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and types of construction

Bautechnisches Prüfamt

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Assessment)
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European Technical Assessment

ETA-17/0323
of 6 October 2020

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the
European Technical Assessment:

Trade name of the construction product

Product family
to which the construction product belongs

Manufacturer

Manufacturing plant

This European Technical Assessment
contains

This European Technical Assessment is
issued in accordance with Regulation (EU)
No 305/2011, on the basis of

This version replaces

Deutsches Institut für Bautechnik

DAA2, KDHT3, KDHT5, KDHTMU3, KDHTMU5, KDHT1,
KDHTQ6

Fastening screws for sandwich panels

ROSETER INFO TRADE CO., LTD
11F., No.213, Fu-Nong Rd.
Gu-Shan Dist.
KAOHSIUNG CITY 80454
TAIWAN R.O.C

Plant 1
Plant 2
Plant 3
Plant 4
Plant 5

15 pages including 10 annexes which form an integral
part of this assessment

EAD 330047-01-0602

ETA-17/0323 issued on 19 June 2017

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Specific part**1 Technical description of the product**

The products are fastening screws for sandwich panels (self-drilling screws). The fastening screws for sandwich panels are completed with a metallic washer and an EPDM sealing washer. The fastening screws for sandwich panels are made of austenitic stainless steel or a bimetal combination with drill bits made of galvanised/painted carbon steel. The fastening screws for sandwich panels and the corresponding connections are subject to tension and/or shear forces. Samples of fastenings screws for sandwich panels are shown in Figure 1.

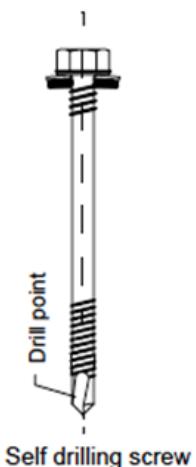


Figure 1: Fastening screws for sandwich panels.

The components and the system setup of the product are given in Annex (1-10).

Table 1 – Types of the fastening screws for sandwich panels

Annex	Fastening Screw
Annex 4	DAA2 x L
Annex 5	KDHT1 x L
Annex 6	KDHT3 x L
Annex 7	KDHT5 x L
Annex 8	KDHTMU3 x L
Annex 9	KDHTMU5 x L
Annex 10	KDHTQ6 x L

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2 Specification of the intended use in accordance with the applicable European Assessment Document 330047-01-0602

The fastening screws for sandwich panels are intended to be used for fastening sandwich panels to metal or timber 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 $\geq C2$ 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 performances given in Section 3 are only valid if the fastening screws for sandwich panels are used in compliance with the specifications and conditions given in Annex (1-10).

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the fastening screws for sandwich panels of at least 25 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, 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**3.1 Mechanical resistance and stability (BWR 1)**

Essential characteristic	Performance
Shear Resistance of the Connection	see Annex 2-3 and 4-10
Tension Resistance of the Connection	see Annex 2-3 and 4-10
Design Resistance in case of combined Tension and Shear Forces (interaction)	see Annex 2 and 4-10
Check of Bending Capacity in case of Thermal Expansion of the outer face of Sandwich Panels	see Annex 2 and 4-10
Durability	see Annexes 4-10

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1

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

In accordance with EAD No. 330047-01-0602, the applicable European legal act is Decision 1998/214/EC, amended by 2001/596/EC.

The system to be applied is: 2+

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

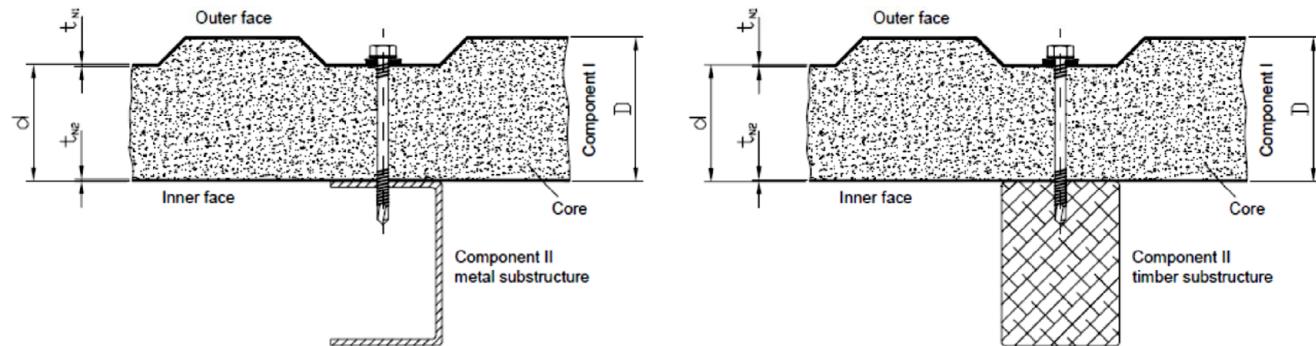
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 6 October 2020 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Head of Department

beglaubigt:
Hahn

Examples of execution of a connection



Terms for materials

Fastener	Fastening screw
Washer	Sealing washer
Component I	Outer face and inner face of the sandwich panel
Component II	Substructure

Terms for dimensions

D or d	Thickness of sandwich panel
t_N1	Thickness of the outer face of sandwich panel
t_N2	Thickness of the inner face of sandwich panel
t_II	Thickness of metal substructure
l_ef	Effective screw-in length in timber substructure (without drill point)
d_dp	Pre-drill diameter of sandwich panel and substructure

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 the sandwich panel
N_{R,I,k}	Characteristic value of tension resistance (pull-through) of the sandwich panel
N_{R,II,k}	Characteristic value of tension resistance (pull-out) of the substructure
u	Maximum allowed displacement of the fastening screw head

Additionally for timber substructure the following terms are used:

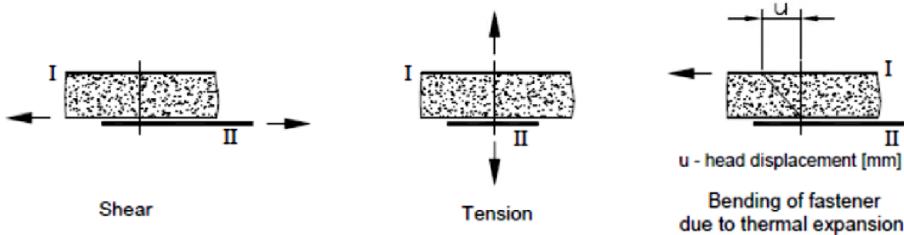
M_{y,Rk}	Characteristic value of yield moment
f_{ax,k}	Characteristic value of withdrawal strength
f_{h,k}	Characteristic value of embedding strength

Used terms in the Annexes

Fastening screws for sandwich panels

Annex 1

Occurred loadings of a connection



Determination of Design Values

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

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

The characteristic values $N_{R,k}$ and $V_{R,k}$ are given in the Annexes. For intermediate dimension of sandwich panel 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 $V_{S,d}$ indicates the design values of applied tension and shear forces.

The design value of bending capacity of the fastening screw in case of thermal expansion of the outer face of sandwich panels corresponds to the maximum allowed displacement of the fastening screw head given in the Annexes.

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 sandwich panel.

The sandwich panel and substructure are in contact to each other. The use of compression resistant thermal insulation strips up to a thickness of 3 mm is allowed.

The thickness (or minimum thickness) of metal substructure needs to be covered by the clamping length of the fastening screw. Otherwise only the screwed-in clamping length of the fastening screw may be considered.

Basics for the design

Fastening screws for sandwich panels

Annex 2

Timber substructures

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

$$N_{R,k} = \min \left\{ \frac{N_{R,I,k}}{F_{ax,Rk} * k_{mod}} \right. \quad V_{R,k} = \min \left\{ \frac{V_{R,I,k}}{F_{v,Rk} * k_{mod}} \right.$$

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 $M_{y,Rk}$ and $f_{h,k}$ given in the corresponding Annex of the fastening screw.

Specific notes to the Annexes

Fastening screws for sandwich panels

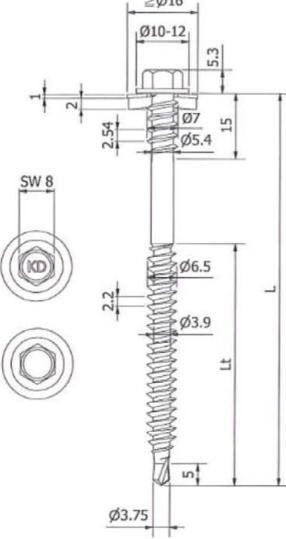
Annex 3

	<u>Materials</u>
	Fastener: Stainless steel 1.4301- EN 10088 Washer: Stainless steel 1.4301- EN 10088 with vulcanized EPDM-seal Component I: S280GD to S350GD - EN 10346 Component II: Timber – EN 14081
	<u>Drilling-capacity</u> $\Sigma(t_i) \leq 2.00 \text{ mm}$
	<u>Characteristics</u>
	$M_{y,Rk} = 14.20 \text{ Nm}$ $f_{ax,k} = 11.80 \text{ N/mm}^2 (l_g = 39 \text{ mm}, p_a = 350 \text{ kg/m}^3)$ $f_{h,0,k} = 24.3 \text{ N/mm}^2 (p_a = 350 \text{ kg/m}^3)$ $f_{h,90,k} = 19.2 \text{ N/mm}^2 (p_a = 350 \text{ kg/m}^3)$

max. head displacement u [mm]	Component II				
	Timber $\geq C24, p_a \geq 350 \text{ kg/m}^3$				
	$l_g \geq 39 \text{ mm}$	$l_g \geq 44 \text{ mm}$	$l_g \geq 54 \text{ mm}$	$l_g \geq 71 \text{ mm}$	$l_g \geq 80 \text{ mm}$
Component I S280 GD to S350 GD - 10346	0,40	0,81	0,81	0,81	0,81
	0,50	1,07 ¹⁾	1,07 ¹⁾	1,07 ¹⁾	1,07 ¹⁾
	0,55	1,25	1,25	1,25	1,25
	0,63	1,53	1,53	1,53	1,53
	0,75	1,96	1,96	1,96	1,96
	0,88	2,08	2,08	2,08	2,08
	1,00	2,19 ¹⁾	2,19 ¹⁾	2,19 ¹⁾	2,19 ¹⁾
	0,40	1,60	1,60	1,60	1,60
	0,50	1,85 ¹⁾	1,85 ¹⁾	1,85 ¹⁾	1,85 ¹⁾
	0,55	2,12	2,12	2,12	2,12
Component II Timber $\geq C24, p_a \geq 350 \text{ kg/m}^3$	0,63	2,53	2,55	2,55	2,55
	0,75	2,53	2,91	3,19	3,19
	0,88	2,53	2,91	3,19	3,19
	1,00	2,53	2,91	3,19	3,19
	$N_{R,k,II}$	2,53	2,91	3,68	4,99
max. head displacement u [mm]	30		3,0		
	40		4,0		
	50		5,0		
	60		6,0		
	80		8,0		
	100		10,0		
	120		12,0		
	≥ 140		14,0		

¹⁾ If component I is made of S320GD to S350GD the values may be increased by 8.3%.

sandwich screw	DAA2 x L	Annex 4
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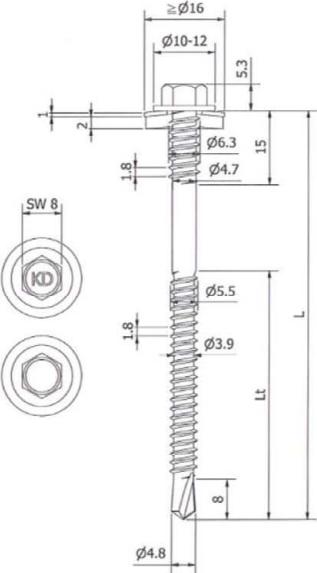
Materials						
Fastener:	Stainless steel 1.4301- EN 10088					
Washer:	Stainless steel 1.4301- EN 10088 with vulcanized EPDM-seal					
Component I:	S280GD to S350GD - EN 10346					
Component II:	S280GD to S350GD - EN 10346 S235 to S355 – EN 10025-2					
<u>Drilling-capacity</u> $\Sigma(t_I + t_{II}) \leq 3.00 \text{ mm}$						
Component II						
S280 GD to S350 GD S235 to S355 $t_{II} [\text{mm}]$						
		1,50	2,00			
Component I S280 GD to S350 GD - 10346 $t_I [\text{mm}]$	0,40	0,90	-			
	0,50	1,72 ¹⁾	-			
	0,55	1,94 ¹⁾	-			
	0,63	2,29 ¹⁾	-			
	0,75	2,81 ¹⁾	-			
	0,88	3,47 ¹⁾	-			
	1,00	4,08 ¹⁾	-			
	0,40	1,81	-			
	0,50	2,28 ¹⁾	-			
	0,55	2,70 ¹⁾	-			
$N_{R,k} [\text{kN}]$	0,63	3,38 ¹⁾	-			
	0,75	4,40 ¹⁾	-			
	0,88	4,40 ¹⁾	-			
	1,00	4,40 ¹⁾	-			
	$N_{R,k,II}$	5,03	-			
	40	6,0	6,0			
	50	7,5	7,5			
	60	9,0	9,0			
	80	12,0	12,0			
	100	15,0	15,0			
$\text{max. head displacement } u [\text{mm}]$	120	18,0	18,0			
	≥ 140	18,0	18,0			

¹⁾ if component I and component II are made of S320GD to S350GD the values may be increased by 8.3%.

sandwich screw

KDHT1 x L

Annex 5



		Materials					
		Fastener: Stainless steel 1.4301- EN 10088					
		Washer: Stainless steel 1.4301- EN 10088 with vulcanized EPDM-seal					
		Component I: S280GD to S350GD - EN 10346					
		Component II: S280GD to S350GD - EN 10346 S235 to S355 – EN 10025-2					
		<u>Drilling-capacity</u> $\Sigma(t_I + t_{II}) \leq 6.50 \text{ mm}$					
		Component II					
		S280 GD to S350 GD – 10346 S235 to S355 – EN 10025-2 $t_{II} [\text{mm}]$					
		1,50	2,00	2,50	3,00	4,00	5,00
Component I S280 GD to S350 GD - 10346 $t_I [\text{mm}]$	0,40	1,01 -	1,01 -	1,01 -	1,01 -	1,01 -	1,01 -
	0,50	1,28 ¹⁾ -	1,28 ¹⁾ -	1,28 ¹⁾ -	1,28 ¹⁾ -	1,28 ¹⁾ -	1,28 ¹⁾ -
	0,55	1,48 -	1,48 -	1,48 -	1,48 -	1,48 -	1,48 -
	0,63	1,79 -	1,79 -	1,79 -	1,79 -	1,79 -	1,79 -
	0,75	2,26 -	2,26 -	2,26 -	2,26 -	2,26 -	2,26 -
	0,88	2,75 -	2,75 -	2,75 -	2,75 -	2,75 -	2,75 -
	1,00	3,21 ¹⁾ -	3,21 ¹⁾ -	3,21 ¹⁾ -	3,21 ¹⁾ -	3,21 ¹⁾ -	3,21 ¹⁾ -
	0,40	1,11 -	1,11 -	1,11 -	1,11 -	1,11 -	1,11 -
	0,50	1,67 ¹⁾ -	1,67 -	1,67 -	1,67 -	1,67 -	1,67 -
	0,55	1,82 -	2,14 -	2,14 -	2,14 -	2,14 -	2,14 -
Component II $N_{R,k} [\text{kN}]$	0,63	1,82 -	2,77 -	2,89 -	2,89 -	2,89 -	2,89 -
	0,75	1,82 -	2,77 -	3,88 -	4,02 -	4,02 -	4,02 -
	0,88	1,82 -	2,77 -	3,88 -	4,02 -	4,02 -	4,02 -
	1,00	1,82 -	2,77 -	3,88 -	4,02 -	4,02 -	4,02 -
	$N_{R,k,II}$	1,82 -	2,77 -	3,88 -	4,98 ¹⁾ -	5,30 ¹⁾ -	5,62 ¹⁾ -
	30	4,0	2,0	2,0	2,0	2,0	2,0
	40	5,3	2,7	2,7	2,7	2,7	2,7
	50	6,7	3,3	3,3	3,3	3,3	3,3
	60	8,0	4,0	4,0	4,0	4,0	4,0
	80	9,3	4,7	4,7	4,7	4,7	4,7
$\text{max. head displacement } u [\text{mm}]$	100	10,7	5,3	5,3	5,3	5,3	5,3
	120	13,3	6,7	6,7	6,7	6,7	6,7
	≥ 140	16,0	8,0	8,0	8,0	8,0	8,0
1) if component I and component II are made of S320GD to S350GD the values may be increased by 8.3%.							
Sandwich screw KDHT3 x L							Annex 6

	<u>Materials</u>
	Fastener: Stainless steel 1.4301- EN 10088 Washer: Stainless steel 1.4301- EN 10088 with vulcanized EPDM-seal Component I: S280GD to S350GD - EN 10346 Component II: S280GD to S350GD - EN 10346 S235 to S355 – EN 10025-2

Drilling-capacity $\Sigma(t_I + t_{II}) \leq 14.00 \text{ mm}$

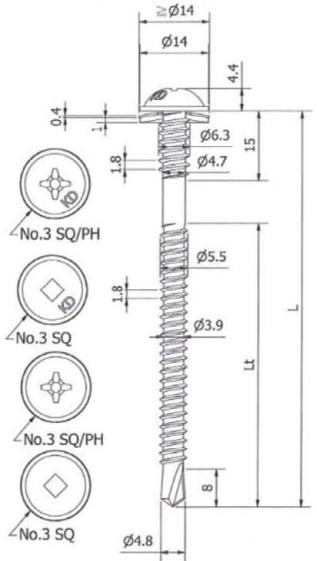
Component I S280 GD to S350 GD - 10346 t I [mm]	Component II						
	S280 GD to S350 GD – 10346 S235 to S355 – EN 10025-2 t II [mm]						
	3,00	4,00	5,00	6,00	8,00	10,00	12,00
0,40	1,02 -	1,02 -	1,02 -	1,02 -	1,02 -	1,02 -	1,02 -
0,50	1,38 ¹⁾ -	1,38 ¹⁾ -	1,38 ¹⁾ -	1,38 ¹⁾ -	1,38 ¹⁾ -	1,38 ¹⁾ -	1,38 ¹⁾ -
0,55	1,69 -	1,69 -	1,69 -	1,69 -	1,69 -	1,69 -	1,69 -
0,63	2,18 -	2,18 -	2,18 -	2,18 -	2,18 -	2,18 -	2,18 -
0,75	2,92 -	2,92 -	2,92 -	2,92 -	2,92 -	2,92 -	2,92 -
0,88	3,37 -	3,37 -	3,37 -	3,37 -	3,37 -	3,37 -	3,37 -
1,00	3,79 ¹⁾ -	3,79 ¹⁾ -	3,79 ¹⁾ -	3,79 ¹⁾ -	3,79 ¹⁾ -	3,79 ¹⁾ -	3,79 ¹⁾ -
0,40	1,52 -	1,52 -	1,52 -	1,52 -	1,52 -	1,52 -	1,52 -
0,50	1,68 ¹⁾ -	1,68 ¹⁾ -	1,68 ¹⁾ -	1,68 ¹⁾ -	1,68 ¹⁾ -	1,68 ¹⁾ -	1,68 ¹⁾ -
0,55	2,04 -	2,04 -	2,04 -	2,04 -	2,04 -	2,04 -	2,04 -
0,63	2,62 -	2,62 -	2,62 -	2,62 -	2,62 -	2,62 -	2,62 -
0,75	3,48 -	3,48 -	3,48 -	3,48 -	3,48 -	3,48 -	3,48 -
0,88	3,48 -	3,48 -	3,48 -	3,48 -	3,48 -	3,48 -	3,48 -
1,00	3,48 -	3,48 -	3,48 -	3,48 -	3,48 -	3,48 -	3,48 -
N _{R,k,II}	4,56 ¹⁾ -	5,88 ¹⁾ -	6,71 ¹⁾ -	7,61 ¹⁾ -	7,61 ¹⁾ -	7,61 ¹⁾ -	7,61 ¹⁾ -
max. head displacement u [mm]	30	2,0	2,0	2,0	2,0	2,0	2,0
	40	2,7	2,7	2,7	2,7	2,7	2,7
	50	3,3	3,3	3,3	3,3	3,3	3,3
	60	4,0	4,0	4,0	4,0	4,0	4,0
	80	4,7	4,7	4,7	4,7	4,7	4,7
	100	5,3	5,3	5,3	5,3	5,3	5,3
	120	6,7	6,7	6,7	6,7	6,7	6,7
	≥ 140	8,0	8,0	8,0	8,0	8,0	8,0

¹⁾ if component I and component II are made of S320GD to S350GD the values may be increased by 8.3%.

sandwich screw

KDHT5 x L

Annex 7



Materials

Fastener: Stainless steel 1.4567- EN 10088
 Washer: Stainless steel 1.4301- EN 10088 with vulcanized EPDM-seal
 Component I: S280GD to S350GD - EN 10346
 Component II: S280GD to S350GD - EN 10346
 S235 to S355 – EN 10025-2

Drilling-capacity $\Sigma(t_I + t_{II}) \leq 6.50 \text{ mm}$

		Component II					
		S280 GD to S350 GD – 10346 S235 to S355 – EN 10025-2 $t_{II} [\text{mm}]$					
		1,50	2,00	2,50	3,00	4,00	5,00
Component I S280 GD to S350 GD - 10346 $t_I [\text{mm}]$	0,40	1,01 -	1,01 -	1,01 -	1,01 -	1,01 -	1,01 -
	0,50	1,28 ¹⁾ -	1,28 ¹⁾ -	1,28 ¹⁾ -	1,28 ¹⁾ -	1,28 ¹⁾ -	1,28 ¹⁾ -
	0,55	1,48 -	1,48 -	1,48 -	1,48 -	1,48 -	1,48 -
	0,63	1,79 -	1,79 -	1,79 -	1,79 -	1,79 -	1,79 -
	0,75	2,26 -	2,26 -	2,26 -	2,26 -	2,26 -	2,26 -
	0,88	2,75 -	2,75 -	2,75 -	2,75 -	2,75 -	2,75 -
	1,00	3,21 ¹⁾ -	3,21 ¹⁾ -	3,21 ¹⁾ -	3,21 ¹⁾ -	3,21 ¹⁾ -	3,21 ¹⁾ -
	0,40	0,96 -	0,96 -	0,96 -	0,96 -	0,96 -	0,96 -
	0,50	1,27 ¹⁾ -	1,27 ¹⁾ -	1,27 ¹⁾ -	1,27 ¹⁾ -	1,27 ¹⁾ -	1,27 ¹⁾ -
	0,55	1,58 -	1,58 -	1,58 -	1,58 -	1,58 -	1,58 -
$N_{R,k} [\text{kN}]$	0,63	1,82 -	2,08 -	2,08 -	2,08 -	2,08 -	2,08 -
	0,75	1,82 -	2,77 -	2,83 -	2,83 -	2,83 -	2,83 -
	0,88	1,82 -	2,77 -	2,83 -	2,83 -	2,83 -	2,83 -
	1,00	1,82 -	2,77 -	2,83 -	2,83 -	2,83 -	2,83 -
	$N_{R,k,II}$	1,82 -	2,77 ¹⁾ -	3,88 ¹⁾ -	4,98 ¹⁾ -	5,30 ¹⁾ -	5,62 ¹⁾ -
	30	4,0	2,0	2,0	2,0	2,0	2,0
	40	5,3	2,7	2,7	2,7	2,7	2,7
	50	6,7	3,3	3,3	3,3	3,3	3,3
max. head displacement $u [\text{mm}]$	60	8,0	4,0	4,0	4,0	4,0	4,0
	80	9,3	4,7	4,7	4,7	4,7	4,7
	100	10,7	5,3	5,3	5,3	5,3	5,3
	120	13,3	6,7	6,7	6,7	6,7	6,7
		≥ 140	16,0	8,0	8,0	8,0	8,0

¹⁾ if component I and component II are made of S320GD to S350GD the values may be increased by 8.3%.

sandwich screw

KDHTMU3 x L

Annex 8

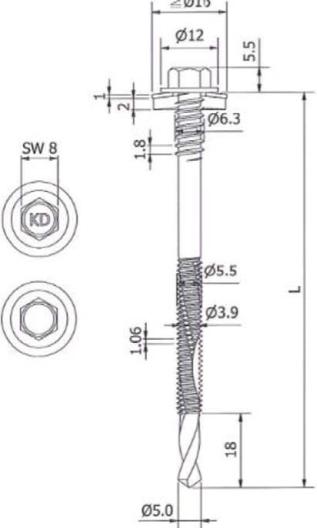
<p>The diagram illustrates a sandwich screw assembly. It consists of a threaded shank with a shoulder diameter of Ø5.5 mm and a lead diameter of Ø3.9 mm. The total length is L. At the top, there is a fastener with a head diameter of ≥Ø14 mm and a thickness of 4.4 mm. Below it is a washer with a diameter of Ø6.3 mm and a thickness of 0.4 mm. The shank has a shoulder diameter of Ø4.7 mm and a thickness of 1.5 mm. Four washers are shown below the main assembly: No.3 SQ/PH, No.3 SQ, No.3 SQ/PH, and No.3 SQ.</p>	<u>Materials</u>
	<p>Fastener: Stainless steel 1.4567- EN 10088</p> <p>Washer: Stainless steel 1.4301- EN 10088 with vulcanized EPDM-seal</p> <p>Component I: S280GD to S350GD - EN 10346</p> <p>Component II: S280GD to S350GD - EN 10346 S235 to S355 – EN 10025-2</p>

Drilling-capacity $\Sigma(t_I + t_{II}) \leq 14.00 \text{ mm}$

Component I S280 GD to S350 GD - 10346 $t_I [\text{mm}]$	Component II							
	S280 GD to S350 GD – 10346 S235 to S355 – EN 10025-2 $t_{II} [\text{mm}]$							
	3,00	4,00	5,00	6,00	8,00	10,00	12,00	
0,40	1,02	-	1,02	-	1,02	-	1,02	-
0,50	1,38 ¹⁾	-	1,38 ¹⁾	-	1,38 ¹⁾	-	1,38 ¹⁾	-
0,55	1,69	-	1,69	-	1,69	-	1,69	-
0,63	2,18	-	2,18	-	2,18	-	2,18	-
0,75	2,92	-	2,92	-	2,92	-	2,92	-
0,88	3,37	-	3,37	-	3,37	-	3,37	-
1,00	3,79 ¹⁾	-	3,79 ¹⁾	-	3,79 ¹⁾	-	3,79 ¹⁾	-
0,40	1,01	-	1,01	-	1,01	-	1,01	-
0,50	1,20 ¹⁾	-	1,20 ¹⁾	-	1,20 ¹⁾	-	1,20 ¹⁾	-
0,55	1,49	-	1,49	-	1,49	-	1,49	-
0,63	1,96	-	1,96	-	1,96	-	1,96	-
0,75	2,66	-	2,66	-	2,66	-	2,66	-
0,88	2,66	-	2,66	-	2,66	-	2,66	-
1,00	2,66	-	2,66	-	2,66	-	2,66	-
$N_{R,k,II}$	4,56 ¹⁾	-	5,88 ¹⁾	-	6,71 ¹⁾	-	7,61 ¹⁾	-
max. head displacement u [mm]	30	2,0	2,0	2,0	2,0	2,0	2,0	
	40	2,7	2,7	2,7	2,7	2,7	2,7	
	50	3,3	3,3	3,3	3,3	3,3	3,3	
	60	4,0	4,0	4,0	4,0	4,0	4,0	
	80	4,7	4,7	4,7	4,7	4,7	4,7	
	100	5,3	5,3	5,3	5,3	5,3	5,3	
	120	6,7	6,7	6,7	6,7	6,7	6,7	
	≥ 140	8,0	8,0	8,0	8,0	8,0	8,0	

¹⁾ if component I and component II are made of S320GD to S350GD the values may be increased by 8.3%.

sandwich screw	KDHTMU5 x L	Annex 9
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	<u>Materials</u>														
	Fastener:	Stainless steel 1.4301 or 1.4567- EN 10088													
	Washer:	Stainless steel 1.4301- EN 10088 with vulcanized EPDM-seal													
	Component I:	S280GD to S350GD - EN 10346													
	Component II:	S280GD to S350GD - EN 10346 S235 to S355 – EN 10025-2													
	<u>Drilling-capacity</u> $\Sigma(t_I + t_{II}) \leq 16.00 \text{ mm}$														
Component I S280 GD to S350 GD - 10346 t I [mm]	Component II														
	S280 GD to S350 GD – 10346 S235 to S355 – EN 10025-2 $t_{II} [\text{mm}]$														
	3,00	4,00	5,00	6,00	8,00	10,00	12,00	15,00							
	0,40	0,72	0,72	0,72	0,72	0,72	0,72	0,72							
	0,50	1,14	1,14	1,14	1,14	1,14	1,14	1,14							
	0,55	1,30	1,30	1,30	1,30	1,30	1,30	1,30							
	0,63	1,55	1,55	1,55	1,55	1,55	1,55	1,55							
	0,75	1,94	1,94	1,94	1,94	1,94	1,94	1,94							
	0,88	2,70	2,70	2,70	2,70	2,70	2,70	2,70							
	1,00	3,40	3,40	3,40	3,40	3,40	3,40	3,40							
N_{R,k} [kN] max. head displacement u [mm]	0,40	1,71	1,71	1,71	1,71	1,71	1,71	1,71							
	0,50	2,30 ¹⁾	2,30 ¹⁾	2,30 ¹⁾	2,30 ¹⁾	2,30 ¹⁾	2,30 ¹⁾	2,30 ¹⁾							
	0,55	2,91 ¹⁾	2,91 ¹⁾	2,91 ¹⁾	2,91 ¹⁾	2,91 ¹⁾	2,91 ¹⁾	2,91 ¹⁾							
	0,63	3,13	3,13	3,13	3,13	3,13	3,13	3,13							
	0,75	3,77 ¹⁾	3,89	3,89	3,89	3,89	3,89	3,89							
	0,88	3,77 ¹⁾	4,11	4,11	4,11	4,11	4,11	4,11							
	1,00	3,77 ¹⁾	4,31	4,31	4,31	4,31	4,31	4,31							
	N_{R,k,II}	3,77 ¹⁾	4,73 ¹⁾	5,68 ¹⁾	6,09 ¹⁾	6,89 ¹⁾	7,97 ¹⁾	7,97 ¹⁾							
	40	6,0	6,0	5,0	5,0	5,0	5,0	5,0							
	50	7,5	7,5	6,0	6,0	6,0	6,0	6,0							
max. head displacement u [mm]	60	9,0	9,0	7,5	7,5	7,5	7,5	7,5							
	80	12,0	12,0	10,0	10,0	10,0	10,0	10,0							
	100	15,0	15,0	12,5	12,5	12,5	12,5	12,5							
	120	18,0	18,0	15,0	15,0	15,0	15,0	15,0							
	≥ 140	21,0	21,0	17,5	17,5	17,5	17,5	17,5							
¹⁾ if component I and component II are made of S320GD to S350GD the values may be increased by 8.3%.															
sandwich screw							Annex 10								
KDHTQ6 x L															