

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-17/0323
of 19 June 2017

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the
European Technical Assessment:

Deutsches Institut für Bautechnik

Trade name of the construction product

DAA2, KDHT3, KDHT5, KDHTMU3, KDHTMU5, KDHT1

Product family
to which the construction product belongs

Fastening screws for sandwich panels

Manufacturer

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

Manufacturing plant

Plant 1
Plant 2
Plant 3
Plant 4
Plant 5

This European Technical Assessment
contains

14 pages including 9 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

European Assessment Document (EAD)
330047-01-0602, "Fastening screws for sandwich panels"

European Technical Assessment

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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.

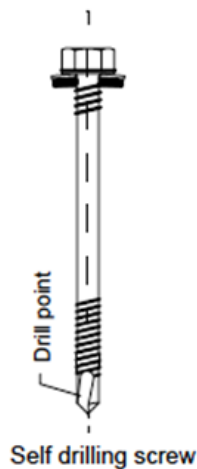


Figure 1: Fastening screws for sandwich panels.

The components and the system setup of the product are given in Annex (1-9).

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

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 (1-9).

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 4-9
Tension Resistance of the Connection	see Annex 2-3 and 4-9
Design Resistance in case of combined Tension and Shear Forces (interaction)	see Annex 2 and 4-9
Check of Bending Capacity in case of Thermal Expansion of the outer face of Sandwich Panels	see Annex 2 and 4-9
Durability	No performance assessed

3.2 Safety in case of fire (BWR 2)

Essential characteristic	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 (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

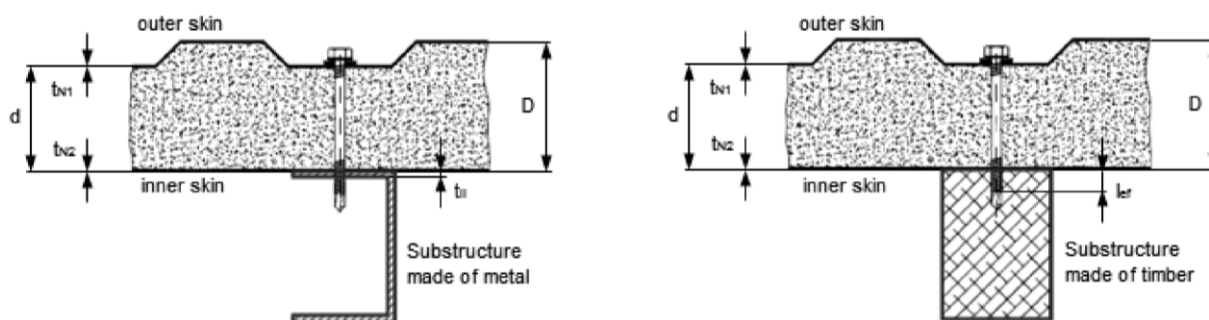
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 19 June 2017 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Head of Department

beglaubigt:
Schult

Examples of execution of a connection



Materials and dimensions

Design relevant materials and dimensions are indicated in the Annexes of the fastening screws:

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

D, d	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

The thickness t_{II} corresponds to the load-bearing screw-in length of the fastening screw in component II, if the load-bearing screw-in length does not cover the entire component thickness.

Performance characteristics

The design relevant performance characteristics of a connection are indicated in the Annexes of the fastening screws:

$N_{R,k}$	Characteristic value of tension resistance
$V_{R,k}$	Characteristic value of shear resistance
u	Maximum allowed head displacement of the fastening screw

In some cases component-specific performance characteristics are indicated for an individual calculation of the design relevant performance characteristics of a connection:

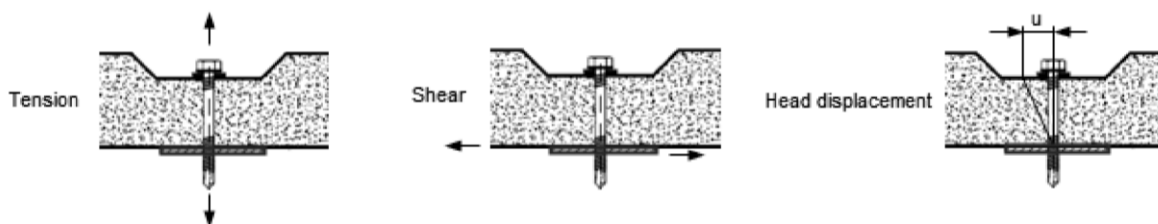
$N_{R,I,k}$	Characteristic value of pull-through resistance for the outer skin of component I
$N_{R,II,k}$	Characteristic value of pull-out resistance for component II
$V_{R,I,k}$	Characteristic value of hole bearing resistance for the inner skin of component I
$V_{R,II,k}$	Characteristic value of hole bearing resistance for component II
$M_{y,Rk}$	Characteristic value of yield moment of the fastening screw (for component II made of timber)
$f_{ax,k}$	Characteristic value of withdrawal strength for component II made of timber
$f_{h,k}$	Characteristic value of embedding strength for component II made of timber

Terms and explanations

Fastening screws for sandwich panels

Annex 1

Occurred loadings of a connection



Design values

The design values of tension and shear resistance of a connection have to be determined as follows:

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

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

$N_{R,d}$ Design value of tension resistance

$V_{R,d}$ Design value of shear resistance

γ_M Partial safety factor

The recommended partial safety factor γ_M is 1.33, provided no partial safety factor is given in national regulations or national Annexes to Eurocode 3.

Special conditions

If the component thickness t_{N1} , t_{N2} or t_{II} lies in between two indicated component thicknesses, the characteristic value may be calculated by linear interpolation.

For asymmetric components II made of metal (e.g. Z- or C-shaped profiles) with component thickness $t_{II} < 5$ mm, the characteristic value $N_{R,k}$ has to be reduced to 70%.

In case of combined loading by tension and shear forces the following interaction equation has to be taken into account:

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

$N_{S,d}$ Design value of the applied tension forces

$V_{S,d}$ Design value of the applied 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 manufacturer's instruction.

The load-bearing screw-in length of the fastening screw specified by the manufacturer has to be taken into account.

The fastening screws have to be processed with suitable drill driver (e.g. cordless drill driver with depth stop). The use of impact wrench is not allowed.

The fastening screws have to be fixed rectangular to the surface of the component.

Component I and component II have to be in direct contact to each other. The use of compression resistant thermal insulation strips up to a thickness of 3 mm is allowed.

Design and installation

Fastening screws for sandwich panels

Annex 2

Component II made of timber

The characteristic values of tension and shear resistance for other k_{mod} or ρ_k as indicated in the Annex of the fastening screw can be determined as follows:

$$N_{R,k} = \min \left\{ \begin{array}{l} N_{R,I,k} \\ N_{R,II,k} * k_{mod} \end{array} \right. \quad V_{R,k} = \min \left\{ \begin{array}{l} V_{R,I,k} \\ V_{R,II,k} * k_{mod} \end{array} \right.$$

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

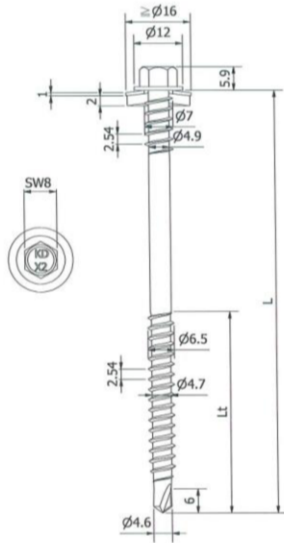
$N_{R,II,k}$ is determined according to EN 1995-1-1:2004 + A1:2008, equation (8.40a), with $f_{ax,k}$ given in the Annex of the fastening screw.

$V_{R,II,k}$ is determined according to EN 1995-1-1:2004 + A1:2008, equation (8.9), with $M_{y,Rk}$ and $f_{h,k}$ given in the Annex of the fastening screw.

Additional provisions

Fastening screws for sandwich panels

Annex 3



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: Timber – EN 14081

Drilling-capacity $\Sigma(t_i) \leq 2.00$ mm

Characteristics

$M_{y,Rk}$ = 14.20 Nm

$f_{ax,k}$ = 11.80 N/mm² ($l_g = 39$ mm, $\rho_a = 350$ kg/m³)

$f_{h,0,k}$ = 24.3 N/mm² ($\rho_a = 350$ kg/m³)

$f_{h,90,k}$ = 19.2 N/mm² ($\rho_a = 350$ kg/m³)

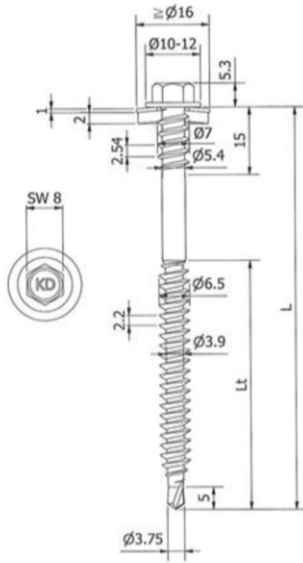
		Component II	
		Timber ≥ C24 $L_g \geq 29$ mm	
Component I S280 GD to S350 GD - 10346	$V_{R,k}$ [kN]	0,40	0,81
		0,50	1,07 ¹⁾
		0,55	1,25
		0,63	1,53
		0,75	1,96
		0,88	2,08
		1,00	2,19 ¹⁾
	$N_{R,k,I}$ [kN]	0,40	1,60
		0,50	1,85 ¹⁾
		0,55	2,12
		0,63	2,55
		0,75	3,19
		0,88	3,19
		1,00	3,19
	$N_{R,k,II}$	-	-
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



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

Drilling-capacity $\Sigma(t_I + t_{II}) \leq 3.00 \text{ mm}$

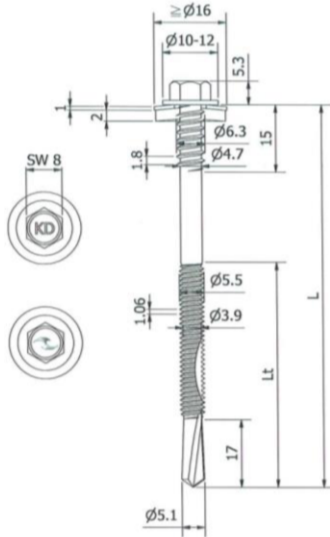
		Component II	
		S280 GD to S350 GD S235 to S355 t II [mm]	
		1,50	2,00
Component I S280 GD to S350 GD - 10346 t I [mm]	V _{R,k} [kN]	0,40	0,90 - 0,90 -
		0,50	1,72 ¹⁾ - 1,72 ¹⁾ -
		0,55	1,94 ¹⁾ - 1,94 ¹⁾ -
		0,63	2,29 ¹⁾ - 2,29 ¹⁾ -
		0,75	2,81 ¹⁾ - 2,81 ¹⁾ -
		0,88	3,47 ¹⁾ - 3,47 ¹⁾ -
		1,00	4,08 ¹⁾ - 4,08 ¹⁾ -
	N _{R,k} [kN]	0,40	1,81 - 1,81 -
		0,50	2,28 ¹⁾ - 2,28 ¹⁾ -
		0,55	2,70 ¹⁾ - 2,70 ¹⁾ -
		0,63	3,38 ¹⁾ - 3,38 ¹⁾ -
		0,75	4,40 ¹⁾ - 4,40 ¹⁾ -
		0,88	4,40 ¹⁾ - 4,40 ¹⁾ -
		1,00	4,40 ¹⁾ - 4,40 ¹⁾ -
	N _{R,k,II}	5,03	5,03 -
max. head displacement u [mm]	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
	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

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

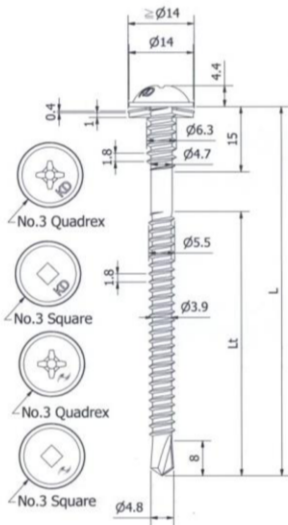
		Component II						
		S280 GD to S350 GD – 10346 S235 to S355 – EN 10025-2 t II [mm]						
		3,00	4,00	5,00	6,00	8,00	10,00	12,00
Component I S280 GD to S350 GD - 10346 t I [mm]	V _{R,k} [kN]	0,40	1,02 -	1,02 -	1,02 -	1,02 -	1,02 -	1,02 -
		0,50	1,38 ¹⁾ -	1,38 ¹⁾ -	1,38 ¹⁾ -	1,38 ¹⁾ -	1,38 ¹⁾ -	1,38 ¹⁾ -
		0,55	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 -
		0,75	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 -
		1,00	3,79 ¹⁾ -	3,79 ¹⁾ -	3,79 ¹⁾ -	3,79 ¹⁾ -	3,79 ¹⁾ -	3,79 ¹⁾ -
	N _{R,k} [kN]	0,40	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⁾ -
		0,55	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 -
		0,75	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 -
		1,00	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⁾ -
max. head displacement u [mm]	30	2,0	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	2,7
	50	3,3	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	4,0
	80	4,7	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	5,3
	120	6,7	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	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 $\Sigma(t_I + t_{II}) \leq 6.50 \text{ mm}$

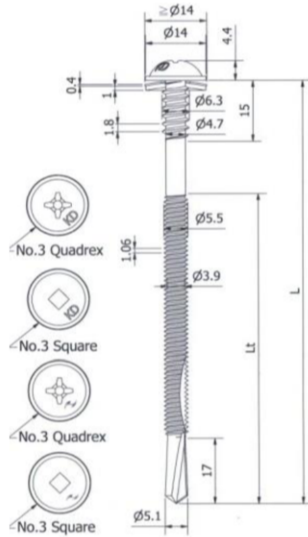
		Component II						
		S280 GD to S350 GD – 10346 S235 to S355 – EN 10025-2 t II [mm]						
		1,50	2,00	2,50	3,00	4,00	5,00	
Component I S280 GD to S350 GD - 10346 t I [mm]	V _{R,k} [kN]	0,40	1,01 -	1,01 -	1,01 -	1,01 -	1,01 -	1,01 -
		0,50	1,28 ¹⁾ -	1,28 ¹⁾ -	1,28 ¹⁾ -	1,28 ¹⁾ -	1,28 ¹⁾ -	1,28 ¹⁾ -
		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⁾ -
	N _{R,k} [kN]	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 -
		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⁾ -
	max. head displacement u [mm]	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
		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

KDHTMU3 x L

Annex 8



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

		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	
Component I S280 GD to S350 GD - 10346 t I [mm]	V _{R,k} [kN]	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⁾ -
	N _{R,k} [kN]	0,40	1,01 -	1,01 -	1,01 -	1,01 -	1,01 -	1,01 -	1,01 -
		0,50	1,20 ¹⁾ -	1,20 ¹⁾ -	1,20 ¹⁾ -	1,20 ¹⁾ -	1,20 ¹⁾ -	1,20 ¹⁾ -	1,20 ¹⁾ -
		0,55	1,49 -	1,49 -	1,49 -	1,49 -	1,49 -	1,49 -	1,49 -
		0,63	1,96 -	1,96 -	1,96 -	1,96 -	1,96 -	1,96 -	1,96 -
		0,75	2,66 -	2,66 -	2,66 -	2,66 -	2,66 -	2,66 -	2,66 -
		0,88	2,66 -	2,66 -	2,66 -	2,66 -	2,66 -	2,66 -	2,66 -
		1,00	2,66 -	2,66 -	2,66 -	2,66 -	2,66 -	2,66 -	2,66 -
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	2,0	
	40	2,7	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	3,3	
	60	4,0	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	4,7	
	100	5,3	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	6,7	
	≥ 140	8,0	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