Designated according to The Construction Products (Amendment etc.) (EU Exit) Regulations 2020

UK Technical Assessment	UKTA-0836-21/0006 of 04/01/2022
Technical Assessment Body issuing the UK Technical Assessment:	British Board of Agrément
Trade name of the construction product:	Kingspan TEK – Prefabricated Wood-based Loadbearing Stressed Skin Panels
Product family to which the construction product belongs:	Product area 14 – Wood-based panels and elements
Manufacturer:	Kingspan Insulation Ltd Pembridge Leominster Herefordshire HR6 9LA
Manufacturing plant(s):	Kingspan Insulation Ltd (Selby Plant) Sherburn Enterprise Park Enterprise Way Sherburn-in-Elmet Leeds LS25 6NA
This UK Technical Assessment contains:	14 pages including 3 Annexes, which form an integral part of this Assessment
This UK Technical Assessment is issued in accordance with The Construction Products (Amendment etc.) (EU Exit) Regulations 2020 on the basis of:	UKAD 140022-00-0304 “Prefabricated Wood Based Loadbearing Stressed Skin Panels”

1 Technical description of the product

Prefabricated Wood-based Loadbearing Stressed Skin Panels form a panellised method of construction. Panels are available with a nominal thickness of either 142 or 172 mm. Each panel has two outer skins of 15 mm thick OSB/3 (oriented strand board, type 3), separated by a core of 112 or 142 mm thick zero-rated Ozone-Depleting Potential, rigid polyurethane (PUR).

The panels are available in widths ranging from 200 to 1220 mm, and lengths up to 7500 mm, and are supplied in the appropriate shapes and sizes for each project. Other components, such as sealant, fixings and jointing pieces, will be required to enable installation to be made in accordance with the UKTA holder's recommendations.

2 Specification of the intended use(s) in accordance with the applicable UK Assessment Document (hereinafter UKAD)

2.1 Intended use

Kingspan TEK panels are for use in single- or multiple-occupancy constructions up to four storeys high as: the loadbearing inner leaf of an external wall; a loadbearing internal wall; a single or double leaf of a separating wall; or pitched roofing panels, where Essential Requirements 1, 2, 3 and 6 *Mechanical resistance and stability, Safety in case of fire, Hygiene, health and environment* and *Energy economy and heat retention* respectively (Construction Product Regulation 305/2011, as brought into UK law and amended, Annex 1), apply.

The panels are for use in timber structures subject to the dry, internal conditions defined by service classes 1 and 2 of BS EN 1995-1-1 : 2004 + A2 : 2014, and for members subject to static or quasi-static loading. However, the panels are not suitable to be used for structural flooring construction.

The panels may also be used in non-load bearing applications.

2.2 Assumed working life

The provisions made in this UKTA are based on an assumed intended working life of 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer but are to be used as a means for selecting the appropriate product in relation to the expected economically reasonable working life of the works.

2.3 Manufacturing of the panels

Detailed workshop drawings and assembly drawings are part of panel production. The process of production includes the control monitoring of the final dimensions of components and structural wood moisture. After the completion of the production of individual parts, a check is performed, during which the functionality of individual components needed for the manufacturing of the product is confirmed as acceptable.

2.4 Packaging, transport and storage

Loading at the manufacturer is performed by trained workers using mechanical means. The panels are delivered in shrink-wrap, with edge protectors, with banded packaging used for initial transit and temporary protection. Unloading at the construction site is performed with the use of machinery.

Panels must be protected from weather, mechanical damage during transport and possible damage during removal onto the prepared site. The panels and their components should be stored inside, or in dry, sheltered conditions, at least 150 mm off the ground, and covered with opaque polythene sheeting or tarpaulin until the panels and components are to be used for

erection. Panels must be stored and transported horizontally. The manufacturer's instructions for packaging, transport and storage must always be observed and obeyed.

2.5 Use, maintenance and repairs

Before use, the panels are inspected visually for completeness and any signs of damage that might have occurred during transport or storage. For each delivery, the manufacturer ensures relevant information and instructions for use are present.

The assessment of the product assumes that during the estimated life expectancy no maintenance is required, though regular checks should be carried out on the finishes to ensure that any damage is detected and repaired as soon as possible.

In cases where a repair becomes necessary, an assessment for mechanical resistance and stability must be performed. Minor repairs to the system can be carried out prior to erection in accordance with the construction manual for Kingspan TEK.

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

3.1 Mechanical resistance and stability (BWR 1)

3.1.1. Verification of structural capacity in general

The mechanical properties, and design-load-carrying capacities for the wall and roof panels, are given in Annex B of this UKTA, and have been derived in accordance with UKAD 140022-00-0304. They should be used for designs in accordance with BS EN 1995-1-1, BS EN 1991-1-1, BS EN 1991-1-2 and BS EN 1991-1-3 or the appropriate national regulation.

The load-carrying capacities have been derived by calculation, and calculation assisted by test. Additional strength of the panels can be achieved using structural engineering principles and via the introduction of structural members, such as ribs or posts within the panels.

In the calculations, the maximum vertical design loads for each roof span, and pitch of panels for each load duration at Ultimate Limit State (ULS), are shown in Tables B1 and B2, Annex B. However, the values do not include Serviceability Limit State (SLS) checks, such as deflection. It should be emphasized that deflection limits in Serviceability Limit States must be checked for roof panels as per UKAD 140022-00-0304 and BS EN 1995-1-1, and considering the shear deformations.

The BBA has assessed a method of design analysis developed by the UKTA holder. The method is based on EOTA TR019 in respect of the roof panels, and sandwich theory in respect of the wall panels. The BBA holds the data on file.

The product is not assessed for resistance to earthquakes. For regions with high seismic activity, an individual assessment is to be carried out in accordance with standards and national regulations.

Any national or regional provisions must be taken into consideration.

Calculations of stability of each structure is to be performed on a case-by-case basis.

3.1.2. Dimensional stability

Significant variations in moisture content in the panel leading to excessive dimensional changes of the product may cause undesirable damage of the product and the structure. Such variations of the moisture content must be prevented.

Relative moisture content of the panels at installation must be compatible with moisture content in the final application to ensure that the dimensional changes the panels may undergo would not have adverse effects on the product or the structure.

3.2 Safety in case of fire (BWR 2)

3.2.1. Reaction to fire of components

In relation to reaction to fire, the panel skins are classified as D-s2, d0, in accordance with BS

EN 13501-1 : 2018 by reference to EC Decision 2003/43/EC, as brought into UK law and amended.

3.2.2. Resistance to fire

Performance of the panels in relation to fire resistance was established after the panels were tested as a ‘load-bearing wall construction’, in accordance with the BS EN 1365-1 : 2012 test method. The results were classified in accordance with BS EN 13501-2 : 2016 as REI 30, based on a test build-up of a 142 mm Kingspan TEK panel, softwood timber battens (25 mm thick by 38 mm wide) fixed and over clad with a single layer of 12.5 mm thick gypsum plasterboard Type A, and as REI 60 based a test build-up of a 142 mm Kingspan TEK panel, softwood timber battens (25 mm thick by 50 mm wide) vertically fixed and over clad with a single layer of 15 mm thick Type F gypsum plasterboard, referenced “Firecheck board”.

In cases where parts of the works in which the panels are intended to be incorporated, installed or applied fall within the scope of BS EN 1995-1-1, the fire design may be calculated in accordance with BS EN 1995-1-2.

3.3 Hygiene, health and environment (BWR 3)

3.3.1. Content and / or release of dangerous substances

According to the manufacturer’s declaration, the product specification has been assessed for dangerous substances, taking account of UK REACH, EU REACH – Directive 67/548/EEC Regulation (EC) No 1272/2008 Indicative list of dangerous substances, Council Directive 76/769/EEC and the list on the database established on the EC construction website, to verify that it does not contain such substances above the acceptable limits. The formaldehyde potential of the OSB skins is designated Class E1 in accordance with BS EN 13986 : 2004. According to the manufacturer’s declaration, the rigid urethane insulation core, when enclosed between the OSB skins, is suitable for use in interior spaces.

In addition to the specific clauses relating to dangerous substances contained in this UKTA, there may be other requirements applicable to the products falling within its scope (eg retained European legislation and national laws, regulations and administrative provisions). To meet the provisions of the retained EU Regulations, these requirements also need to be complied with, when and where they apply.

3.4 Safety and accessibility in use (BWR 4)

3.4.1. Impact / shock resistance

The product is not assessed for impact / shock resistance. When used to construct walls and roofs, the panels will normally be protected by internal and external finishes. Therefore, ‘No Performance Assessed’ is stated.

3.5 Protection against noise (BWR 5)

3.5.1. Airborne sound insulation

Laboratory testing to BS EN ISO 140-3 : 1995 (airborne) and field tests to BS EN ISO 140-4 : 1998 indicate that the panels will contribute to reducing sound transmission, including flanking sound, in an internal/external wall and in a separating wall (see Annex A, Figure 3). The weighted sound reduction is calculated in accordance with the method given in BS EN ISO 717-1 : 1997, namely the Weighted Standardised Level Difference (DnT,w) (Annex A, Table A1).

3.5.2. Impact sound insulation

No Performance Assessed. The product does not contain interior or exterior finishings.

3.5.3. Sound absorption

No Performance Assessed.

3.6 Energy economy and heat retention (BWR 6)

3.6.1. Thermal resistance

Thermal resistance R [m2.K/W] is also expressed by means of thermal transmittance U [W/m2.K], which is calculated for particular constructions in accordance with BS EN ISO 6946, including consideration of BS EN ISO 10211. Details of thermal conductivities are given in Annex A, Table A1 and Annex C, Table C1.

3.6.2. Air permeability

No Performance Assessed.

3.6.3. Thermal inertia

Details are given in Annex A, Table A1.

3.7 Sustainable use of natural resources (BWR 7)

The panels can be used in service classes 1 and 2 as defined in BS EN 1995-1-1 : 2004 and in Use Classes 1 and 2 as specified in BS EN 335 : 2013. The products may be exposed directly to the weather for a short time during installation, depending on the weather conditions. However, they should be covered by a suitable breather membrane, as soon as possible, after they are erected.

3.8 Aspects of serviceability

The ability of the panels to resist loads without undue deflection (serviceability) is dealt with in section 3.1 [*Mechanical resistance and stability* (BWR1)].

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

According to UKAD No. 140022-00-0304 and Annex V of the Construction Products Regulation (Regulation (EU) 305/2011 as brought into UK law and amended, the system of assessment and verification of constancy of performance (AVCP) 1 applies.

5 Technical details necessary for the implementation of the AVCP System, as outlined in the applicable UKAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with the British Board of Agrément and made available to the UK Approved Bodies involved in the conformity attestation process.

5.1 UKCA marking for the product/ system must contain the following information:

- Identification number of the Approved Body
- Name/address of the manufacturer of the product/ system
- Marking with intention of clarification of intended use
- Date of marking
- Number of certificate of constancy of performance
- UKTA number.

On behalf of the British Board of Agrément 	
Date of Issue: 4 January 2022	**Hardy Giesler** Chief Executive

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ANNEX A – PRODUCT DETAILS

Table A1 – Description of the basic requirements

Basic works requirements BWR / Essential characteristics	Verification Procedure	Class / Use category / Numerical value
Basic Works Requirement 1 (BWR 1): Mechanical resistance and stability		
Mechanical resistance and stability		
Wall design load of 142 and 172 mm thickness	BS EN 1995-1-1	See Annex B
Roof design load of 142 and 172 mm thickness	BS EN 1995-1-1	See Annex B
Connecting means	BS EN 1995-1-1	
Dimensional stability		
During operation, change in the moisture content must not occur in order to avoid undesirable deformations		
Basic Works Requirement 2 (BWR 2): Safety in case of fire		
Reaction to fire		
OSB board Grade 3	2003/43/EC(1)	D-s2, d0
Rigid urethane insulation core	BS EN ISO 11925-2 and classified to BS EN 13501-1	E
Wooden structural element	2003/43/EC(1)	D-s2, d0
Explanation:(1) As amended by Commission decision 2003/593/EC,2006/673/EC and 2007/348/EC		
Fire resistance		
142 mm	Tested to BS EN 1365-1 and classified to BS EN 13501-2	REI 30
Fire resistance test construction: - 12.5 mm Type A plasterboard, eg KNAUF - 25 x 38 mm timber batten - Kingspan TEK panel		
142 mm	Tested to BS EN 1365-1 and classified to BS EN 13501-2	REI 60
Fire resistance test construction: - 15 mm Type F plasterboard, eg “Firecheck board” - 25 x 50 mm timber batten - Kingspan TEK panel		
Basic Works Requirement 3 (BWR 3): Hygiene, health and environment		
Vapour permeability and moisture resistance		
OSB board (ρ = 650 kg/m^3)	BS EN ISO 10456	μ = 30-50 (-)
Thermal insulation, PU (ρ = 32-35 kg/m^3)	BS EN ISO 12572	μ = 70-100 (-)
Wooden structural element (ρ = 500 kg/m^3)	BS EN ISO 10456	μ = 20-50 (-)
Watertightness – external envelope	No Performance Assessed Product does not include exterior cladding	
Watertightness – internal surface	No Performance Assessed Product does not include interior cladding	
Content and/or release of dangerous substances	No Performance Assessed	
Formaldehyde from OSB boards	BS EN 13986 + A1	Class E1
Pentachlorophenol PCP from OSB boards	BS EN 13986 + A1	PCP≤ 5ppm or PCP≥ 5ppm
Basic Works Requirement 4 (BWR 4): Safety and accessibility in use		
Slipperiness of floor finishes	No Performance Assessed Product does not include floor finishing	
Impact resistance	No Performance Assessed Product does not include floor finishing	

Table A1 – Description of the basic requirements (continued)

Basic works requirements BWR / Essential characteristics	Verification Procedure	Class / Use category / Numerical value
Basic Works Requirement 5 (BWR 5): Protection against noise		
Airborne sound insulation		
OSB board (15 mm thickness)	BS EN ISO 717-1 Measurement Procedure in accordance with BS EN ISO 140-3	Weighted sound reduction: $R_w(C;C_{tr})$=31 (-2;-5)dB
Insulation core PU (112 mm thickness)		
OSB board (15 mm thickness)		
Basic Works Requirement 5 (BWR 5): Protection against noise		
Impact sound insulation	No Performance Assessed Product does not include interior and exterior surface finishing	
Sound absorption	No Performance Assessed	
Basic Works Requirement 6 (BWR 6): Energy economy and heat retention		
Thermal resistance		
Input parameters for calculating thermal resistance according to BS EN ISO 6946 and BS EN ISO 10211		
Thermal conductivity		
OSB board	BS EN 13986	λ = 0.13 W/(m.K)
Thermal insulation rigid urethane core	BS EN 13165	λ_D = 0.024 W/(m.K)
Wooden structural element	BS EN ISO 10456	λ = 0.13 W/(m.K)
Air permeability	No performance assessed	
Thermal inertia		
Characteristic density		
OSB board	BS EN 13986	ρ > 650 kg/m^3
Thermal insulation, PU core	BS EN 13165	ρ = 32-35 kg/m^3
Spruce, fir wood (C24 and C16)	BS EN 338	ρ = 350-420 kg/m^3
Specific thermal capacity		
OSB board (ρ = 650 kg/m^3)	BS EN ISO 10456	C_p = 1700 J/(kg.K)
Thermal insulation, PU core (ρ = 10-50 kg/m^3)	BS EN ISO 10456	C_p = 1400 J/(kg.K)
Wooden structural element (ρ = 500 kg/m^3)	BS EN ISO 10456	C_p = 1600 J/(kg.K)
Basic Works Requirement 7 (BWR 7): Sustainable use of natural resources		
No performance assessed		

Table A2 — Connection of panels

	Kingspan TEK 142 mm	**Kingspan TEK 172 mm**
Panel to spline	2.8 x 63 mm galvanized ring shank nails	2.8 x 63 mm galvanized ring shank nails
Panel to timber post/end timbers	Expanding urethane foam, when connecting panel to panel – 2 beads of silicone sealant 2.8 x 63 mm galvanized ring shank nails	Expanding urethane foam, when connecting panel to panel – 2 beads of silicone sealant 2.8 x 63 mm galvanized ring shank nails

For further information please see Kingspan TEK construction manual

Figure 1 Cassette joint system

Figure 2 Connection through timber spline

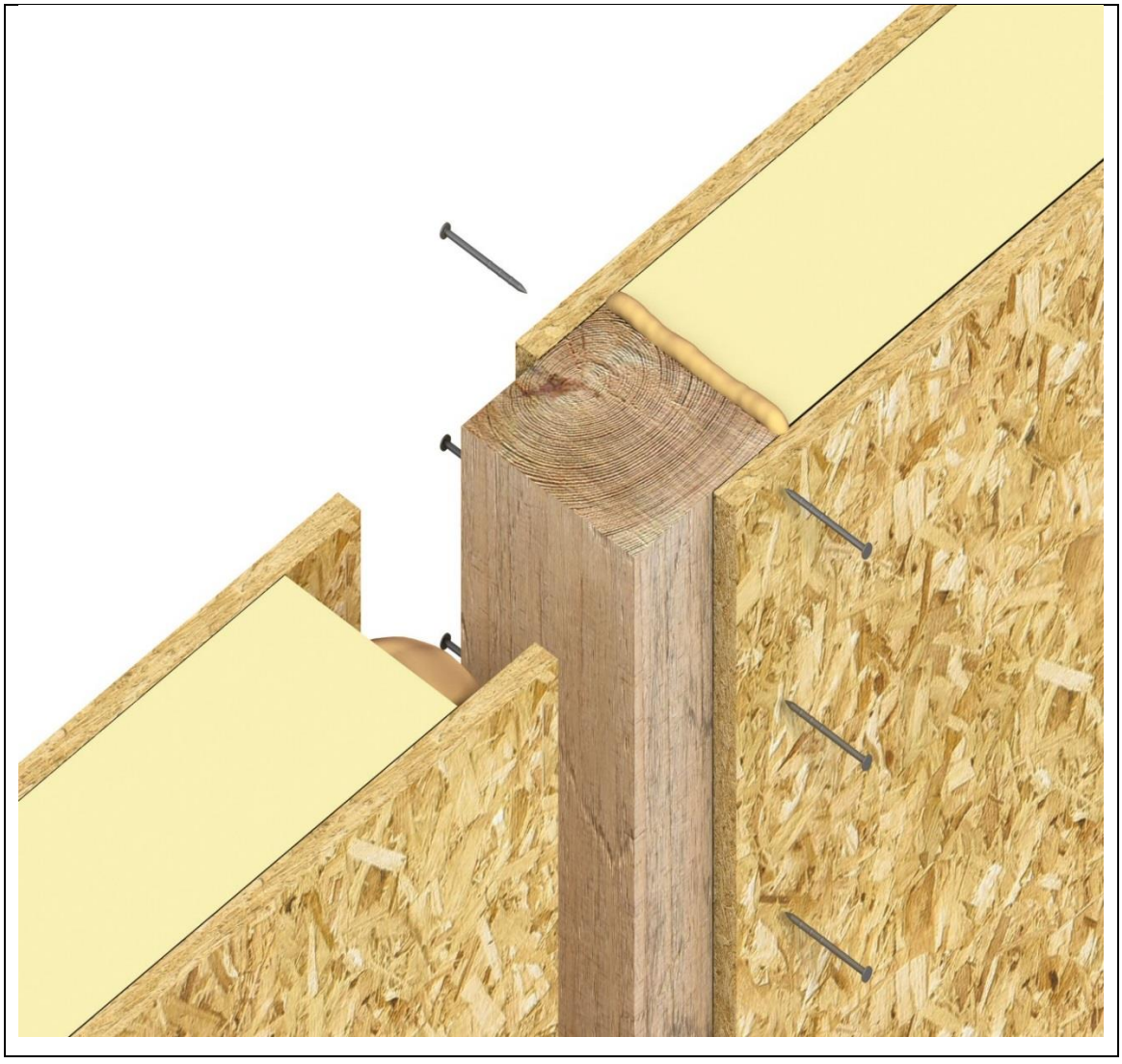
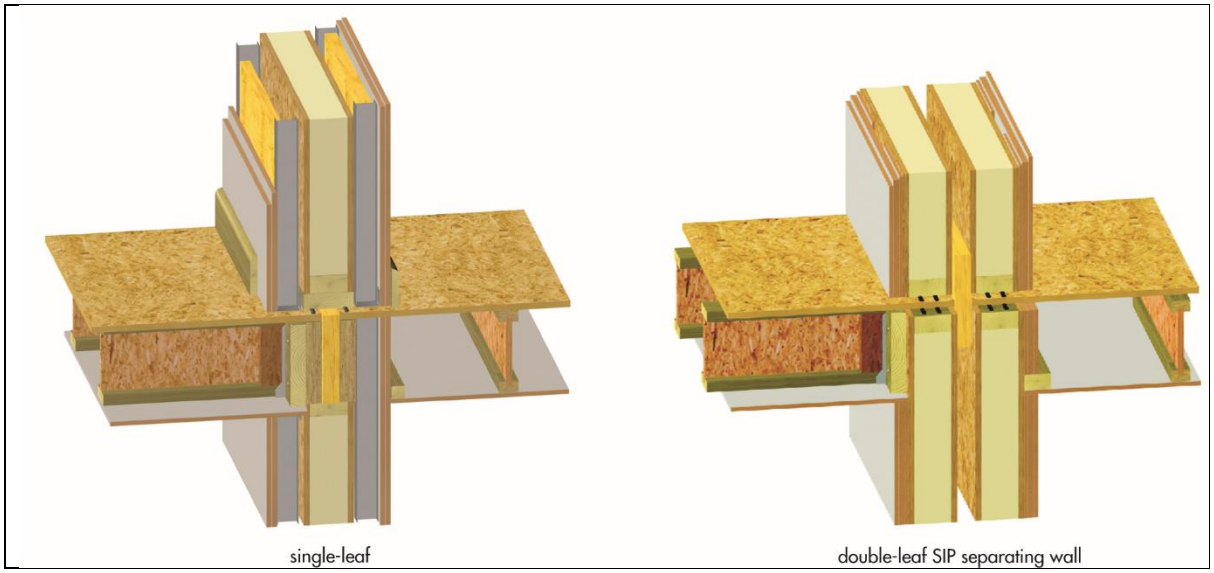


Figure 3 Separating wall details



ANNEX B – DESIGN LOAD TABLES FOR KINGSPAN TEK 142 AND TEK 172 WALL AND ROOF PANELS

Table B1 Structural properties – limit state design(1) – TEK 142

Strength (per metre width of panel)		**Duration of load**				
		Permanent	**Long**	**Medium**	**Short**	**Instantaneous**
Bending strength perpendicular to plane of the panel(2) (M_{Rd})	kN·m	4.48	5.97	8.21	10.4	13.4
Shear strength(2) (V_{Rd})	kN	3.81	7.62	11.4	15.2	15.2
Bearing strength perpendicular to plane of the panel(3) (B) min. 45 mm bearing	kN	3.66	7.32	11.0	14.6	14.6
Axial strength (N)(10)						
wall height <2400 mm	kN	38.5	50.8	57.9	64.7	78.1
wall height 2400 – 2700 mm	kN	33.4	44.4	57.9	64.7	78.1
wall height 2700 – 3000 mm	kN	29.0	38.8	57.9	64.7	78.1
wall height 3000 – 3500 mm	kN	23.3	31.4	47.6	64.7	78.1
wall height 3500 – 4000 mm	kN	18.9	25.7	39.3	64.7	78.1
wall height 4000 – 4800 mm	kN	14.0	19.2	29.6	50.4	62.6
Racking strength(4)(5)(6) (R) with ø2.8 x 63 mm smooth nails to each face						
75 mm nail centres	kN	N/A	N/A	N/A	8.89	10.9
100 mm nail centres	kN	N/A	N/A	N/A	7.42	9.07
150 mm nail centres	kN	N/A	N/A	N/A	5.58	6.82
Stiffness (per metre width of panel)(7)(8)(9)						
EI_{inst}	N·mm^2	4.60E+11				
Deformation factor due to bending ($k_{def, EI}$)	–	1.87				
GA_{inst}	N	5.70E+05				
Deformation factor due to shear ($k_{def, GA}$)	–	6.45				

(1) The strength values in this Table are design values that should be compared to the worst loading case at the Ultimate Limit State (ULS)

(2) When checking a panel under combined loading (axial + bending), the interaction formula $N_{Ed} / N_{Rd} + M_{Ed} / M_{Rd} \leq 1.0$ (where N_{Ed} and M_{Ed} are calculated from design loads, and N_{Rd} and M_{Rd} are taken from the values in the above Table). The deflection of the panel should also be checked to ensure it is within appropriate limits

(3) The bearing strength (B) should be used where a panel spans continuously over a central support. The bearing strength at an end support should be resisted by including an edge timber in the panel at the support

(4) Racking resistance is influenced by the spacing of fixing nails around the perimeter (minimum 50 mm, maximum 150 mm). The racking resistance for other nail spacing can be calculated – the Certificate holder's advice should be sought

(5) Racking resistance was calculated according to BS EN 1991-1-1 : 2002, Method B. The fixing spacing factor (k_s) is included in the racking resistance values, but the wall shape factor (k_d) and the load factor ($k_{i,q}$) must be applied to the strength values

(6) The dimension of nails given for the racking resistance relates to machine-driven nails with tensile strength of 600 N·mm^{-2}. The capacity of other fixings can be calculated in accordance with BS EN 1995-1-1 : 2004, Method B

(7) The stiffness values and deflection factors must be used to calculate the instantaneous and final deflection according to BS EN 1995-1-1 : 2004

(8) The deflection due to shear must be taken into account

(9) An appropriate deflection limit should be defined for each project on a case-by-case basis

(10) Structural insulated panels transfer any in-plane forces through the OSB/3 outer skin. The facing OSB/3 skin is to be fully supported on both faces of the panel, typically bearing directly on the top and bottom sill.

Table B1 Structural properties – limit state design(1) – TEK 172

Strength (per metre width of panel)		**Duration of load**				
		Permanent	**Long**	**Medium**	**Short**	**Instantaneous**
Bending strength perpendicular to plane of the panel(2) (M_{Rd})	kN·m	5.53	5.97	8.21	10.4	13.4
Shear strength(2) (V_{Rd})	kN	4.71	9.42	14.1	18.8	18.8
Bearing strength perpendicular to plane of the panel(3) (B) min. 45 mm bearing	kN	3.66	7.32	11.0	14.6	14.6
Axial strength (N)(10)						
wall height <2400 mm	kN	43.4	51.2	57.9	64.7	78.1
wall height 2400 – 2700 mm	kN	43.4	51.2	57.9	64.7	78.1
wall height 2700 – 3000 mm	kN	40.0	51.2	57.9	64.7	78.1
wall height 3000 – 3500 mm	kN	32.7	43.8	57.9	64.7	78.1
wall height 3500 – 4000 mm	kN	27.0	36.4	55.2	64.7	78.1
wall height 4000 – 4800 mm	kN	20.4	27.7	42.4	64.7	78.1
Racking strength(4)(5)(6) (R) with ø2.8 x 63 mm smooth nails to each face						
75 mm nail centres	kN	N/A	N/A	N/A	8.89	10.9
100 mm nail centres	kN	N/A	N/A	N/A	7.42	9.07
150 mm nail centres	kN	N/A	N/A	N/A	5.58	6.82
Stiffness (per metre width of panel)(7)(8)(9)						
EI_{inst}	N·mm^2	7.02 E+11				
Deformation factor due to bending ($k_{def, EI}$)	–	1.87				
GA_{inst}	N	6.89E+05				
Deformation factor due to shear ($k_{def, GA}$)	–	6.45				

(1) The strength values in this Table are design values that should be compared to the worst loading case at the ULS
(2) When checking a panel under combined loading (axial + bending), the interaction formula $N_{Ed} / N_{Rd} + M_{Ed} / M_{Rd} \leq 1.0$ (where N_{Ed} and M_{Ed} are calculated from design loads and N_{Rd} and M_{Rd} are taken from the values in the above Table). The deflection of the panel should also be checked to ensure it is within appropriate limits
(3) The bearing strength (B) should be used where a panel spans continuously over a central support. The bearing strength at an end support should be resisted by including an edge timber in the panel at the support
(4) Racking resistance is influenced by the spacing of fixing nails around the perimeter (minimum 50 mm, maximum 150 mm). The racking resistance for other nail spacing can be calculated – the Certificate holder's advice should be sought
(5) Racking resistance was calculated according to BS EN 1991-1-1 : 2002, Method B. The fixing spacing factor (k_s) is included in the racking resistance values, but the wall shape factor (k_d) and the load factor ($k_{i,q}$) must be applied to the strength values
(6) The dimension of nails given for the racking resistance relates to machine-driven nails with tensile strength of 600N·mm^{-2}. The capacity of other fixings can be calculated in accordance with BS EN 1995-1-1 : 2004, Method B
(7) The stiffness values and deflection factors must be used to calculate the instantaneous and final deflection according to BS EN 1995-1-1 : 2004
(8) The deflection due to shear must be taken into account
(9) An appropriate deflection limit should be defined for each project on a case-by-case basis
(10) Structural insulated panels transfer any in-plane forces through the OSB/3 outer skin. The facing OSB/3 skin is to be fully supported on both faces of the panel, typically bearing directly on the top and bottom sill.

ANNEX C – THERMAL DATA

The thermal conductivities (λ values) given in Table C1 may be used to conduct thermal transmittance (U value) calculations in accordance with BS EN ISO 6946 : 2007.

Table C1 Thermal conductivity of associated materials

Material	**λ value ($W \cdot m^{-1} \cdot K^{-1}$)**
Plasterboard	0.25
Timber	0.13
PUR insulation(1)	0.024(2)
OSB/3	0.13

(1) Rigid urethane insulation.
(2) This value is determined in accordance with BS EN 12667 : 2001 and declared in accordance with BS EN 13165 : 2008.

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