LUXEMBOURG INSTITUTE FOR
LUXIB
BUILDING AND TECHNOLOGY

62, Avenue de la Liberté
1930 Luxembourg
info@luxib.lu - www.luxib.lu

Designated according to Article 29 of Regulation (EU) No 305/2011

Member of EOTA
www.eota.eu

European Technical Assessment ETA-21/0537 of 26.08.2024

General Part

Technical Assessment Body issuing the European Technical Assessment:	LUXEMBOURG INSTITUTE FOR BUILDING AND TECHNOLOGY
Trade name of the construction product	6.3/5.5xL#3, 6.3/5.5xL#5 and 7.0/6.5xL#1
Product family to which the construction product belongs	Fastening screws for sandwich panels
Manufacturer	Sheh Kai Precision Co., LTD No.1 Ben Gong 1st Rd., Ben Chou Industrial Park Gang Shan Dist., Kaohsiung City 820110 Taiwan.
Manufacturing plant(s)	Manufacturer plants of Sheh Kai Precision Co., LTD
This European Technical Assessment contains	9 pages including 6 annexes which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	EAD 330047-01-0602 Fastening screws for sandwich panels

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.
Communication of this European Technical Assessment, including transmission by electronic means, shall be in full (excepted the confidential Annex(es) referred to above). However, partial reproduction may be made, with the written consent of the issuing Technical Assessment Body. Any partial reproduction has to be identified as such.

Specific parts

1. Technical description of the product

The products are sandwich screws manufactured by the company Sheh Kai Precision Co., LTD. The screws are made of austenitic stainless steel A2 or A4 according to EN 3506-1:2018 with a drill bit made of hardened carbon steel. The screws are completed with a sealing washer. The washers are made of stainless steel A2 or A4 according to EN 3506-1:2018 with an 2.0 mm EPDM sealing.

The following table summarizes the products of this ETA.

Table 1: Fastening screws for metal meners and sheeting

Fastener	Application	Annex
6.3/5.5xL#3 with hexagon head and sealing washer ≥ Ø 16,0 mm	steel/steel	4
6.3/5.5xL#5 with hexagon head and sealing washer ≥ Ø 16,0 mm	steel/steel	5
7.0/6.5xL#1 with hexagon head and sealing washer ≥ Ø 16,0 mm	steel/timber	6

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

The fastening screws for sandwich panels are intended to be used for fastening sandwich panels to metal or timber supporting substructures. The sandwich panel can either be used as wall or roof cladding or as load bearing wall and roof element. The intended use comprises fastening screws for sandwich panels and connections for indoor and outdoor applications.

Fastening screws which are intended to be used in external environments with ≥C2 corrosion according to the standard EN ISO 12944-2 are made of stainless steel. Furthermore the intended use comprises connections with predominantly static loads (e.g. wind loads, dead loads). The fastening screws for sandwich panels are not intended for re-use.

The field of application of the screws are shown in the Annexes of this ETA.

According to EAD 330047-01-0602 a working life of the fastening screws for sandwich panels of at least 25 years is assumed. The indications given on the working life cannot be interpreted as a guarantee given by the manufacturer, 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

Mechanical resistance and stability (BWR1)	
Essential characteristic	**Performance**
Shear resistance of the connection	See Annex 4-6
Tension resistance of the connection	See Annex 4-6
Design resistance in combination of tension and shear forces (interaction)	See Annex 4-6
Check of bending capacity in case of thermal expansion of the outer face of sandwich panels	See Annex 4-6
Durability	See Annex 4-6 for material specification

Safety in case of fire (BWR2)	
Essential characteristics	Performance
Reaction to fire	Performance Class A1 in accordance with EC decision 96/603/EC (as amended)

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

In accordance with EAD 330047-01-0602, the applicable European legal act is:

Commission Decision 1998/214/EC, amended by 2001/596/EC.

The AVCP-system to be applied is: 2+

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

Technical details necessary for the implementation of the AVCP-system are laid down in the control plan deposited with LUXIB.

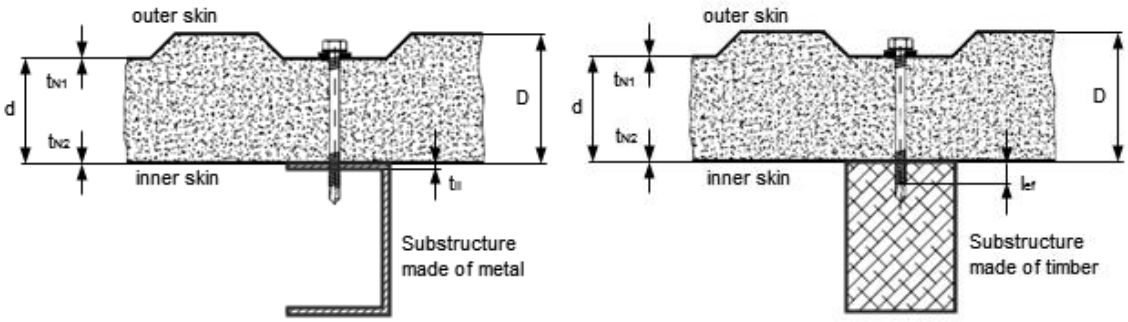
Issued in Luxembourg on 26.08.2024 by Luxembourg Institute for Building and Technology

Thierry Kohnen

General Manager

LUXEMBOURG INSTITUTE FOR LUXIB BUILDING AND TECHNOLOGY

Examples of execution of a connection



Terms for materials

Fastener	Material of the fastening screw
Washer	Material of the sealing washer
Component I	Material of the sandwich panel (outer skin and inner skin)
Component II	Material of the substructure

Terms for dimensions

D, d	Total thickness of component I
t_{N1}	Thickness of the outer skin of component I
t_{N2}	Thickness of the inner skin of component I
t_{II}	Thickness of component II made of metal
l_{ef}	Effective screw-in length in component II made of timber (without drill point)
d_{dp}	Pre-drill diameter of component I and component II

Terms for performances

$V_{R,k}$	Characteristic value of shear resistance of the connection
$N_{R,k}$	Characteristic value of tension resistance of the connection
$V_{R,I,k}$	Characteristic value of shear resistance of metal member or sheeting
$N_{R,I,k}$	Characteristic value of tension resistance (pull-through) of metal member or sheeting
$N_{R,II,k}$	Characteristic value of tension resistance (pull-out) of the substructure
u	Maximum allowed head displacement of the fastening screw

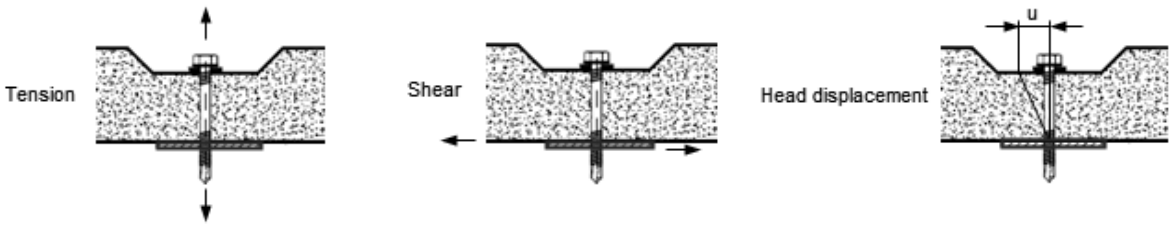
Additionally for timber substructure the following terms are used:

$M_{y,Rk}$	Characteristic value of yield moment
$f_{ax,k}$	Characteristic value of withdrawal strengthh

Used terms in the Annexes	**Annex 1**
Fastening screws for sandwich panels	

LUXEMBOURG INSTITUTE FOR LUXIB BUILDING AND TECHNOLOGY

Types of connection and occurred loadings



Recommendation for design

The design value of tension and shear resistance can be determined as follows:

$$N_{R,d} = \frac{N_{R,k}}{\gamma_M} \qquad V_{R,d} = \frac{V_{R,k}}{\gamma_M}$$

The characteristic values $N_{R,k}$ and $V_{R,k}$ are given in the Annexes. For intermediate dimension of metal member or sheeting or substructure the characteristic value of the thinner dimension is used.

The recommended partial safety factor $\gamma_M = 1{,}33$ is used, provided no partial safety factor is given in national regulations or national Annexes to Eurocode 3.

For asymmetric metal substructures with thickness $t_{II} < 5$ mm (for instance Z- or C-shaped profiles), the characteristic value $N_{R,k}$ given in the Annexes has to be reduced to 70%.

In case of combined tension and shear forces the following interaction equation is taken into account:

$$\frac{N_{S,d}}{N_{R,d}} + \frac{V_{S,d}}{V_{R,d}} \leq 1{,}0$$

$N_{S,d}$ and $V_{S,d}$ indicate the design values of applied tension and shear forces.

Head displacement

The head displacement of the fastening screw as a result of thermal expansion of the outer skin of the sandwich panel may not exceed the maximum allowed head displacement of the fastening screw.

Installation conditions

The installation is carried out according to the manufacturer's instructions.

The fastening screws are screwed-in with electric screw driver. The use of impact wrenches is not allowed.

The fastening screws are fixed rectangular to the surface of the metal member or sheeting.

Recommendation for design	**Annex 2**
Fastening screws for sandwich panels	

Timber substructures

Characteristic values of tension and shear resistance of the connection for other k_{mod} or ρ_k as indicated in the Annexes can be determined as follows:

$$N_{R,k} = \min \left\{ \begin{matrix} N_{R,I,k} \\ F_{ax,Rk} * k_{mod} \end{matrix} \right. \qquad V_{R,k} = \min \left\{ \begin{matrix} V_{R,I,k} \\ F_{v,Rk} * k_{mod} \end{matrix} \right.$$

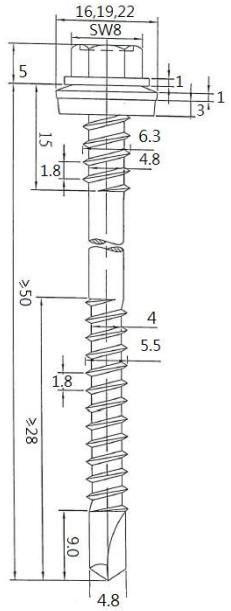
The characteristic values $N_{R,I,k}$ and $V_{R,I,k}$ are given in the corresponding Annex of the fastening screw.

$F_{ax,Rk}$ indicates the characteristic value of tension resistance of timber substructure. The value has to be determined according to EN 1995-1-1:2004 + A1:2008, equation (8.40a) with $f_{ax,k}$ given in the corresponding Annex of the fastening screw.

$F_{v,Rk}$ indicates the characteristic shear resistance of timber substructure. The value has to be determined according to EN 1995-1-1:2004 + A1:2008, equation (8.9) with $M_{y,Rk}$ given in the corresponding Annex of the fastening screw.

Recommendation for design	**Annex 3**
Fastening screws for sandwich panels	

LUXEMBOURG INSTITUTE FOR LUXIB BUILDING AND TECHNOLOGY



Materials

Fastener: stainless steel A2 or A4 - EN ISO 3506
galvanized or with ruspert coating

washer: stainless steel A2 or A4 - EN ISO 3506

Component I: S280GD, S320GD or S350GD - EN 10346

Component II: S235 - EN 10025-1
S280GD, S320GD or S350GD - EN 10346

Drilling capacity $\Sigma t_i \leq 6.00$ mm

Timber substructures

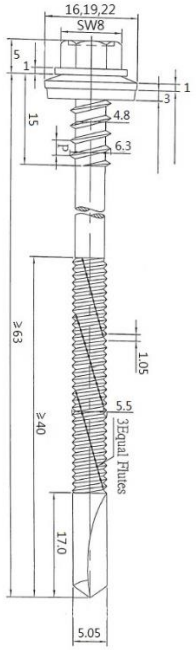
for timber substructures no performance determined

t_I [mm]		t_{II} [mm]							
		1.50	1.75	2.00	2.50	3.00	3.50	4.00	5.00
$V_{R,k}$ [kN]	0.40	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
	0.50	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08
	0.63	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33
	0.75	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.35
	0.88	2.73	2.73	2.73	2.73	2.73	2.73	2.73	2.73
	1.00	3.09	3.09	3.09	3.09	3.09	3.09	3.09	3.09
$N_{R,k}$ [kN]	0.40	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18
	0.50	1.38	1.68	1.68	1.68	1.68	1.68	1.68	1.68
	0.63	1.38	1.73	2.08	2.33	2.33	2.33	2.33	2.33
	0.75	1.38	1.73	2.08	3.00	3.33	3.33	3.33	3.33
	0.88	1.38	1.73	2.08	3.00	3.85	3.85	3.85	3.85
	1.00	1.38	1.73	2.08	3.00	3.92	4.34	4.34	4.34
$N_{R,II,k}$ [kN]		1.38	1.73	2.08	3.00	3.92	4.84	5.76	9.53
D. d [mm] max. head displacement u [mm]	40	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
	50	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
	60	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
	80	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
	90	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
	100	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
	120	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
	≥140	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0

6.3/5.5xL#3
with hexagon head and sealing washer ≥ Ø16.0 mm

Annex 4

LUXEMBOURG INSTITUTE FOR LUXIB BUILDING AND TECHNOLOGY



Materials

Fastener: stainless steel A2 or A4 - EN ISO 3506
galvanized or with ruspert coating

washer: stainless steel A2 or A4 - EN ISO 3506

Component I: S280GD, S320GD or S350GD - EN 10346

Component II: S235 - EN 10025-1
S280GD, S320GD or S350GD - EN 10346

Drill-capacity $\Sigma t_i \leq 12.00$ mm

Timber substructures

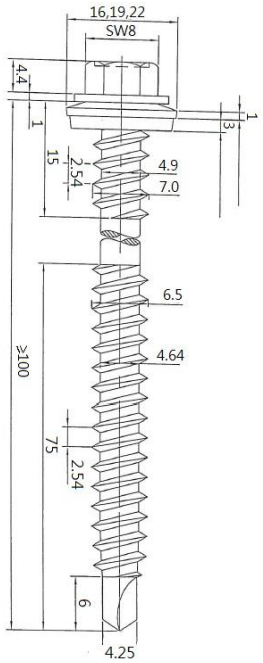
for timber substructures no performance determined

t_I [mm]		t_{II} [mm]							
		3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00
$V_{R,k}$ [kN]	0.50	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08
	0.55	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18
	0.63	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33
	0.75	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.35
	0.88	2.73	2.73	2.73	2.73	2.73	2.73	2.73	2.73
	1.00	3.09	3.09	3.09	3.09	3.09	3.09	3.09	3.09
$N_{R,k}$ [kN]	0.50	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54
	0.55	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95
	0.63	2.11	2.61	2.61	2.61	2.61	2.24	2.61	2.61
	0.75	2.11	3.20	3.60	3.60	3.43	2.24	2.93	3.60
	0.88	2.11	3.20	3.91	3.92	3.43	2.24	2.93	3.62
	1.00	2.11	3.20	3.91	4.21	3.43	2.24	2.93	3.62
$N_{R,II,k}$ [kN]		2.11	3.20	3.91	4.61	3.43	2.24	2.93	3.62
D. d [mm] max. head displacement u [mm]	40	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
	50	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
	60	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
	80	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
	90	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8
	100	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
	120	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
	≥140	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5

6.3/5.5xL#5
with hexagon head and sealing washer ≥ Ø16.0 mm

Annex 5

LUXEMBOURG INSTITUTE FOR LUXIB BUILDING AND TECHNOLOGY



Materials

Fastener: stainless steel A2 or A4 - EN ISO 3506
galvanized or with ruspert coating

washer: stainless steel A2 or A4 - EN ISO 3506

Component I: S280GD, S320GD or S350GD - EN 10346

Component II:timber ≥ C24 - EN 14081

Drill-capacity $\Sigma t_i \leq 2.00$ mm

For Timber substructures

$M_{y,Rk}$ = 12.90 Nm

$f_{ax,k}$ = 15.36 N/mm² für lef ≥ 30.0 mm

		l_{ef} [mm]					Failure of component I	
		30	35	40	45	50		
$V_{R.k}$ [kN]	0.50	0.85	0.85	0.85	0.85	0.85	0.85	$V_{R.I.k}$ [kN]
	0.55	0.84	0.84	0.84	0.84	0.84	0.84	
	0.63	0.84	0.84	0.84	0.84	0.84	0.84	
	0.75	1.03	1.03	1.03	1.03	1.03	1.03	
	0.88	1.24	1.24	1.24	1.24	1.24	1.24	
	1.00	1.44	1.44	1.44	1.44	1.44	1.44	
$N_{R.k}$ [kN]	0.50	1.70	1.70	1.70	1.70	1.70	1.70	$N_{R.I.k}$ [kN]
	0.55	2.09	2.09	2.09	2.09	2.09	2.09	
	0.63	2.71	2.71	2.71	2.71	2.71	2.71	
	0.75	3.00	3.50	3.65	3.65	3.65	3.65	
	0.88	3.00	3.50	3.99	4.17	4.17	4.17	
	1.00	3.00	3.50	3.99	4.49	4.64	4.64	
$N_{R,II,k}$ [kN]		3.00	3.50	3.99	4.49	4.99	-	
D. d [mm] max. head displacement u [mm]	40	3.0	3.0	3.0	3.0	3.0		
	50	3.8	3.8	3.8	3.8	3.8		
	60	4.5	4.5	4.5	4.5	4.5		
	80	6.0	6.0	6.0	6.0	6.0		
	90	6.8	6.8	6.8	6.8	6.8		
	100	7.5	7.5	7.5	7.5	7.5		
	120	9.0	9.0	9.0	9.0	9.0		
	≥140	10.5	10.5	10.5	10.5	10.5		

7.0/6.5xL#1
with hexagon head and sealing washer ≥ Ø19.0 mm

Annex 6