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Authorized 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-22/0762 of 2022/12/20

### General Part

**Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: ETA-Danmark A/S**

Trade name of the  
construction product:

EJOT Solar Fasteners

Product family to which the  
above construction product  
belongs:

Fastening screws with welded or cold formed set  
screws

Manufacturer:

EJOT SE & Co. KG  
Market Unit Construction  
In der Stockwiese 35  
DE-57334 Bad Laasphe  
Telephone: +49 2752 9080  
[www.ejot.de](http://www.ejot.de)

Manufacturing plant:

EJOT production plants

This European Technical  
Assessment contains:

14 pages including 9 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:

EAD 220169-00-0402 – Fastening screws with welded  
or cold formed set screws

This version replaces:

-

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## II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

### 1 Technical description of product

The EJOT Solar Fasteners are fastening screws (self-drilling and self-tapping screws) with welded set screws for parallel or elevated solar and photovoltaic installations or support profiles of solar installations.

The fastening screw is threaded over part of its length and has a welded set screw with nuts and washers for fastening the brackets of the solar or photovoltaic frame. The drilling point or self-tapping tip/stud and the thread of the screw depends on the material of the supporting structure in which the screw is fixed, i.e. steel or timber.

This ETA covers fastening screws and set screws made of stainless steel.

Examples of the fasteners are shown in Figure 1.

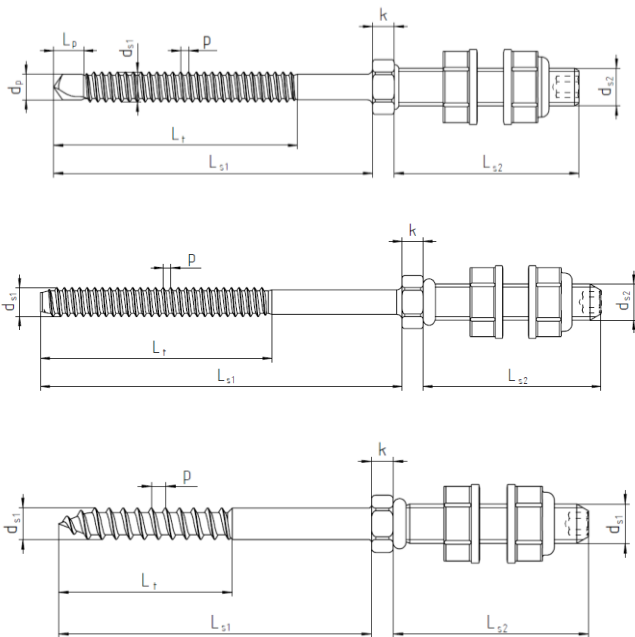


Figure 1 Fastening screws with welded set screws

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

The EJOT Solar Fasteners with welded or cold formed set screws are intended for the systematic load-transmitting connection of add-on parts (especially for elevated solar and photovoltaic installations or support profiles of solar installations) with supporting structures made from steel, concrete or timber.

The Solar Fasteners are bolted through the crest of sheeting panels made from steel or aluminium or of sandwich panels with steel or aluminium faces.

The Solar Fasteners are subject to static and/or quasistatic loads in tension or compression, shear and a combination of tension or compression and shear..

The installation should be carried out according to the ETA holder's specifications, using the specific kit components, manufactured by suppliers of the ETA holder and carried out by appropriately qualified staff with supervision of the technical responsible of the site.

The verification and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of at least 25 years, that the conditions lay down for the installation, packaging, transport and storage as well as appropriate use, maintenance and repair are met.

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 product in relation to the expected economically reasonable working life of the works.

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

Characteristic	Assessment of characteristic
<b>3.1 Mechanical resistance and stability (BWR 1)</b>	
Characteristic pull-through resistance, $N_{Rk,I}$	See annex 15-16
Characteristic pull-out resistance, $N_{Rk,II}$	See annex 17 – 20
Bending capacity in case of thermal expansion of the outer face of sandwich panels, max u	See annex 17 – 20
Characteristic bearing resistance, $F_{Rk}$	See annex 15-16
Characteristic yield moment, $M_{y,Rk}$	See annex 17 – 20
<b>3.2 Safety in case of fire (BWR 2)</b>	
Reaction to fire	The EJOT Solar fasteners are classified as <b>Euroclass A1</b> in accordance with EN 13501-1 and Commission delegated Regulation 2016/364 on the basis of EC Decision 96/603/EC (as amended) without the need for further testing.
<b>3.3 Aspects of durability</b>	
Durability	See annex 7

#### 3.8 Methods of verification

The product is assessed in accordance with EAD 220169-00-0402.

#### 3.9 General aspects related to the fitness for use of the product.

The European Technical Assessment is issued for the product based on 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 if such changes affect the ETA and consequently the validity of the CE marking based on the ETA and if so whether further assessment or alterations to the ETA, shall be necessary.

The EJOT Solar fasteners are manufactured in accordance with the provisions of this European Technical Assessment using the manufacturing processes as identified in the inspection of the plant by the notified inspection body and laid down in the technical documentation.

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

##### **4.1 AVCP system**

According to the decision 1998/214/ECEC of the European Commission, as amended by 2001/596/EC, the system(s) of assessment and verification of constancy of performance (see Annex III to Regulation (EU) No 305/2011) is 2+.

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

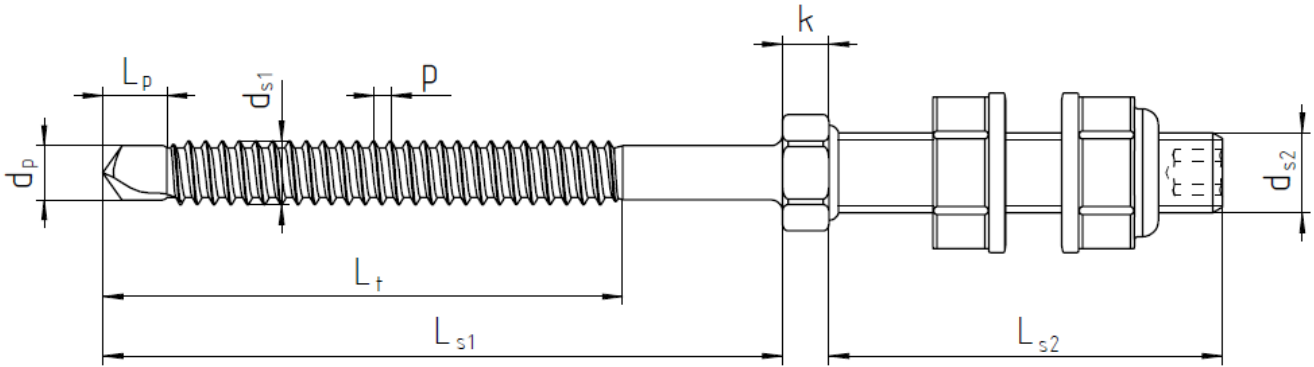
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at ETA-Danmark prior to CE marking.

Issued in Copenhagen on 2022-12-20 by

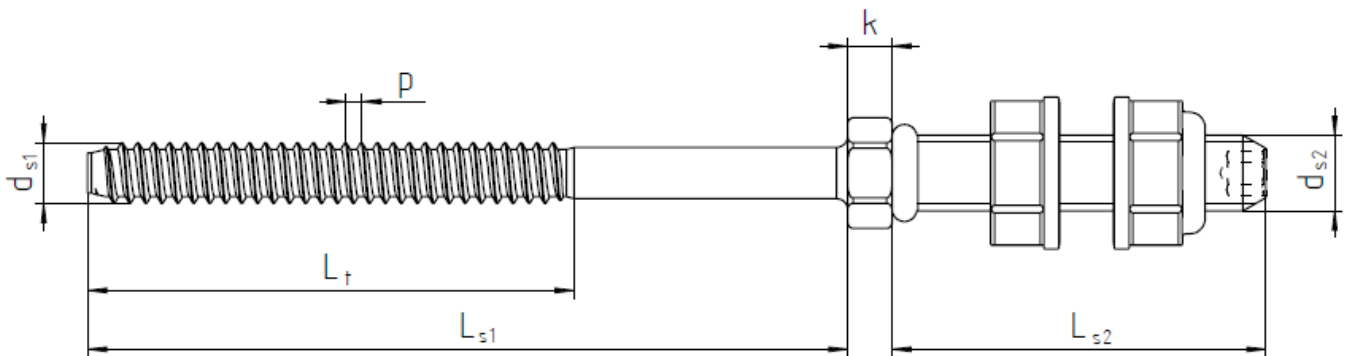


Thomas Bruun  
Managing Director, ETA-Danmark

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**Figure 1: Solar Fastener with JT-thread for steel supporting structures**



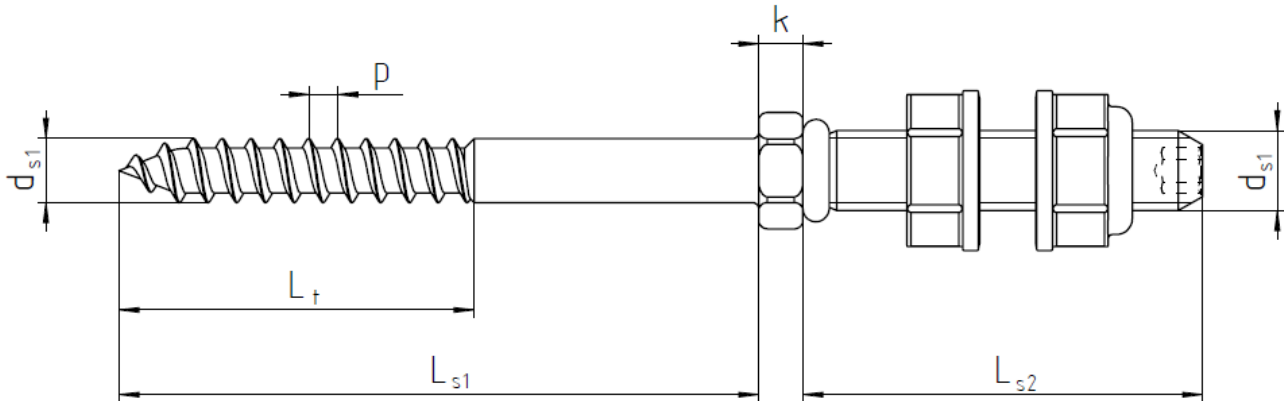
**Figure 2: Solar Fastener with JZ-thread for steel supporting structures**

Solar fastener JA, JT and JZ

Terms and explanations

Annex 1

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**Figure 3: Solar Fastener with JA-thread for timber supporting structures**

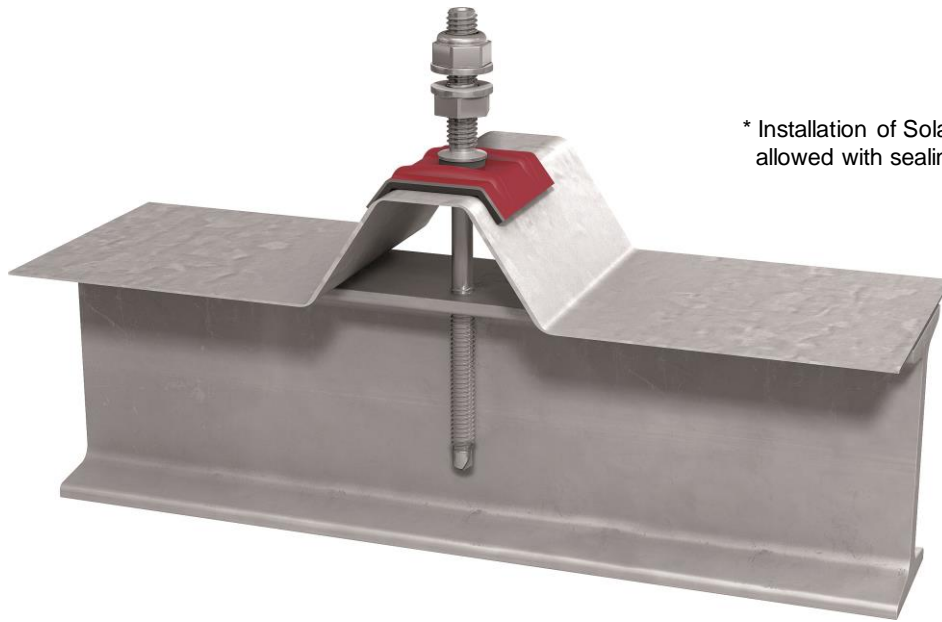
$L_{s1}$	Length of screw
$L_{s2}$	Length of set screw
$L_t$	Length of thread
$L_p$	Length of drill tip
$k$	Head height
$d_{s1}$	Diameter of screw
$d_{s2}$	Diameter of set screw
$d_c$	Core diameter
$d_p$	Diameter of drill tip
$P$	Pitch of the thread

Solar fastener JA, JT and JZ

Terms and explanations

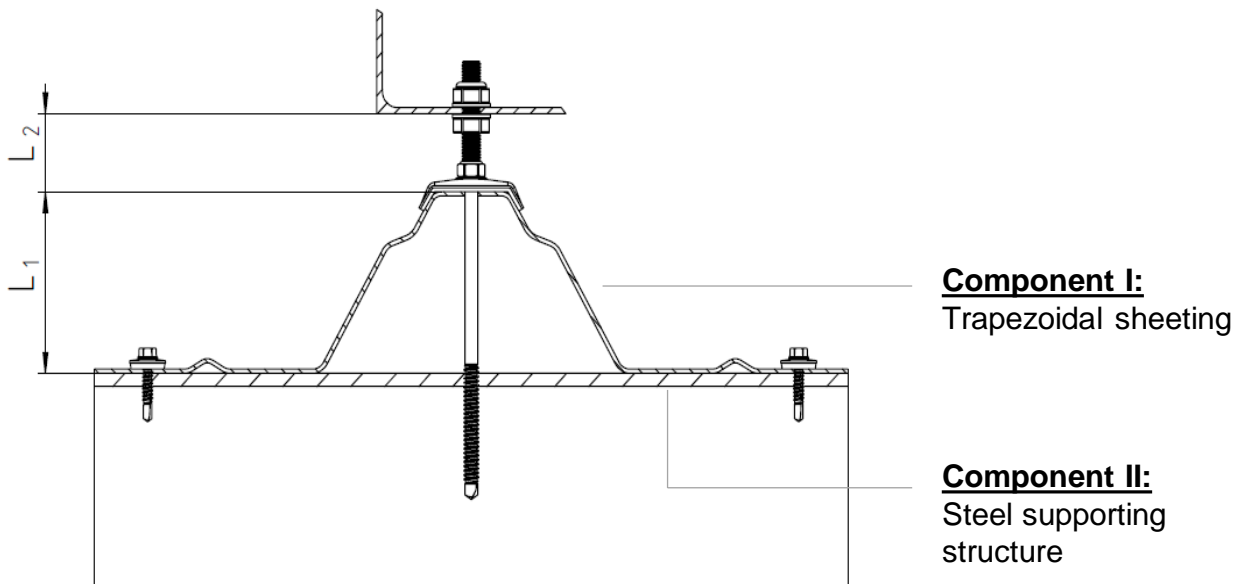
Annex 2

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\* Installation of Solar fastener is only allowed with sealing washer  $\geq 16\text{mm}$ .

**Figure 4: Application Solar Fastener on profiled sheeting (e.g. trapezoidal / sinusoidal) and steel supporting structure**



**Component I:**  
Trapezoidal sheeting

**Component II:**  
Steel supporting structure

**Figure 5: Application solar fastener on trapezoidal sheeting and steel supporting structure**

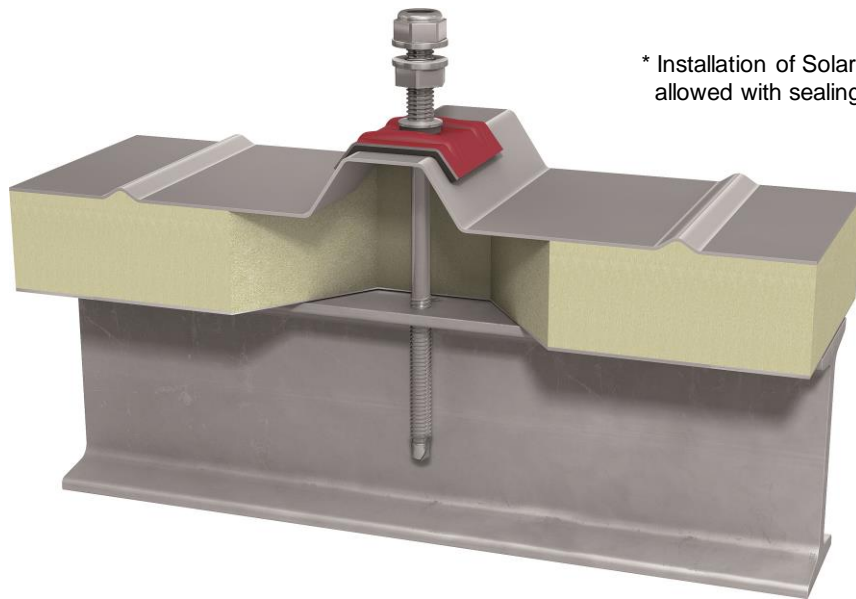
Solar fastener JA, JT and JZ

Application example

Annex 3

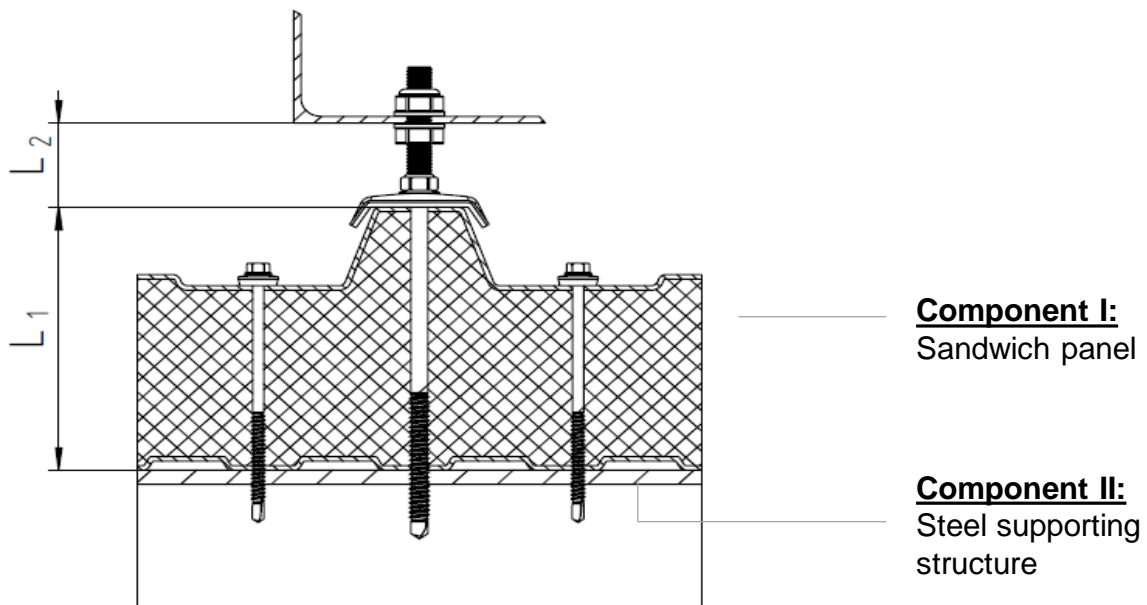


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\* Installation of Solar fastener is only allowed with sealing washer  $\geq 16\text{mm}$ .

**Figure 6: Application Solar Fastener on sandwich panel and steel supporting structure**



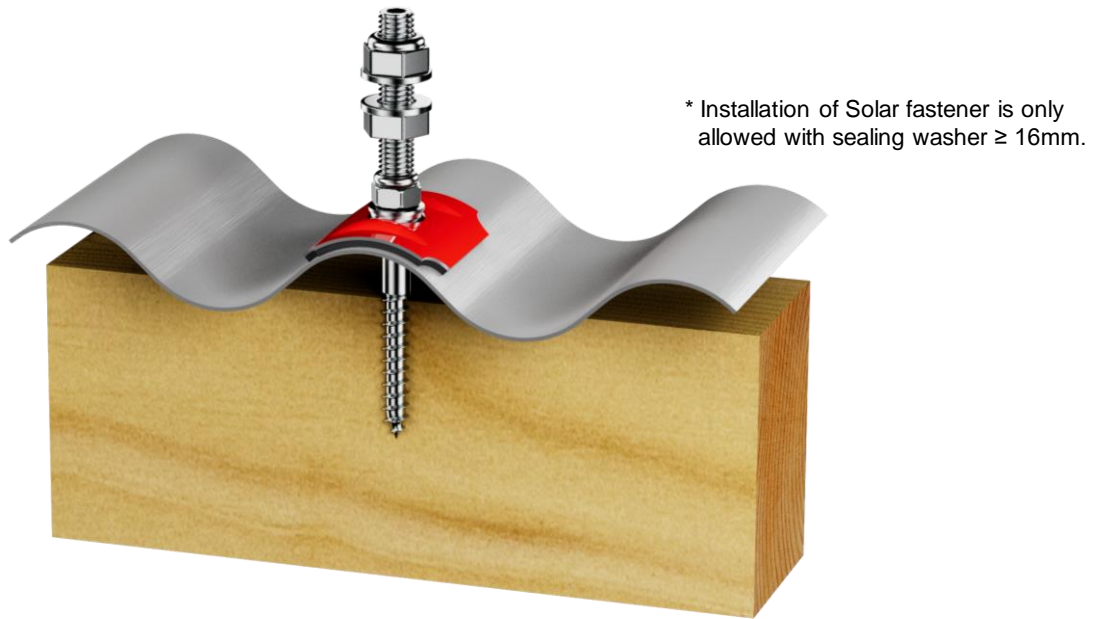
**Figure 7: Application Solar Fastener on sandwich panel and steel supporting structure**

Solar fastener JA, JT and JZ

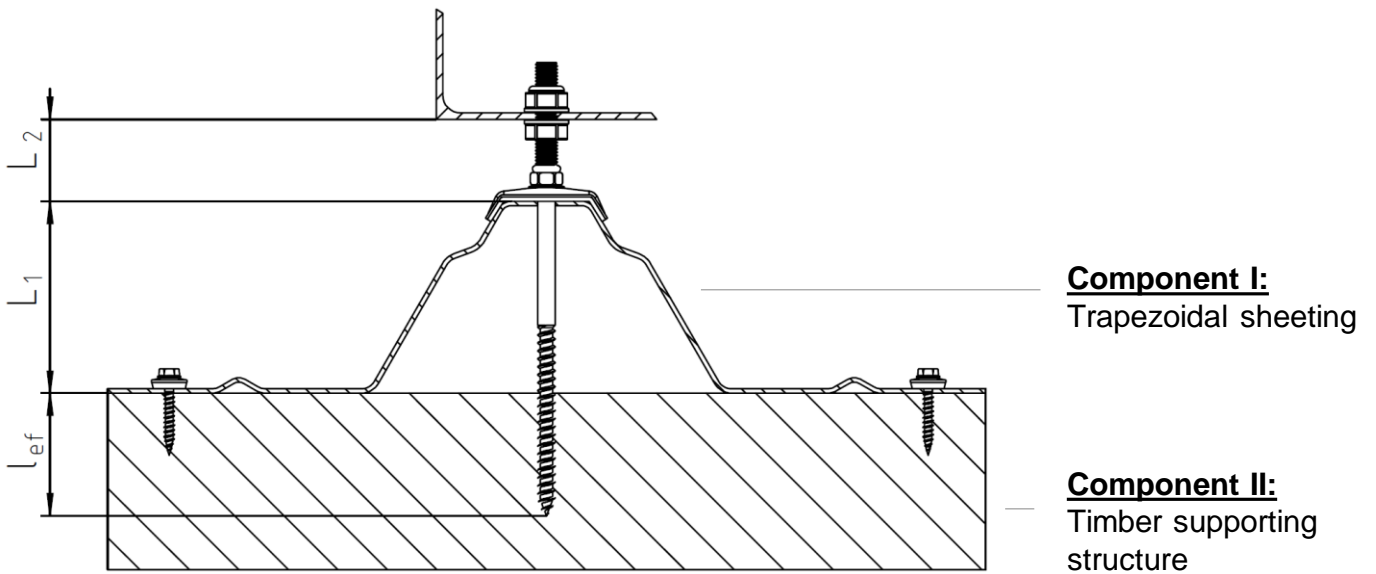
Application example

Annex 4

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**Figure 8: Application Solar Fastener on profiled sheeting (e.g. trapezoidal / sinusoidal) and timber supporting structure**



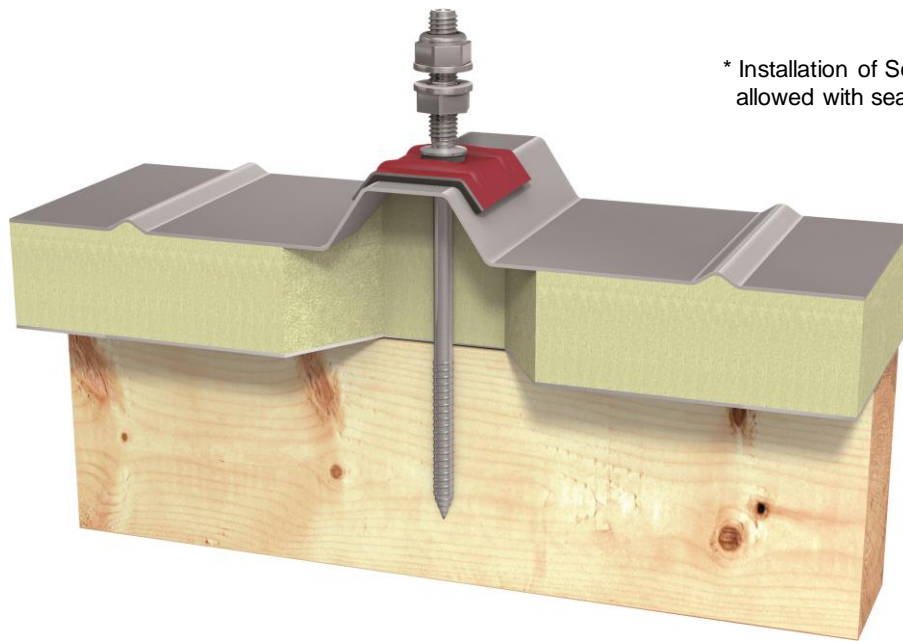
**Figure 9: Application Solar Fastener on trapezoidal sheeting and timber supporting structure**

Solar fastener JA, JT and JZ

Application example

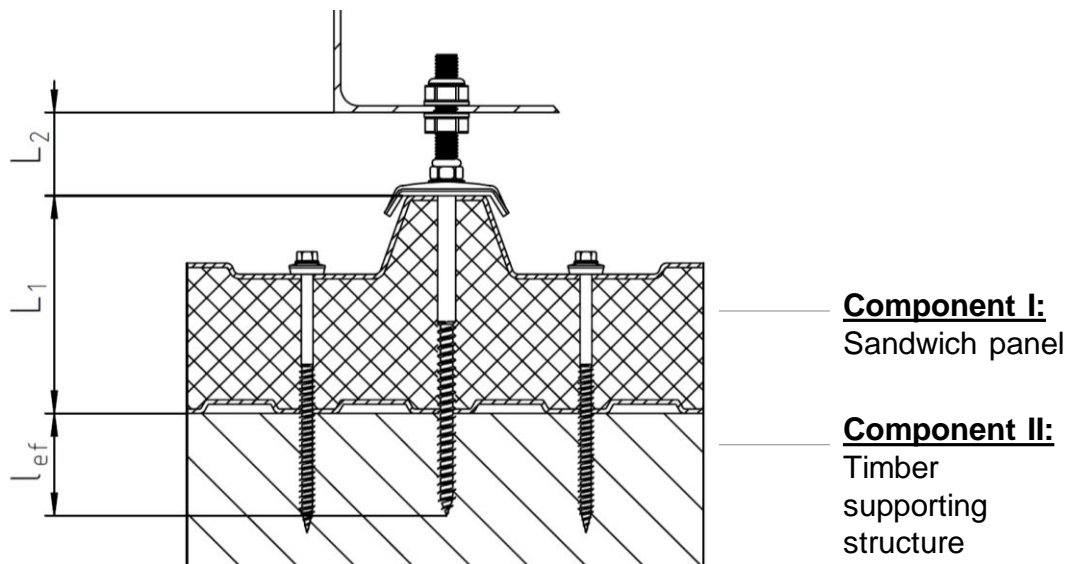
Annex 5

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\* Installation of Solar fastener is only allowed with sealing washer  $\geq 16\text{mm}$ .

**Figure 10: Application Solar Fastener on sandwich panel and timber supporting structure**



**Figure 11: Application Solar Fastener on sandwich panel and timber supporting structure**

Solar fastener JA, JT and JZ

Application example

Annex 6

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**Solar Fastener:**

Material: stainless steel A2 acc. to EN ISO 3506, min. CRC II acc. to EN 1993-1-4  
 stainless steel A4 acc. to EN ISO 3506, min. CRC III acc. to EN 1993-1-4

**Metal sheeting: (component I)**

Material: steel  $R_m \geq 360 \text{ N/mm}^2$  (S280GD - EN 10346)  
 $R_m \geq 390 \text{ N/mm}^2$  (S320GD - EN 10346)  
 aluminium  $R_m \geq 165 \text{ N/mm}^2$   
 $R_m \geq 215 \text{ N/mm}^2$

Dimensions: nominal sheet thickness  
 steel  $t_l \geq 0.40 \text{ mm}$   
 aluminium  $t_l \geq 0.50 \text{ mm}$

**Sandwich panels: (component I)**

A national approval or CE-marking acc. EN 14509 of the sandwich panel is mandatory.

**Exterior layer:**

Material: steel  $R_m \geq 360 \text{ N/mm}^2$  (S280GD EN 10346)  
 $R_m \geq 390 \text{ N/mm}^2$  (S320GD EN 10346)  
 aluminium  $R_m \geq 165 \text{ N/mm}^2$   
 $R_m \geq 215 \text{ N/mm}^2$

Dimensions: nominal sheet thickness  
 steel  $t_l \geq 0.40 \text{ mm}$   
 aluminium  $t_l \geq 0.50 \text{ mm}$

**Core material:**

Cross panel tensile strength:  $f_{Ct} \geq 0.06 \text{ N/mm}^2$   
 Shear strength for short term loading:  $f_{Cv} \geq 0.05 \text{ N/mm}^2$

**Supporting structure: (component II)**

Material: please see annex for corresponding fastener

Dimensions: minimum thickness for steel is  $t_{II} \geq 1.5 \text{ mm}$   
 screw-in length of timber supporting structure  $\geq 4 \cdot d_{s1}$

Solar fastener JA, JT and JZ	<b>Annex 7</b>
<b>Performance characteristics &amp; special conditions</b>	

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**Performance characteristics**

$N_{Rk,I}$	Characteristic pull-through resistance (component I)
$N_{Rk,II}$	Characteristic pull-out resistance (component II made of steel)
$N_{Rk,II,t}$	Characteristic pull-out resistance (component II made of timber)
$N_{Rk,II,c}$	Characteristic compression resistance (component II made of timber)
<b>max u</b>	Maximum allowed head displacement of the fastening screw
$F_{Rk,I}$	Characteristic bearing resistance (component I)
$F_{Rk,II}$	Characteristic bearing resistance (component II)
$N_{pl,Rk}$	Characteristic value of the resistance to axial force of the cross-section
$M_{pl,Rk}$	Characteristic value of plastic bending moment resistance
$M_{y,Rk}$	Characteristic yield moment
$f_{ax,k}$	Characteristic withdrawal parameter (component II made of timber)
$f_{h,k}$	Characteristic value of embedding strength component II made of timber (acc. EN 1995-1-1:2004, section 8.3, equation (8.15))
$l_{ef}$	Effective screw-in length in component II made of timber

**Special conditions**

For asymmetric components II made of metal (e.g. Z- or C-shaped profiles) with component thickness  $t_{II} \leq 2$  mm, the characteristic values  $N_{Rk,I}$  and  $N_{Rk,II}$  shall be reduced to 70%.

Solar fastener JA, JT and JZ	<b>Annex 8</b>
<b>Performance characteristics &amp; special conditions</b>	

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**Design values**

The design values have to be determined as following:

$F_{Rd,l}$	Design Value of bearing resistance
$M_{pl,Rd}$	Design value of plastic bending moment resistance
$M_{y,Rd}$	Design value of yield moment
$\gamma_M$	Partial factor for bearing resistance; 1.33 or acc. to National Annex to EN 1993-1-4
$\gamma_{M0}$	Partial factor for resistance of cross-section (yield moment and plastic bending resistance); 1.1 or acc. to National Annex EN 1993-1-4
$\gamma_{M1}$	Partial factor for resistance to instability; 1.1 or acc. to National Annex to EN 1993-1-4
$k_{mod}$	Modification factor according to National Annex to EN 1995-1-1

Solar fastener JA, JT and JZ

Design values

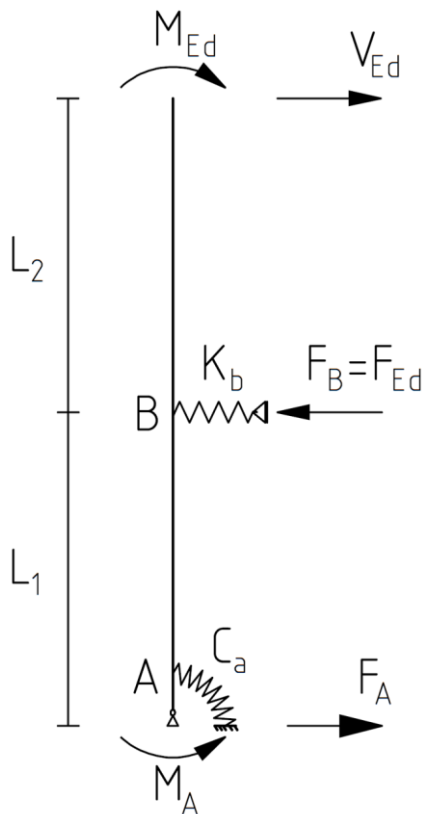
Annex 9

**Design**

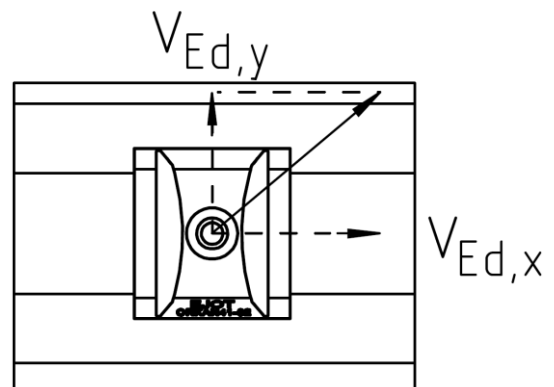
The solar fastener is designed on the basis of a mechanical system of a simply supported member of span  $L_1$  with a cantilever with length  $L_2$  placed on top, see Figure 12). The forces  $V_{Ed}$  and  $N_{Ed}$  act at the head of the cantilever, causing both axial force and bending in the system. If  $N_{Ed}$  acts with an eccentricity to the screw axis, this results in an additional bending moment  $M_{Ed}$  at the head:

- $V_{Ed}$**  Force acting on the solar fastener, parallel to the plane of the sheeting or sandwich panel (e.g. caused by roof thrust  $V_{Ed,x}$  plus a transverse shear force  $V_{Ed,y}$ , see Figure 13).
- $N_{Ed}$**  Force acting on the solar fastener, perpendicular to the plane of the sheeting or sandwich panel
- $M_{Ed}$**  Moment acting on the solar fastener (e.g. caused by eccentricity when using an adapter plate)

The resistances tabulated in Annexes 15 to 20 are the resistances at the supports of the member. Thus they are assigned to components I and II by subscripts I and II.



**Figure 12: Mechanical system**

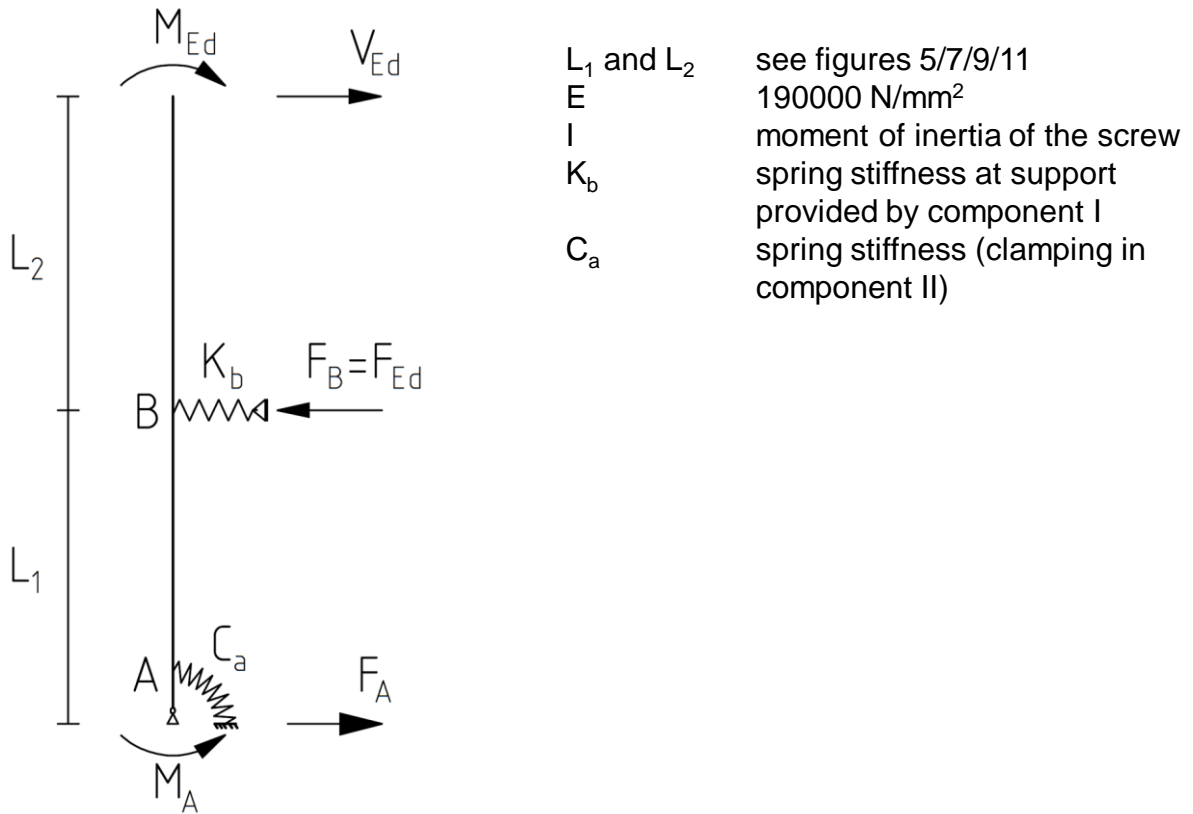


$$V_{Ed} = \sqrt{V_{Ed,x}^2 + V_{Ed,y}^2}$$

**Figure 13: Resulting shear forces**

Solar fastener JA, JT and JZ	
Design criteria	Annex 10

**Design for shear forces  $V_{Ed}$  – General Method**



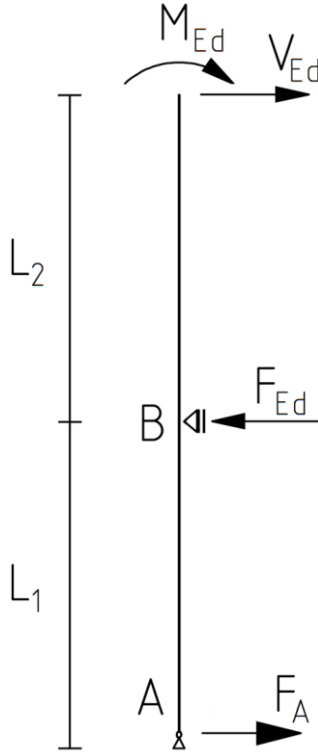
**Figure 14: General mechanical system**

$$\frac{V_{Ed} (L_1 + L_2) + M_{Ed}}{L_1} - \frac{-L_1^3 K_b C_a (M_{Ed} + L_2 V_{Ed}) + 6 E I C_a (V_{Ed} (L_1 + L_2) + M_{Ed})}{2 L_1^4 K_b C_a + 6 E I C_a L_1 + 6 L_1^3 K_b E I} \leq \frac{F_{Rk,I}}{\gamma_M}$$

Solar fastener JA, JT and JZ	<b>Annex 11</b>
Design criteria	



**Design for shear forces  $V_{Ed}$  – Simplified Method**



$L_1$  and  $L_2$  see figures 5/7/9/11

**Figure 15: Simplified mechanical system**

Steel supporting structure  $t_{II} \leq \frac{1}{2} d$ :

$$V_{Ed} \left( \frac{L_2}{L_1} + 1 \right) + \frac{M_{Ed}}{L_1} \leq \frac{F_{Rk,I}}{\gamma_M}$$

$$V_{Ed} L_2 + M_{Ed} \leq \frac{M_{pl,Rk}}{\gamma_{M0}}$$

Steel supporting structure  $t_{II} > \frac{1}{2} d_{s1}$  and timber supporting structure:

$$V_{Ed} \left( \frac{3 L_2}{2 L_1} + 1 \right) + \frac{3 M_{Ed}}{2 L_1} \leq \frac{F_{Rk,I}}{\gamma_M}$$

$$V_{Ed} L_2 + M_{Ed} \leq \frac{M_{pl,Rk}}{\gamma_{M0}}$$

$$\frac{V_{Ed} L_2}{2} + \frac{M_{Ed}}{2} \leq \frac{M_{y,Rk}}{\gamma_M}$$

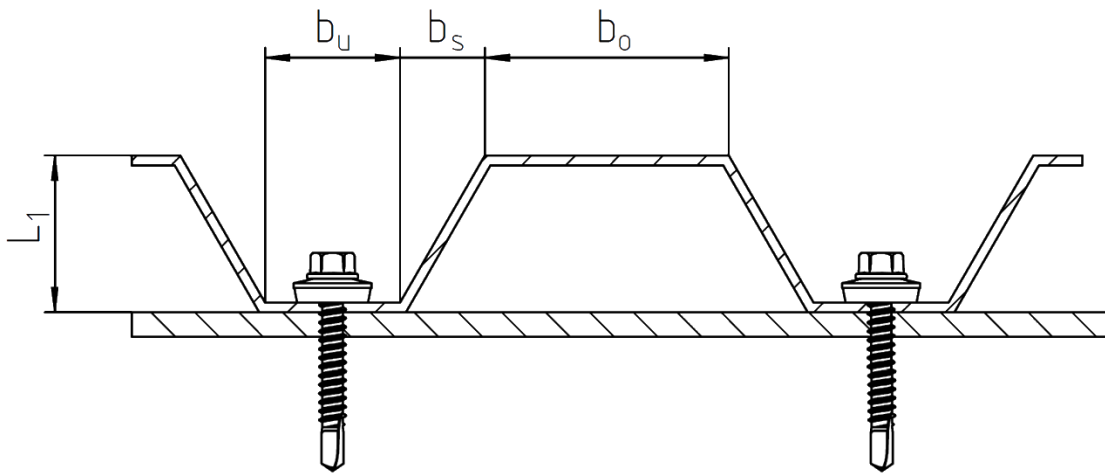
Solar fastener JA, JT and JZ

Design criteria

Annex 12

**Design for shear forces  $V_{Ed,y}$  – Sheeting**

$L_1$  see figures 5/7/9/11  
 $f_{y,k}$  yield strength of the sheeting  
 $a$  distance between solar fasteners  
 in x-direction (in the span of the  
 direction of sheeting)  
 $b_u, b_o, b_s$  see Figure xy



**Figure 16: Dimensions of the sheeting**

$$V_{Ed,x} \leq \frac{f_{y,k} a t_f^2 (b_u + 2 b_u + b_o)}{\gamma_{M0} 3 L_1 b_o}$$

Solar fastener JA, JT and JZ

Design criteria

Annex 13

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**Design for axial forces  $N_{Ed}$  and bending  $M_{Ed}$  – Buckling design**

$$\frac{N_{Ed}}{N_{pl,Rd}} + \frac{\alpha \cdot V_{Ed} \cdot L_2}{M_{pl,Rd}} + \frac{\alpha \cdot N_{Ed} \cdot L_2}{20 \cdot M_{pl,Rd}} \leq 1$$

$N_{Ed}$  design value of the acting compressive force

$N_{pl,Rd}$  design value of the resistance to axial force of the cross-section

$$N_{pl,Rd} = N_{pl,Rk} / \gamma_{M1}$$

**JT3/6-3-SBx8.0xL**  $N_{pl,Rk} = 12,08 \text{ kN}$

**JZ3-SBx8.0xL**  $N_{pl,Rk} = 12,08 \text{ kN}$

**JA3-SBx8.0xL**  $N_{pl,Rk} = 9,85 \text{ kN}$

**JA3-SBx10.0xL**  $N_{pl,Rk} = 12,18 \text{ kN}$

$V_{Ed}$  design value of acting shear force

$M_{pl,Rd}$  design value of bending moment resistance

$$M_{pl,Rd} = M_{pl,Rk} / \gamma_{M1}$$

$\alpha$  amplification factor

$$\alpha = \frac{1}{1 - \frac{N_{Ed}}{N_{cr}}}$$

$N_{cr}$  elastic critical axial force

$$N_{cr} = \frac{\pi^3 E d}{64 (\beta_1 L_1)^2}$$

$E$  190000 N/mm<sup>2</sup>

$L_1$  and  $L_2$  see figures 5/7/9/11

$d$  diameter

**JT3/6-3-SBx8.0xL**  $d = 6,75 \text{ mm}$

**JZ3-SBx8.0xL**  $d = 6,75 \text{ mm}$

**JA3-SBx8.0xL**  $d = 8,0 \text{ mm}$

**JA3-SBx10.0xL**  $d = 10,0 \text{ mm}$

$\beta_1$  1.0 + 1.87 x  $L_2/L_1$  steel supporting structure  $t_{||} \leq \frac{1}{2} d$   
0.7 + 1.85 x  $L_2/L_1$  steel supporting structure  $t_{||} > \frac{1}{2} d$  or timber supporting structure

Solar fastener JA, JT and JZ

Design criteria

Annex 14

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**Pull-through resistance  $N_{Rk,I}$**

	$t_{N,I}$ [mm]	Head/washer diameter $\geq 16$ mm
Steel $R_m \geq 360$ N/mm <sup>2</sup>	0.40	1.38
	0.50	1.77
	0.55	1.96
	0.63	2.27
	0.75	2.73
	0.88	3.23
	1.00	3.69

	$t_{N,I}$ [mm]	Head/washer diameter $\geq 16$ mm
Steel $R_m \geq 390$ N/mm <sup>2</sup>	0.40	1.50
	0.50	1.91
	0.55	2.12
	0.63	2.45
	0.75	2.95
	0.88	3.49
	1.00	3.99

**Characteristic bearing resistance  $F_{Rk,I}$**

	Material	Steel $R_m \geq 360$ N/mm <sup>2</sup>					
	Component I [mm]	0.40*	0.55*	0.63*	0.75	0.88	$\geq 1.00$
$F_{Rk,I}$ [kN]	JT3/JT6-SB-3-8.0xL	0.56	1.14	1.48	1.74	2.39	3.01
	JZ3-SB-8.xL	0.56	1.14	1.48	1.74	2.39	3.01
	JA3-SB-8.0xL	0.61	1.24	1.61	1.90	2.61	3.28
	JA3-SB-10.0xL	0.69	1.38	1.80	2.12	2.91	3.67

	Material	Steel $R_m \geq 390$ N/mm <sup>2</sup>					
	Component I [mm]	0.40*	0.55*	0.63*	0.75	0.88	$\geq 1.00$
$F_{Rk,I}$ [kN]	JT3/JT6-SB-3-8.0xL	0.61	1.23	1.60	1.99	2.74	3.44
	JZ3-SB-8.xL	0.61	1.23	1.60	1.99	2.74	3.44
	JA3-SB-8.0xL	0.66	1.34	1.75	2.17	2.98	3.75
	JA3-SB-10.0xL	0.74	1.50	1.95	2.42	3.33	4.19

\* Intermediate values may be obtained by linear interpolation.

Solar fastener JA, JT and JZ

Pull-through & bearing resistance for component I made of steel

Annex 15

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**Pull-through resistance  $N_{Rk,I}$**

	$t_{N,I}$ [mm]	Head/washer diameter $\geq 16$ mm
Aluminium $R_m \geq 165$ N/mm <sup>2</sup>	0.40	-
	0.50	0.46
	0.60	0.55
	0.70	0.64
	0.80	0.73
	0.90	0.82
	1.00	0.91

	$t_{N,I}$ [mm]	Head/washer diameter $\geq 16$ mm
Aluminium $R_m \geq 215$ N/mm <sup>2</sup>	0.40	-
	0.50	0.60
	0.60	0.72
	0.70	0.83
	0.80	0.95
	0.90	1.07
	1.00	1.19

**Characteristic bearing resistance  $F_{Rk,I}$**

	Material	aluminium $R_m \geq 165$ N/mm <sup>2</sup>		
	Component I [mm]	0.50	0.60	$\geq 0.70$
$F_{Rk,I}$ [kN]	JT3-SB-3-8.0xL	0.23	0.34	0.46
	JZ3-SB-8.0xL	0.23	0.34	0.46
	JA3-SB-8.0xL	0.25	0.37	0.49
	JA3-SB-10.0xL	0.28	0.42	0.56

	Material	aluminium $R_m \geq 215$ N/mm <sup>2</sup>		
	Component I [mm]	0.50	0.60	$\geq 0.70$
$F_{Rk,I}$ [kN]	JT3-SB-3-8.0xL	0.30	0.45	0.59
	JZ3-SB-8.0xL	0.30	0.45	0.59
	JA3-SB-8.0xL	0.33	0.49	0.65
	JA3-SB-10.0xL	0.37	0.54	0.72

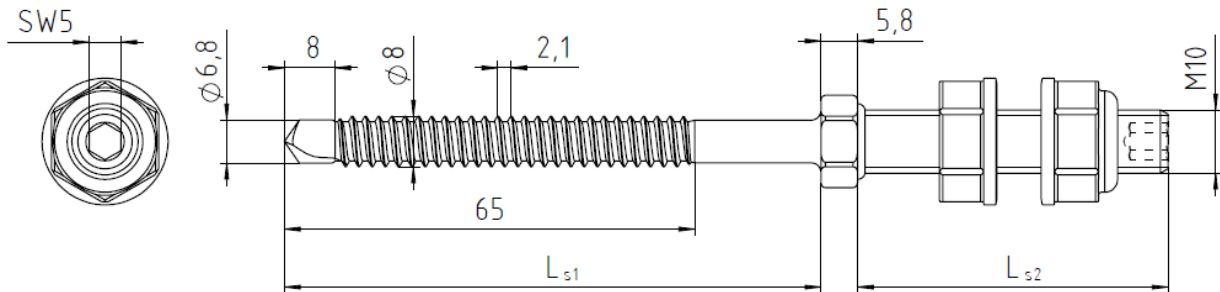
\* Intermediate values may be obtained by linear interpolation.

Solar fastener JA, JT and JZ

Pull-through & bearing resistance for component I made of aluminium

Annex 16

Annex 17 of 21 of European Technical Assessment no. ETA-xx/xxx



**Material:**

Component I: see annex 7

Component II: S235, S275, S355 - EN 10025-2  
S280GD to S450GD & HX300LAD to HX460LAD - EN 10346

**Drilling capacity:**  $t_{II} \leq 3$  mm

**Pre-drill diameter:** see table

$M_{pl,k}$ : 33.35 Nm

$M_{y,Rk}$ : 46.45 Nm

Component II $t_{II}$ [mm]	1.50	2.00	3.00	4.00	5.00	6.00	8.00	$\geq 10.00$
$N_{Rk,II}$ [kN]	2.20	3.40	5.80	10.05	15.29	19.03	19.03	19.03
Max u [mm] for $D_f$	40	8.00	6.00	4.00	3.00	2.80	2.80	2.80
	60	12.00	9.00	6.00	4.50	4.20	4.20	4.20
	80	16.00	12.00	8.00	6.00	5.60	5.60	5.60
	100	20.00	15.00	10.00	7.50	7.00	7.00	7.00
	120	24.00	18.00	12.00	9.00	8.40	8.40	8.40
$\geq 140$	28.00	21.00	14.00	10.50	9.80	9.80	9.80	9.80
Pre-drill diameter [mm]	Not necessary	Not necessary	Not necessary	6.80	7.00	7.00	7.20	7.40

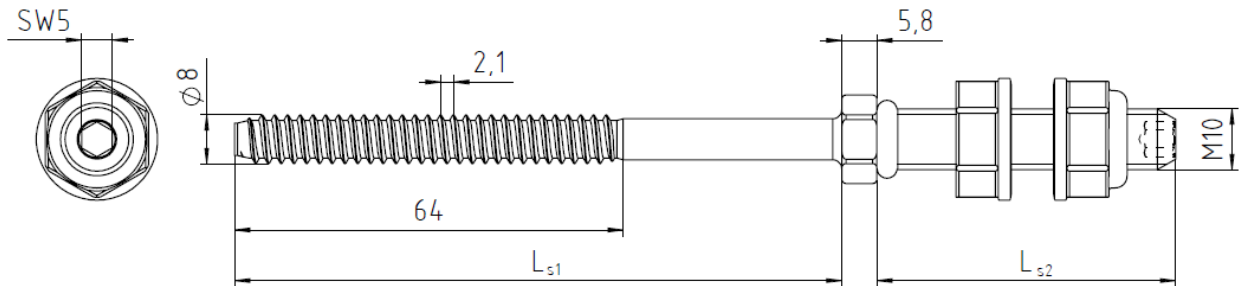
- For intermediate values for the thickness of supporting structure  $N_{Rk,II}$  must be selected for the smaller component thickness

Solar fastener JA, JT and JZ

JT3-SB-3-8,0xL<sub>s1</sub>/L<sub>s2</sub>; JT6-SB-3-8,0xL<sub>s1</sub>/L<sub>s2</sub>

Annex 17

Annex 18 of 21 of European Technical Assessment no. ETA-xx/xxx



**Material:**

Component I: see annex 7

Component II: S235, S275 and S355 - EN 10025-2  
S280GD to S350GD - EN 10346

**Drilling capacity:**

-

**Pre-drill diameter:**

see table

$M_{pl,k}$ :

33.35 Nm

$M_{y,Rk}$ :

46.45 Nm

Component II $t_{II}$ [mm]	1.50	2.00	3.00	4.00	5.00	6.00	8.00	$\geq 10.00$
$N_{Rk,II}$ [kN]	2.20	3.40	5.80	10.05	15.29	19.03	19.03	19.03
Max u [mm] for $D_f$	40	8.00	6.00	4.00	3.00	2.80	2.80	2.80
	60	12.00	9.00	6.00	4.50	4.20	4.20	4.20
	80	16.00	12.00	8.00	6.00	5.60	5.60	5.60
	100	20.00	15.00	10.00	7.50	7.00	7.00	7.00
	120	24.00	18.00	12.00	9.00	8.40	8.40	8.40
$\geq 140$	28.00	21.00	14.00	10.50	9.80	9.80	9.80	9.80
Pre-drill diameter [mm]	6.80	6.80	6.80	6.80	7.00	7.00	7.20	7.40

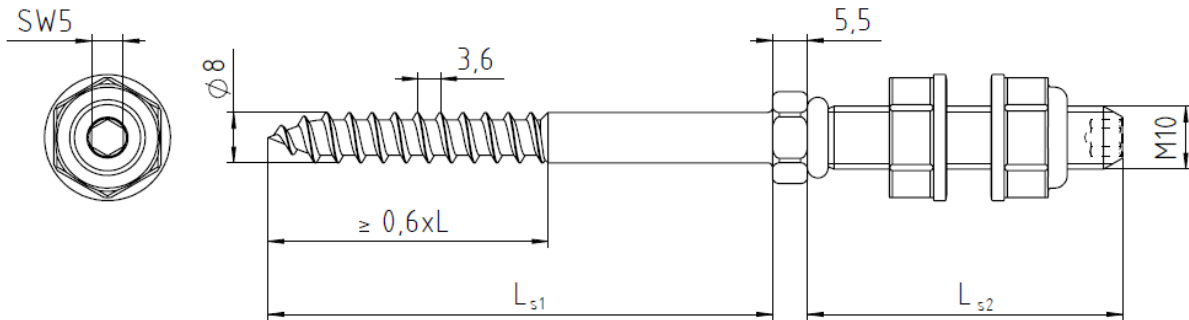
- For intermediate values for the thickness of supporting structure  $N_{Rk,II}$  must be selected for the smaller component thickness

Solar fastener JA, JT and JZ

JZ3-SB-8,0xL<sub>s1</sub>/L<sub>s2</sub>; JZ5-SB-8,0xL<sub>s1</sub>/L<sub>s2</sub>

Annex 18

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**Material:**

Component I: see annex 7

Component II: timber according EN 14080-1 & EN 14081

**Drilling capacity:** -

**Pre-drill diameter:** see table

$M_{pl,k}$ : 40.66 Nm

$M_{y,Rk}$ : 47.86 Nm

$f_{ax,k}$ : 8.575 N/mm<sup>2</sup>

Component II $l_{ef}$ [mm]	32	40	48	56	64	72	80	88	96
$N_{Rk,II,t}$ [kN]	2.47	3.09	3.70	4.32	4.94	5.56	6.17	6.79	7.41
$N_{Rk,II,c}$ [kN]	1.10	1.37	1.65	1.92	2.20	2.47	2.74	3.02	3.29
Max u [mm] for $D_f$	40	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
	60	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
	80	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
	100	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
	120	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3
$\geq 140$	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7
Pre-drill diameter [mm]	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50

- The values indicated above, depending on the screw depth  $l_{ef}$  shall apply to  $k_{mod} = 0.90 (N_{Rk,II,t}) / 0.50 (N_{Rk,II,c})$  and the timber strength class C24 ( $\rho_k = 350 \text{ kg/m}^3$ ). For other values of  $k_{mod}$  and strength classes see Annex 8.

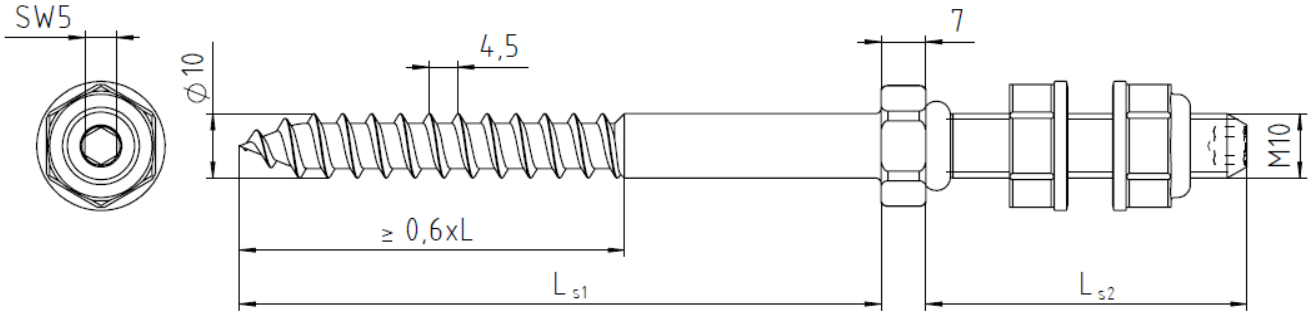
Solar fastener JA, JT and JZ

JA3-SB-8.0 x  $L_{s1}/L_{s2}$

Annex 19



Annex 20 of 21 of European Technical Assessment no. ETA-xx/xxx



**Material:**

Component I: see annex 7

Component II: timber according EN 14080-1 & EN 14081

**Drilling capacity:** -

**Pre-drill diameter:** see table

$M_{pl,k}$ : 40.66 Nm

$M_{y,Rk}$ : 47.86 Nm

$f_{ax,k}$ : 8.575 N/mm<sup>2</sup>

Component II $l_{ef}$ [mm]	40	50	60	70	80	90	100	110	120
$N_{Rk,II,t}$ [kN]	3.09	3.86	4.63	5.40	6.17	6.95	7.72	8.49	9.26
$N_{Rk,II,c}$ [kN]	1.72	2.14	2.57	3.00	3.43	3.86	4.29	4.72	5.15
Max u [mm] for D <sub>F</sub>	40	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
	60	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
	80	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
	100	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
	120	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3
≥ 140	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7
Pre-drill diameter [mm]	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00

- The values indicated above, depending on the screw depth  $l_{ef}$  shall apply to  $k_{mod} = 0.90 (N_{Rk,II,t}) / 0.50 (N_{Rk,II,c})$  and the timber strength class C24 ( $\rho_k = 350 \text{ kg/m}^3$ ). For other values of  $k_{mod}$  and strength classes see Annex 8.

Solar fastener JA, JT and JZ

JA3-SB-10.0 x  $L_{s1}/L_{s2}$

Annex 20

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**Planning**

- In case the Solar Fasteners should be loaded transverse to the profiled sheeting or sandwich panel (perpendicular to direction of span), the profiled sheeting or sandwich panels should be fastened to the supporting structure at the same height in the adjacent troughs (see figures 5,7,9,11). The fastenings must be designed that they transfer the shear forces from the Solar Fasteners into the supporting structure.
- In case the Solar Fasteners are loaded in longitudinal direction to the profile or sandwich panels remote fasteners between the corresponding sheeting or sandwich panel and the supporting structure may be used for load transfer.
- The edge distance of the Solar Fasteners in the direction of span of the sandwich panels shall be a minimum of 250mm.
- The distance of the Solar Fasteners in the clamping direction between one other should be a minimum of 500mm.
- A fastening in the edge ribs of the laying area is not permitted.
- Existing fastening points and their fasteners may be used and replaced by the Solar Fastener. In this case, the solar fastener may be used to stabilise the structure.

**Design & Installation**

- The structural design of the Solar Fasteners is shown in Figures 4 - 11.
- It must be ensured through the design that no contact corrosion can occur and that no compressive and tensile forces are introduced into the profile or sandwich panels.
- The Solar Fasteners should be installed at right angles to the part surface, to ensure a proper bearing and rain-proof fastening.
- When mounting Solar Fasteners via sandwich panels, it must be ensured that the roof shells are not excessively deformed.
- The Solar Fasteners, including the elements to be fastened, must be stored and mounted in a clean, dry and grease-free condition.
- The use of impact screw drivers is not permitted
- Only companies with the experience required are allowed to make connections via Solar Fasteners, unless the installation staff is instructed by specialists from companies experienced in this field.

Solar fastener JA, JT and JZ

Planning, design & installation

Annex 21