 kg/m³ | | 549 • $k_{mod}$ | | | | | | (20) |
| material factor (NA to) EN 1995-1-1 §2.4.1 | | | | $\gamma_M$ = 1,30 [withdrawal capacity] | | | | | | (21) |
| **design** value $X_d$ of the axial withdrawal capacity N | | | | | | | | | | (22) |
| strength class wood (EN 338) | C18 | $\rho_k$ = 320 kg/m³ | | 393 • $k_{mod}$ | | | | | | (23) |
| | C24 | $\rho_k$ = 350 kg/m³ | | 422 • $k_{mod}$ | | | | | | (24) |
| **design value of the axial load $X_d = X_k / \gamma_M$ N** | | | | **minimum value of the rows:** | | | | | | (25) |
| for the locations | | | | A | B | C | D | E | F | (26) |
| strength class | C18 | $\rho_k$ = 320 kg/m³ | | (7)(12) (23) | (7)(12) (23) | (7)(12) (23) | (7)(12) (23) | (7)(12) (23) | (7)(12) (23) | (27 |
| wood (EN 338) | C24 | $\rho_k$ = 350 kg/m³ | | (7)(12) (24) | (7)(12) (24) | (7)(12) (24) | (7)(12) (24) | (7)(12) (24) | (7)(12) (24) | (28) |
| board span b | | | | 600 | | | | | | (29) |
| fixing distance a (corresponds with $b_{eff}$ in Fig. 1) | | | | Type S: 151-156 | | | | | | (30) |

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

*[b] : $\ell_{ef} \geq 21$ mm (penetration length of the threaded part)*

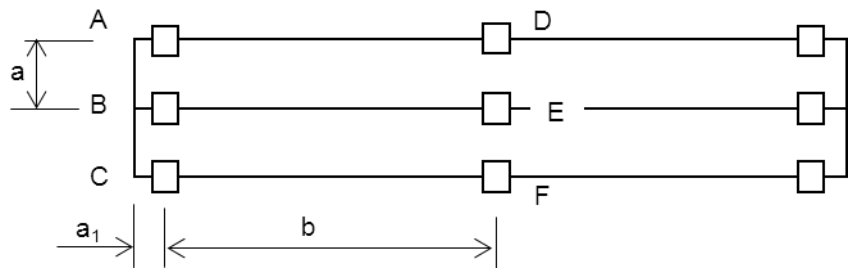
*[c]: angle α between shaft and the wood grain: $\alpha \geq 30°$*

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

*[e]: $\alpha$ is the angle between the screw axis and the grain direction*

CLIP fixing locations ROCKPANEL Lines²

*$a_1 \geq 20$ mm*
*$L \leq 600$ mm*



**Annex 3.2**

**Table 11**: **Lines² XL 8** - Characteristic axial load $X_k$ and **design** value of the axial load $X_d = X_k / \gamma_M$ for the combination **Lines² XL 8** , **clip** and round-top **screw** 3,5x25 [b], with $\alpha \geq 30°$ [e] corrected for $f_{05}$ declared (27 N/mm²).

| | | | | Edge of panel | | | Middle of panel | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| location of the clips | | | | A | B | C | D | E | F | (2) |
| pull-off N *(corrected for $f_{05}$ = 27 N/mm² )* | | | | | | | | | | (3) |
| characteristic pull-off N | | | | *69* | *184* | *77* | *90* | *226* | *120* | (4) |
| material factor $\gamma_M$ | ROCKPANEL (manufacturers declaration) | | | | *2* | *2* | | *2* | *2* | (5) |
| | clip | | | *1,3* | | | *1,3* | | | (6) |
| **design** value $X_d$ of the pull-off N | | | | 53 | 92 | 39 | 69 | 113 | 60 | (7) |
| wind suction *(corrected for $f_{05}$ = 27 N/mm² )* | | | | | | | | | | (8) |
| average wind load in N/m² | | | | 1914 | | | 1171 | | | (9) |
| average strength N | | | | *184* | *184* | *184* | *272* | *272* | *272* | (10) |
| material factor (NA to) EN 1995-1-1 §2.4.1 | | | | *2,0* (manufacturers declaration) | | | | | | (11) |
| **design** value $X_d$ of the pull-through N | | | | 92 | 92 | 92 | 136 | 136 | 136 | (12) |
| withdrawal capacity | | | | | | | | | | (13) |
| characteristic withdrawal capacity $F_{ax,k,Rk}$ [c] [d] | | | | | | | | | | (14) |
| strength class | C18 | $\rho_k$ = 320 kg/m³ | | 511 [b] | | | | | | (15) |
| wood (EN 338) | C24 | $\rho_k$ = 350 kg/m³ | | 549 [b] | | | | | | (16) |
| modification factor for $k_{mod}$ | | | | $k_{mod}$ [a] | | | | | | (17) |
| axial withdrawal capacity $F_{ax,k,Rk} . k_{mod}$ [a] [c] [d] | | | | | | | | | | (18) |
| strength class | C18 | $\rho_k$ = 320 kg/m³ | | 511 • $k_{mod}$ | | | | | | (19) |
| wood (EN 338) | C24 | $\rho_k$ = 350 kg/m³ | | 549 • $k_{mod}$ | | | | | | (20) |
| material factor (NA to) EN 1995-1-1 §2.4.1 | | | | $\gamma_M$ = 1,30 [withdrawal capacity] | | | | | | (21) |
| **design** value $X_d$ of the axial withdrawal capacity N | | | | | | | | | | (22) |
| strength class | C18 | $\rho_k$ = 320 kg/m³ | | 393 • $k_{mod}$ | | | | | | (23) |
| wood (EN 338) | C24 | $\rho_k$ = 350 kg/m³ | | 422 • $k_{mod}$ | | | | | | (24) |
| **design value of the axial load $X_d = X_k / \gamma_M$ N** | | | | **minimum value of the rows:** | | | | | | (25) |
| for the locations | | | | A | B | C | D | E | F | (26) |
| strength class | C18 | $\rho_k$ = 320 kg/m³ | | (3)(7) (15) | 3)(7) (15) | 3)(7) (15) | (3)(7) (15) | 3)(7) (15) | 3)(7) (15) | (27) |
| wood (EN 338) | C24 | $\rho_k$ = 350 kg/m³ | | (3)(7) (16) | (3)(7) (16) | (3)(7) (16) | (3)(7) (16) | (3)(7) (16) | (3)(7) (16) | (28) |
| board span b | | | | 600 | | | | | | (29) |
| fixing distance a (corresponds with $b_{eff}$ in Fig. 1) | | | | Type XL : 282-287 | | | | | | (30) |

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

*[b] : $\ell_{ef} \geq 21$ mm (penetration length of the threaded part)*

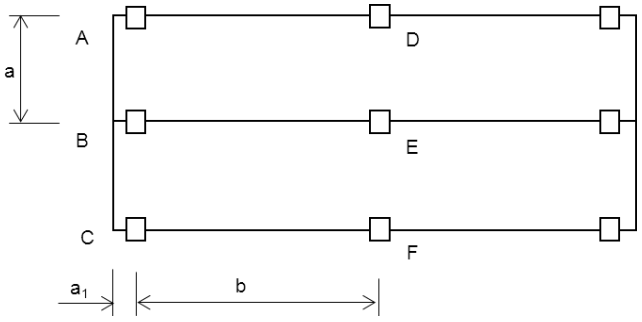
*[c]: angle α between shaft and the wood grain: $\alpha \geq 30°$*

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

*[e]: $\alpha$ is the angle between the screw axis and the grain direction*

CLIP fixing locations ROCKPANEL Lines²

*$a_1 \geq 20$ mm*
*$L \leq 600$ mm*



**Annex 4**

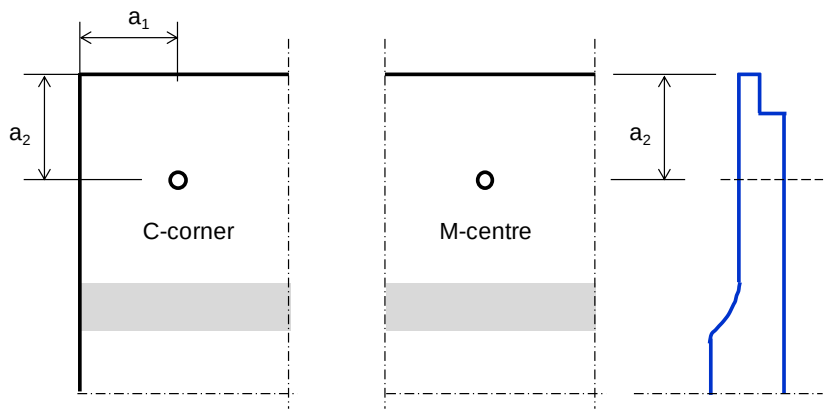
**Fixing positions**

**Table 12** Lines[2] 10 mm - Fixing positions M / C

Fixing locations

*$a_1$ ≥ 15 mm*
*$a_2$ = 15 mm*

*M: single fixing*




*$a_1$ ≥ 15 mm*
*$a_2$ = 15 mm*
*$a_3$ ≥ 20 mm*

*M: double fixing*

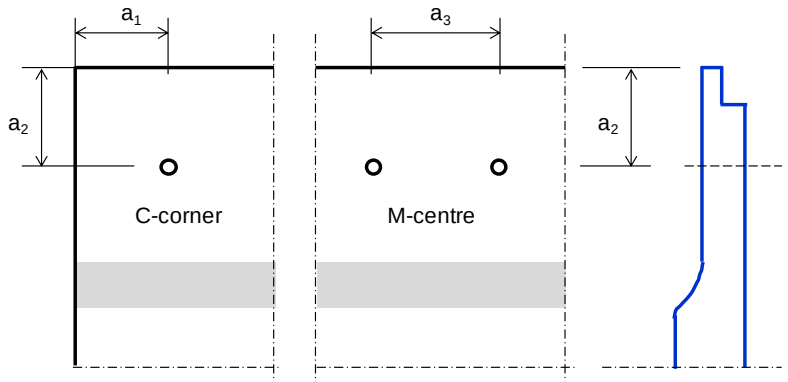
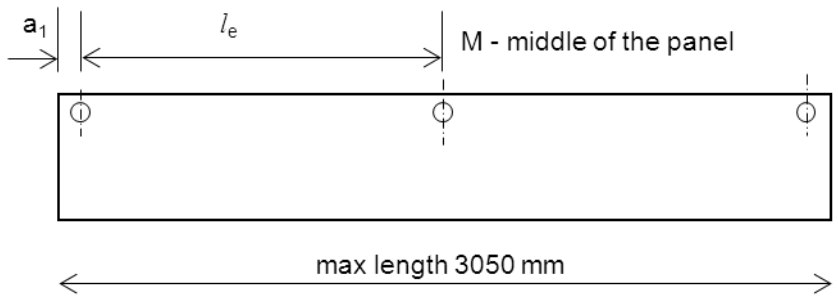


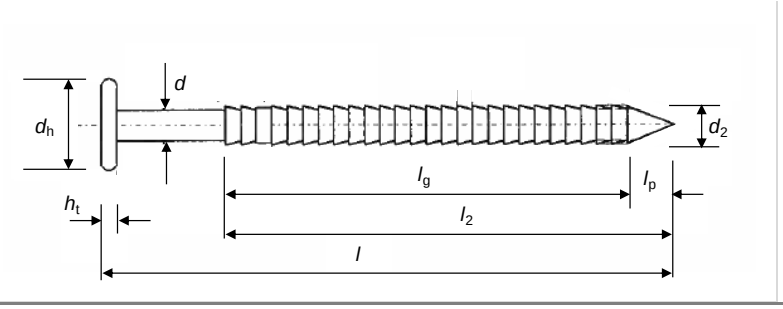

**Table 13** Hole diameters mm for Lines[2] 10 mm type **S 10** and **XL 10**

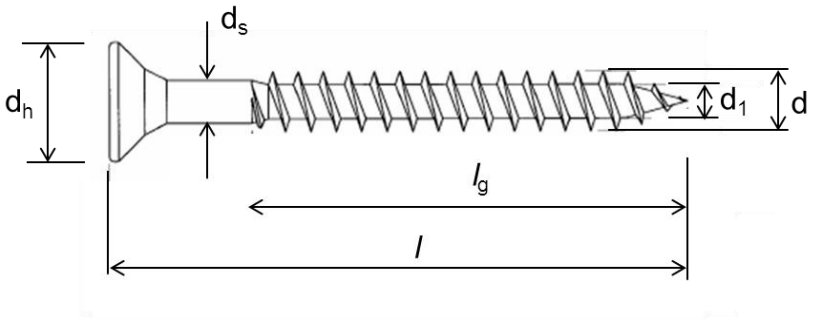
| fixing | Diameter hole | |
|---|---|---|
| | M – middle of the panel | Other locations |
| nail | 2,0 | 3,0 |
| screw | 2,5 | 3,5 [a)] |

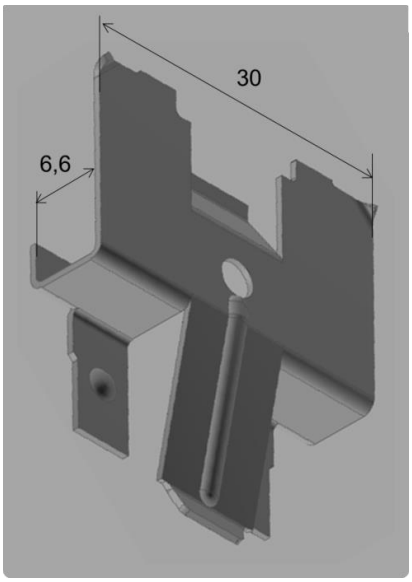
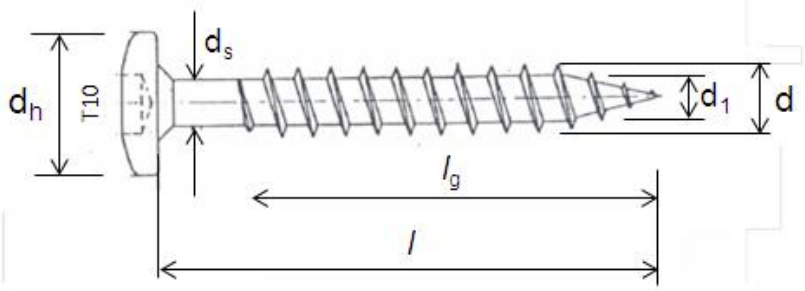



[a)] *The consequence of these diameters is that under certain circumstances a tension perpendicular to the shafts of the fixings in the fixing locations can occur.*

**Annex 5**

| **Table 14** | Ring-shank nail 2,1/2,3 x 27 |
|---|---|
| Stainless steel in accordance with EN 10088 - Material number 1.4401 or 1.4578<br>Definitions in accordance with EN 14592:2008+A1:2012 | |
| *d* = 2,1<br>$d_2$ = 2,4 – 2,2<br>*l* = 27,0 – 26,0<br>$l_p$ = ≤ 3,5<br>$l_g$ = $l_2$ - $l_p$<br>$d_h$ = 4,8 – 4,5<br>$h_t$ = 0,7 – 0,5 |  |

| **Table 15** | Flat-top screws 3,5 x 30 mm for Lines² 10 mm fixing |
|---|---|
| Stainless steel in accordance with EN 10088 - Material number 1.4301, 1.4401 or 1.4578<br>Definitions in accordance with EN 14592:2008+A1:2012<br>Minimum required dimensions (mm) | |
| d = 3,5 – 3,2<br>0,6•d ≤ $d_1$ ≤ 0,9•d<br>*l* ≥ 29,0<br>$l_g$ ≥ 22,5<br>$d_h$ = 7,0 - 6,6<br>$d_s$ = 2,6 – 2,3 |  |

| **Table 16** | Fixing clip Lines² 8 mm and Torx T10 screws ø 3,5 mm for clip fixing |
|---|---|
|  |  <br>Definitions in accordance with EN 14592:2008+A1:2012<br>Stainless steel in accordance with EN 10088<br>Material number 1.4301 |
| Material number 1.4310<br>Material thickness : 0,6 mm | d = 3,5 – 3,2 mm<br>$d_1$ = 2,3 ± 0,15 mm<br>$d_s$ = 2,30 ± 0,15 mm<br>*l* = 25,00 [a] ± 1,15 mm<br>$l_g$ ≥ 21,25 mm<br>$d_h$ = 7,0 - 0,4 mm |
| [a] : in the case a 8 mm ROCKPANEL strip is used between the back of the clip and the front of the batten, the length l shall be increased with the thickness of the strip | |

**Annex 6**

**Table 17 - Control plan for the manufacturer**

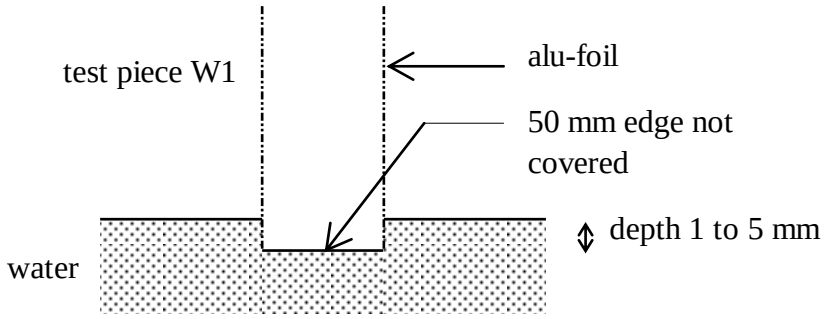
| Nr | Subject/type of control | Test or control method | Criteria, if any | Minimum number of samples | Minimum frequency of control |
|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) |
| **Factory production control (FPC) [including testing of samples in accordance with a prescribed test plan]*** | | | | | |
| 1 | Board thickness | EN 325 | 8 ± 0,5 mm<br>10 ± 0,5 mm | 40 [a] | One board for every 200 boards produced |
| 2 | Density | EN 323 | 1050 -150 / +150 kg/m$^3$ | 40 [a] | One board for every 200 boards produced |
| 3 | Bending strength dry parallel and perpendicular to the production direction | EN 310 | $f_{05}$ ≥ 27 N/mm² | 20 (length) + 20 (width) [a] | One board for every 200 boards produced |
| 4 | Bending strength after ageing parallel and perpendicular to the production direction | EN 310 Ageing in accordance with description in Table 13 | lowest individual strength f ≥ 22 N/mm² | 3 (length) + 2 (width) | One board for every 200 boards produced |
| 5 | Water absorption after 4 days | see Table 13 | ≤ 2 weight % after 4 days; if sample fails, the 2$^{nd}$ sample must be tested. | 1 (2 in the case of fail) | One board for every 200 boards produced |
| 6 | Organic material content (resin binder) | Glowing at 650° for at least 60 min. *Remark: time depends on the type of oven* | 12 ± 1,5 weight % | 40 [a] | One board for every 200 boards produced |
| 7 | Reaction to fire [b] | EN 13162 loss on ignition Table B.2 | Table 4 EN 13501-1 | Three specimen [b] | every two years |
| The below mentioned controls are carried out by the sub-supplier and the documentation is maintained by the board manufacturer as part of his FPC | | | | | |
| 8 | Dowel-type fasteners for timber structures | | EN 14592, Annex ZA.2<br>Procedure for attestation of conformity | | Every 3 years |

[a] amount of samples from four different boards

[b] Small components, e.g. gaskets and seals shall be considered on the basis of EOTA Technical Report TR 021

**Annex 7**

**Table 18 - Special methods of control and testing used for the evaluation**

| | | |
|---|---|---|
| Bending strength after ageing | | |
| | Ageing of the 5 test pieces in (tab) water from 70ºC ( with surface tension changing additives : for instance 0,5 ml Triton per litre) for 30 minutes.<br>Determination of the bending strength in accordance with EN-310 within 20 minutes after the ageing period in a test room with an air temperature between 17 and 23°C. | |
| Water absorption | | |
| | The water absorption by the edges must be determined on test pieces W1 in the size 50*400 mm.<br>The dimensions and the weight of the test pieces is determined.<br>The sample is wrapped with aluminum foil with the exception of one 50 mm edge.<br>The test pieces are vertically placed in a bucket with tab water, with the 50 mm size without aluminum foil horizontally in the water. The edge must be 1 to 5 mm in the water (without additives). | |
| | Test conditions: | |
| | Water temperature | 17 - 23 °C |
| | Room temperature | 17 - 23 °C |
| |  | |

**Annex 8**

**Table 19 - Control plan for the notified body (bodies)**

| Nr | Subject/type of control | Test or control method | Criteria, if any | Minimum number of samples | Minimum frequency of control |
|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) |
| **Initial type-testing of the product (ITT)** | | | | | |
| 1 | Testing to determine the product performance has been carried out under the responsibility of the TAB as part of the procedure to issue the ETA | | | | |
| **Initial inspection of factory and factory production control (FPC)** | | | | | |
| 1 | See Table 17 | | | | |
| **Continuous surveillance, judgment and assessment of factory production control (FPC)** | | | | | |
| 1 | See Table 17 | | | | |

**Table 20 – Impact resistance : Definition of use categories**

| Use category | Description |
|---|---|
| I | A zone readily accessible at ground level to the public and vulnerable to hard body impacts but not subjected to abnormally rough use. |
| II | A zone liable to impacts from thrown or kicked objects, but in public locations where the height of the kit will limit the size of the impact; or at lower levels where access to the building is primarily to those with some incentive to exercise care. |
| III | A zone not likely to be damaged by normal impacts caused by people or by thrown or kicked objects. |
| IV | A zone out of reach from ground level |

The hard body impact with steel ball represents the action from heavy, non-deformable objects, which accidentally hit the kit.