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European Technical Assessment

**ETA-21/0784
of 29/09/2022**

General part

Technical Assessment Body issuing the European Technical Assessment

Instytut Techniki Budowlanej

Trade name of the construction product

SDC5, SDC14, DDC5, DDC12, MDW

Product family to which the construction product belongs

Fastening screws for sandwich panels

Manufacturer

SFS Group Schweiz AG
Rosenbergsaustasse 10
9435 Heerbrugg
Switzerland

Manufacturing plant(s)

Factories of SFS Group Schweiz AG

This European Technical Assessment contains

23 pages including 19 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"

This version replaces

ETA-21/0784 issued on 30/09/2021

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Specific part

1. Technical description of the product

The fastening screws, listed in Table 1, are self-drilling or self-tapping screws made of carbon steel with anticorrosion coating, with sealing washers made of steel and EPDM seal. For details see the Annexes.

The fastening screws and the corresponding connections are subject to tension and shear forces.

Table 1

No.	Screw	Description ¹⁾	Application	Annex
1	SDC5-T16-6,3xL SDC5-S16-6,3xL	Self-drilling screw with sealing washer $\geq \varnothing$ 16 mm	Steel	3 and 4
			Timber	5
2	SDC5-T19-6,3xL SDC5-S19-6,3xL	Self-drilling screw with sealing washer $\geq \varnothing$ 19 mm	Steel	6 and 7
			Timber	8
3	SDC5-S29-6,3xL	Self-drilling screw with sealing washer $\geq \varnothing$ 29 mm	Steel	9 and 10
			Timber	11
4	SDC14-T16-5,5xL SDC14-S16-5,5xL	Self-drilling screw with sealing washer $\geq \varnothing$ 16 mm	Steel	12
5	SDC14-T19-5,5xL SDC14-S19-5,5xL	Self-drilling screw with sealing washer $\geq \varnothing$ 19 mm	Steel	13
6	SDC14-S29-5,5xL	Self-drilling screw with sealing washer $\geq \varnothing$ 29 mm	Steel	14
7	DDC5-T19-5,5xL	Self-drilling screw with sealing washer $\geq \varnothing$ 19 mm	Steel	15
			Timber	16
8	DDC12-T19-5,5xL	Self-drilling screw with sealing washer $\geq \varnothing$ 19 mm	Steel	17
9	MDW-T19-6,3xL	Self-tapping screw with sealing washer $\geq \varnothing$ 19 mm	Steel	18
			Timber	19

¹⁾ for materials see Annexes 3 to 19

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

The fastening screws are intended to be used for fastening of sandwich panels (component I) to steel or timber substructures (component II). For details see the Annexes. 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 C1 applications, according to EN ISO 12944-2.

Furthermore the intended use comprises connections with predominantly static loads (e.g. wind loads, dead loads). The fastening screws are not intended for re-use.

An exemplary execution of a connection is given in Annex 1.

The provisions made in this European Technical Assessment are based on an assumed working life of the fastening screws of 25 years. The indications given on the working life cannot be interpreted as a guarantee given by the manufacturer or Technical Assessment Body, 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. Performances of the product and references to the methods used for their assessment

3.1. Performance of the product

3.1.1. Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Shear resistance of the connection	see Annexes to this ETA
Tension resistance of the connection	see Annexes to this ETA
Design resistance in case of combined tension and shear forces (interaction)	see Annexes to this ETA
Check of bending capacity in case of thermal expansion of the outer face of sandwich panels	see Annexes to this ETA
Durability	No performance assessed

3.1.2. Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1

3.2. Methods used for the assessment

The assessment has been made in accordance with EAD 330047-01-0602.

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

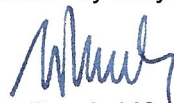
According to Decision 1998/214/EC, amended by 2001/596/EC, of the European Commission the system 2+ of AVCP applies (see Annex V to regulation (EU) No 305/2011).

5. Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document (EAD)

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at the Instytut Techniki Budowlanej.

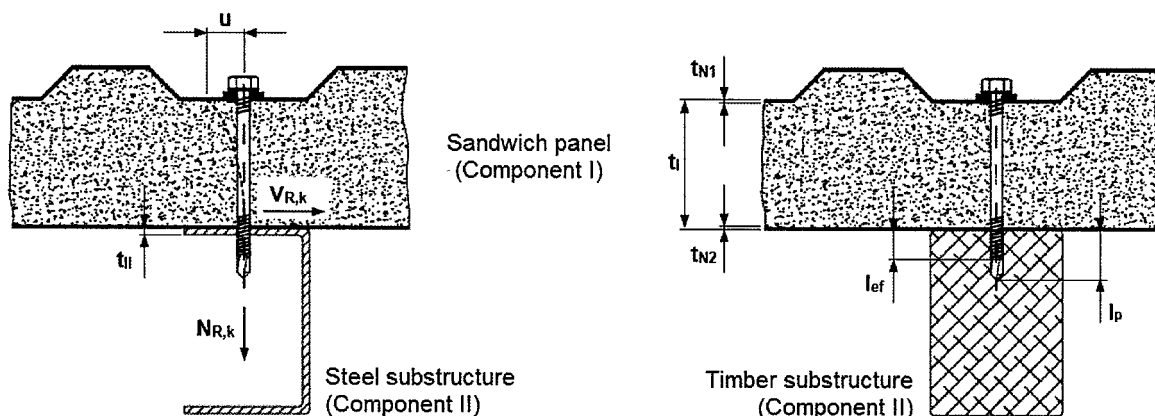
For type testing the results of the tests performed as part of the assessment for the European Technical Assessment shall be used unless there are changes in the production line or plant. In such cases the necessary type testing has to be agreed between Instytut Techniki Budowlanej and the notified body.

Issued in Warsaw on 29/09/2022 by Instytut Techniki Budowlanej



Anna Panek, MSc
Deputy Director of ITB

Examples of connections with fastening screws



Description of the components

- Component I Sandwich panel with outer and inner skin made of steel
- Component II Substructure made of steel or timber

Dimensions of the components

- t_i Thickness of sandwich panel
- t_{N1} Thickness of sandwich panel outer skin
- t_{N2} Thickness of the inner skin of component I
- t_{ii} Thickness of component II made of steel
- l_{ef} Effective screw-in length in timber substructure (without drill point or without thread point)
- l_p Screw-in length in timber substructure (including drill point or including thread point)
- d_{dp} Pre-drill diameter for component I and II

Performance characteristics

- $N_{R,k}$ Characteristic value of tension resistance of the connection
- $V_{R,k}$ Characteristic value of shear resistance of the connection
- u Bending capacity of the fastening screw (maximum displacement of the upper end of the screw)
- $N_{R,I,k}$ Characteristic value of pull-through resistance through the sandwich panel (component I)
- $N_{R,II,k}$ Characteristic value of pull-out resistance out of the substructure (component II)
- $M_{y,Rk}$ Characteristic value of yield moment of the fastening screw (timber structure)
- $f_{ax,k}$ Characteristic value of withdrawal strength (timber structure)

Fastening screws for sandwich panels	Annex 1 of European Technical Assessment ETA-21/0784
Basics	

Assessment basics

The characteristic value of tension resistance of a connection ($N_{R,k}$) corresponds to the maximum load of the fastening screw concerning tension stress and the minimum value between pull-through resistance through the sandwich panel outer skin ($N_{R,I,k}$) and pull-out resistance out of the substructure ($N_{R,II,k}$). A reduction factor 2/3 has been applied at pull-through resistance ($N_{R,I,k}$) to take into account the influence of repeated wind loads.

The characteristic value of shear resistance of a connection ($V_{R,k}$) corresponds to the maximum shear load of the fastening screw in connection between sandwich panel inner skin and substructure.

The characteristic values ($N_{R,k}$, $N_{R,I,k}$, $N_{R,II,k}$, $V_{R,k}$) have been statistically evaluated to 5% fractile values and determined for minimum thickness (t_{N1} , t_{N2} , t_I) and minimum tensile strength of steel material resp. screw-in length (l_{ef} , l_p) and characteristic density of timber material. In case of failure of the fastening screw, the minimum tension or shear load capacity of the fastening screw has been taken into account.

Use of performance characteristics

The characteristic values of tension and shear resistance of a connection ($N_{R,k}$, $V_{R,k}$) are intended to be used for the design of a connection. The characteristic values have to be divided by a partial safety factor (γ_M). Recommended is $\gamma_M = 1.33$ unless otherwise stated in national regulations.

In case of a timber substructure, a modification factor (k_{mod}) according to EN 1995-1-1 table 3.1 has to be applied at pull-out resistance ($N_{R,II,k}$). According to EAD 330047-01-0602 a modification factor 1.0 is recommended unless otherwise stated in national regulations. According to manufacturer instruction a modification factor 0.9 is recommended.

In case of combined tension and shear load of a connection the condition according to EN 1993-1-3 equation 8.2 has to be fulfilled.

Reduction of the pull-through resistance ($N_{R,I,k}$) due to the position of the fastener shall be taken into account according to EN 1993-1-3, section 8.3 (7) and Figure 8.2 or EN 1999-1-4, Table 8.3.

Thermal expansions of the outer skin of sandwich panels may not exceed the declared maximal displacements of upper end of the fastening screws (u).

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

Fastening screws for sandwich panels	Annex 2 of European Technical Assessment ETA-21/0784
Basics	

Materials

Fastener: Carbon steel with anticorrosion coating (Durocoat® 480)

Washer: Carbon steel with anticorrosion coating (galvanized) or stainless steel A2 and with EPDM seal

Component I: S280GD to S450GD - EN 10346

Component II: S235 to S355 - EN 10025
S280GD to S450GD - EN 10346

Drilling capacity: $\Sigma(t_{N1} + t_{N2} + t_{II}) \leq 6.00$ mm

		t_{II} [mm]							$N_{R,I,k}$ [kN]		
		1.00	1.25	1.50	2.00	2.50	3.00	4.00	Pull-through		
$V_{R,k}$ [kN]	0.40	0.85									
	0.45	1.17									
	0.50	1.49									
	0.55	1.55									
	t_{N2} [mm]	0.60	1.62								
		0.63	1.65								
		0.70	1.91								
		≥ 0.75	2.09								
$N_{R,k}$ [kN]	0.40	1.28							1.28	1.92 ¹	
	0.45	1.31	1.65						1.65	2.47 ¹	
	0.50	1.31	1.68	2.02				2.02	3.02 ¹		
	0.55	1.31	1.68	2.17	2.37			2.37	3.56 ¹		
	t_{N1} [mm]	0.60	1.31	1.68	2.17	2.73			2.73	4.10 ¹	
		0.63	1.31	1.68	2.17	2.95			2.95	4.42 ¹	
		0.70	1.31	1.68	2.17	3.16			3.16	4.75 ¹	
		≥ 0.75	1.31	1.68	2.17	3.32			3.32	4.98 ¹	
$N_{R,II,k}$ [kN]	Pull-out	1.31	1.68	2.17	3.51	4.58	5.65	8.69			
u [mm]	40	2.4									
	60	3.6									
	80	4.8									
t_i [mm]	80	4.8									
	≥ 100	6.0									

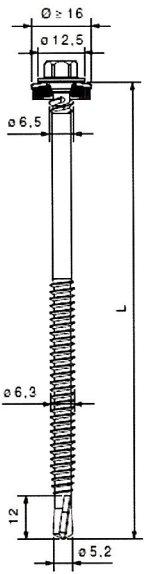
$N_{R,I,k}$ may be increased by 8.3% for component I made of steel S320GD and by 16.6% for component I made of steel S350GD to S450GD.

$N_{R,II,k}$ may be increased by 8.3% for component II made of steel S320GD and by 16.6% for component II made of steel S350GD to S450GD, S275 and S355.

$V_{R,k}$ may be increased by 8.3% for component I made of S320GD and by 16.6% for component I made of steel S350GD to S450GD.

Index 1: Without reduction factor 2/3 for repeated wind loads.

Fastening screws for sandwich panels	Annex 3 of European Technical Assessment ETA-21/0784
Self-drilling screws SDC5-T16-6,3xL, SDC5-S16-6,3xL with sealing washer $\geq \phi 16$ mm	

	Materials Fastener: Carbon steel with anticorrosion coating (Durocoat® 480) Washer: Carbon steel with anticorrosion coating (galvanized) or stainless steel A2 and with EPDM seal Component I: S280GD to S450GD - EN 10346 Component II: S235 to S355 - EN 10025 S280GD to S450GD - EN 10346	
	Drilling capacity: $\Sigma(t_{N1} + t_{N2} + t_{II}) \leq 6.00 \text{ mm}$	

		t _{II} [mm]						
		2 x 0.75	2 x 0.88	2 x 1.00	2 x 1.25	2 x 1.50	2 x 2.00	
V _{R,k} [kN]	0.40	0.85						
	0.45	1.17						
	0.50	1.49						
	0.55	1.55						
	t _{N2} [mm]	0.60	1.62					
		0.63	1.65					
		0.70	1.91					
		≥ 0.75	2.09					
N _{R,k} [kN]	0.40	1.28						
	0.45	1.65						
	0.50	1.86	2.02					
	0.55	1.86	2.09	2.30	2.37			
	t _{N1} [mm]	0.60	1.86	2.09	2.30	2.73		
		0.63	1.86	2.09	2.30	2.94	2.95	
		0.70	1.86	2.09	2.30	2.94	3.16	
		≥ 0.75	1.86	2.09	2.30	2.94	3.32	
N _{R,II,k} [kN]	Pull-out	1.86	2.09	2.30	2.94	3.54	5.47	
u [mm]	40	2.4						
	60	3.6						
	80	4.8						
	≥ 100	6.0						

N_{R,I,k} [kN]
Pull-through

1.28	1.92 ¹
1.65	2.47 ¹
2.02	3.02 ¹
2.37	3.56 ¹
2.73	4.10 ¹
2.95	4.42 ¹
3.16	4.75 ¹
3.32	4.98 ¹

N_{R,I,k} may be increased by 8.3% for component I made of steel S320GD and by 16.6% for component I made of steel S350GD to S450GD.

N_{R,II,k} may be increased by 8.3% for component II made of S320GD and by 16.6% for component II made of steel S350GD to S450GD, S275 and S355.

V_{R,k} may be increased by 8.3% for component I made of S320GD and by 16.6% for component I made of steel S350GD to S450GD.

Index 1: Without reduction factor 2/3 for repeated wind loads.

Fastening screws for sandwich panels	Annex 4 of European Technical Assessment ETA-21/0784
Self-drilling screws SDC5-T16-6,3xL, SDC5-S16-6,3xL with sealing washer ≥ Ø 16 mm	

	Materials Fastener: Carbon steel with anticorrosion coating (Durocoat® 480) Washer: Carbon steel with anticorrosion coating (galvanized) or stainless steel A2 and with EPDM seal Component I: S280GD to S450GD - EN 10346 Component II: Coniferous timber \geq C24 - EN 14081
	Drilling capacity: $\Sigma(t_{N1} + t_{N2}) \leq 2.00$ mm Timber structure: $M_{y,Rk} = 12.68$ Nm $f_{ax,k} = 8.36$ N/mm ² for $l_{ef} \geq 25$ mm, $\rho_a = 350$ kg/m ³

		l_{ef} [mm]						$N_{R,I,k}$ [kN] Pull-through	
		25	30	35	45	55	65		
$V_{R,k}$ [kN]	0.40	0.81							
	0.45	0.99							
	0.50	1.17							
	0.55	1.26							
	0.60	1.35							
	0.63	1.40							
	0.70	1.53							
	≥ 0.75	1.62							
t_{N2} [mm]	0.40	1.28							
	0.45	1.32	1.58	1.65				1.28	1.92 ¹
	0.50	1.32	1.58	1.84	2.02			1.65	2.47 ¹
	0.55	1.32	1.58	1.84	2.37			2.02	3.02 ¹
	0.60	1.32	1.58	1.84	2.37	2.73		2.37	3.56 ¹
	0.63	1.32	1.58	1.84	2.37	2.90	2.95	2.73	4.10 ¹
	0.70	1.32	1.58	1.84	2.37	2.90	3.16	2.95	4.42 ¹
	≥ 0.75	1.32	1.58	1.84	2.37	2.90	3.32	3.16	4.75 ¹
$N_{R,II,k}$ [kN]	Pull-out	1.32	1.58	1.84	2.37	2.90	3.42	3.32	4.98 ¹
u [mm]	40	2.4							
	60	3.6							
	80	4.8							
t_i [mm]	≥ 100	6.0							

$N_{R,I,k}$ may be increased by 8.3% for component I made of steel S320GD and by 16.6% for component I made of steel S350GD to S450GD.

$V_{R,k}$ may be increased by 8.3% for component I made of steel S320GD and by 16.6% for component I made of steel S350GD to S450GD.

Index ¹: Without reduction factor 2/3 for repeated wind loads.

Fastening screws for sandwich panels	Annex 5 of European Technical Assessment ETA-21/0784
Self-drilling screws SDC5-T16-6,3xL, SDC5-S16-6,3xL with sealing washer $\geq \varnothing 16$ mm	

	Materials Fastener: Carbon steel with anticorrosion coating (Durocoat® 480) Washer: Carbon steel with anticorrosion coating (galvanized) or stainless steel A2 and with EPDM seal Component I: S280GD to S450GD - EN 10346 Component II: S235 to S355 - EN 10025 S280GD to S450GD - EN 10346
	Drilling capacity: $\Sigma(t_{N1} + t_{N2} + t_{II}) \leq 6.00 \text{ mm}$

		t_{II} [mm]						
		1.00	1.25	1.50	2.00	2.50	3.00	4.00
$V_{R,k}$ [kN]	0.40	0.85						
	0.45	1.17						
	0.50	1.49						
	0.55	1.55						
	t_{N2} [mm]	1.62						
	0.63	1.65						
	0.70	1.91						
	≥ 0.75	2.09						
$N_{R,k}$ [kN]	0.40	1.31	1.50					
	0.45	1.31	1.68	1.92				
	0.50	1.31	1.68	2.17	2.34			
	0.55	1.31	1.68	2.17	2.65			
	t_{N1} [mm]	1.31	1.68	2.17	2.96			
	0.63	1.31	1.68	2.17	3.15			
	0.70	1.31	1.68	2.17	3.51	3.66		
	≥ 0.75	1.31	1.68	2.17	3.51	4.02		
$N_{R,II,k}$ [kN]	Pull-out	1.31	1.68	2.17	3.51	4.58	5.65	8.69
u [mm]	40	2.4						
	60	3.6						
	80	4.8						
	t_I [mm]	≥ 100 6.0						

$N_{R,I,k}$ [kN]
Pull-through

1.50	2.26 ¹
1.92	2.88 ¹
2.34	3.51 ¹
2.65	3.98 ¹
2.96	4.44 ¹
3.15	4.72 ¹
3.66	5.49 ¹
4.02	6.03 ¹

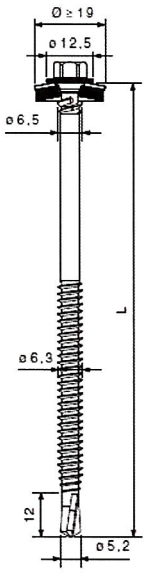
$N_{R,I,k}$ may be increased by 8.3% for component I made of steel S320GD and by 16.6% for component I made of steel S350GD to S450GD.

$N_{R,II,k}$ may be increased by 8.3% for component II made of S320GD and by 16.6% for component II made of steel S350GD to S450GD, S275 and S355.

$V_{R,k}$ may be increased by 8.3% for component I made of S320GD and by 16.6% for component I made of steel S350GD to S450GD.

Index ¹: Without reduction factor 2/3 for repeated wind loads.

Fastening screws for sandwich panels	Annex 6 of European Technical Assessment ETA-21/0784
Self-drilling screws SDC5-T19-6,3xL, SDC5-S19-6,3xL with sealing washer $\geq \text{Ø } 19 \text{ mm}$	



Materials

Fastener: Carbon steel with anticorrosion coating (Durocoat® 480)

Washer: Carbon steel with anticorrosion coating (galvanized) or stainless steel A2 and with EPDM seal

Component I: S280GD to S450GD - EN 10346

Component II: S235 to S355 - EN 10025
S280GD to S450GD - EN 10346

Drilling capacity: $\Sigma(t_{N1} + t_{N2} + t_{II}) \leq 6.00 \text{ mm}$

		t _{II} [mm]						
		2 x 0.75	2 x 0.88	2 x 1.00	2 x 1.25	2 x 1.50	2 x 2.00	
V_{R,k} [kN]	0.40	0.85						
	0.45	1.17						
	0.50	1.49						
	0.55	1.55						
	t _{N2} [mm]	1.62						
	0.63	1.65						
	0.70	1.91						
	≥ 0.75	2.09						
N_{R,k} [kN]	0.40	1.50						
	0.45	1.86	1.92					
	0.50	1.86	2.09	2.30	2.34			
	0.55	1.86	2.09	2.30	2.65			
	t _{N1} [mm]	0.60	1.86	2.09	2.30	2.94	2.96	
	0.63	1.86	2.09	2.30	2.94	3.15		
	0.70	1.86	2.09	2.30	2.94	3.54	3.66	
	≥ 0.75	1.86	2.09	2.30	2.94	3.54	4.02	
N_{R,II,k} [kN] Pull-out	1.86	2.09	2.30	2.94	3.54	5.47		
u [mm]	40	2.4						
	60	3.6						
	80	4.8						
	t _I [mm]	≥ 100						

N_{R,I,k} [kN]
Pull-through

1.50	2.26 ¹
1.92	2.88 ¹
2.34	3.51 ¹
2.65	3.98 ¹
2.96	4.44 ¹
3.15	4.72 ¹
3.66	5.49 ¹
4.02	6.03 ¹

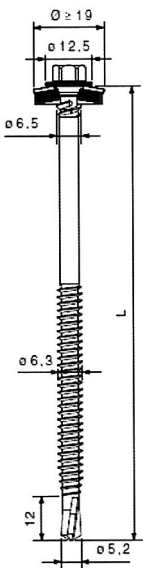
N_{R,I,k} may be increased by 8.3% for component I made of steel S320GD and by 16.6% for component I made of steel S350GD to S450GD.

N_{R,II,k} may be increased by 8.3% for component II made of steel S320GD and by 16.6% for component II made of steel S350GD to S450GD, S275 and S355.

V_{R,k} may be increased by 8.3% for component I made of steel S320GD and by 16.6% for component I made of steel S350GD to S450GD.

Index ¹: Without reduction factor 2/3 for repeated wind loads.

Fastening screws for sandwich panels	Annex 7 of European Technical Assessment ETA-21/0784
Self-drilling screws SDC5-T19-6,3xL, SDC-S19-6,3xL with sealing washer ≥ Ø 19 mm	

	<p>Materials</p> <p>Fastener: Carbon steel with anticorrosion coating (Durocoat® 480)</p> <p>Washer: Carbon steel with anticorrosion coating (galvanized) or stainless steel A2 and with EPDM seal</p> <p>Component I: S280GD to S450GD - EN 10346</p> <p>Component II: Coniferous timber ≥ C24 - EN 14081</p>
	<p>Drilling capacity: $\Sigma(t_{N1} + t_{N2}) \leq 2.00$ mm</p> <p>Timber structure: $M_{y,Rk} = 12.68$ Nm $f_{ax,k} = 8.36$ N/mm² for $l_{ef} \geq 25$ mm, $\rho_a = 350$ kg/m³</p>

		l_{ef} [mm]					
		25	30	35	45	55	65
$V_{R,k}$ [kN]	0.40	0.81					
	0.45	0.99					
	0.50	1.17					
	0.55	1.26					
	0.60	1.35					
	0.63	1.40					
	0.70	1.53					
	≥ 0.75	1.62					
$N_{R,k}$ [kN]	0.40	1.32	1.50				
	0.45	1.32	1.58	1.84	1.92		
	0.50	1.32	1.58	1.84	2.34		
	0.55	1.32	1.58	1.84	2.37	2.65	
	0.60	1.32	1.58	1.84	2.37	2.90	2.96
	0.63	1.32	1.58	1.84	2.37	2.90	3.15
	0.70	1.32	1.58	1.84	2.37	2.90	3.42
	≥ 0.75	1.32	1.58	1.84	2.37	2.90	3.42
$N_{R,II,k}$ [kN]	Pull-out	1.32	1.58	1.84	2.37	2.90	3.42
u [mm]	40	2.4					
	60	3.6					
	80	4.8					
	≥ 100	6.0					

$N_{R,I,k}$ [kN]
Pull-through

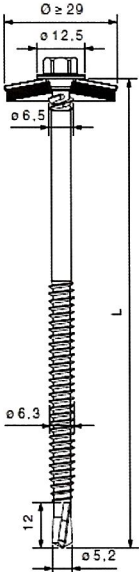
1.50	2.26 ¹
1.92	2.88 ¹
2.34	3.51 ¹
2.65	3.98 ¹
2.96	4.44 ¹
3.15	4.72 ¹
3.66	5.49 ¹
4.02	6.03 ¹

$N_{R,I,k}$ may be increased by 8.3% for component I made of steel S320GD and by 16.6% for component I made of steel S350GD to S450GD.

$V_{R,k}$ may be increased by 8.3% for component I made of steel S320GD and by 16.6% for component I made of steel S350GD to S450GD.

Index 1: Without reduction factor 2/3 for repeated wind loads.

Fastening screws for sandwich panels	Annex 8 of European Technical Assessment ETA-21/0784
Self-drilling screws SDC5-T19-6,3xL, SDC5-S19-6,3xL with sealing washer ≥ Ø 19 mm	



Materials

Fastener: Carbon steel with anticorrosion coating (Durocoat® 480)

Washer: Stainless steel A2 with EPDM seal

Component I: S280GD to S450GD - EN 10346

Component II: S235 to S355 - EN 10025
S280GD to S450GD - EN 10346

Drilling capacity: $\Sigma(t_{N1} + t_{N2} + t_i) \leq 6.00$ mm

		t_i [mm]							
		1.00	1.25	1.50	2.00	2.50	3.00	4.00	
$V_{R,k}$ [kN]	0.40	0.85							
	0.45	1.17							
	0.50	1.49							
	0.55	1.55							
	t_{N2} [mm]	0.60	1.62						
		0.63	1.65						
		0.70	1.91						
		≥ 0.75	2.09						
$N_{R,k}$ [kN]	0.40	1.31	1.68	2.17	3.51	3.79			
	0.45	1.31	1.68	2.17	3.51	4.29			
	0.50	1.31	1.68	2.17	3.51	4.58	4.80		
	0.55	1.31	1.68	2.17	3.51	4.58	4.95		
	t_{N1} [mm]	0.60	1.31	1.68	2.17	3.51	4.58	5.11	
		0.63	1.31	1.68	2.17	3.51	4.58	5.21	
		0.70	1.31	1.68	2.17	3.51	4.58	5.65	6.21
		≥ 0.75	1.31	1.68	2.17	3.51	4.58	5.65	6.93
$N_{R,II,k}$ [kN]	Pull-out	1.31	1.68	2.17	3.51	4.58	5.65	8.69	
u [mm]	40	2.4							
	60	3.6							
t_i [mm]	80	4.8							
	≥ 100	6.0							

$N_{R,I,k}$ [kN]	
Pull-through	
3.79	5.69 ¹
4.29	6.44 ¹
4.80	7.19 ¹
4.95	7.43 ¹
5.11	7.67 ¹
5.21	7.81 ¹
6.21	9.32 ¹
6.93	10.39 ¹

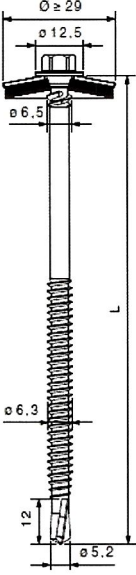
$N_{R,I,k}$ may be increased by 8.3% for component I made of steel S320GD and by 16.6% for component I made of steel S350GD to S450GD.

$N_{R,II,k}$ may be increased by 8.3% for component II made of S320GD and by 16.6% for component II made of steel S350GD to S450GD, S275 and S355.

$V_{R,k}$ may be increased by 8.3% for component I made of S320GD and by 16.6% for component I made of steel S350GD to S450GD.

Index 1: Without reduction factor 2/3 for repeated wind loads.

Fastening screws for sandwich panels	Annex 9 of European Technical Assessment ETA-21/0784
Self-drilling screw SDC5-S29-6,3xL with sealing washer $\geq \phi 29$ mm	

	Materials Fastener: Carbon steel with anticorrosion coating (Durocoat® 480) Washer: Stainless steel A2 with EPDM seal Component I: S280GD to S450GD - EN 10346 Component II: S235 to S355 - EN 10025 S280GD to S450GD - EN 10346
	Drilling capacity: $\Sigma(t_{N1} + t_{N2} + t_{II}) \leq 6.00 \text{ mm}$

		t_{II} [mm]						
		2 x 0.75	2 x 0.88	2 x 1.00	2 x 1.25	2 x 1.50	2 x 2.00	
$V_{R,k}$ [kN]	0.40	0.85						
	0.45	1.17						
	0.50	1.49						
	0.55	1.55						
	t_{N2} [mm]	0.60	1.62					
		0.63	1.65					
		0.70	1.91					
		≥ 0.75	2.09					
$N_{R,k}$ [kN]	0.40	1.86	2.09	2.30	2.94	3.54	3.79	
	0.45	1.86	2.09	2.30	2.94	3.54	4.29	
	0.50	1.86	2.09	2.30	2.94	3.54	4.80	
	0.55	1.86	2.09	2.30	2.94	3.54	4.95	
	t_{N1} [mm]	0.60	1.86	2.09	2.30	2.94	3.54	5.11
		0.63	1.86	2.09	2.30	2.94	3.54	5.21
		0.70	1.86	2.09	2.30	2.94	3.54	5.47
		≥ 0.75	1.86	2.09	2.30	2.94	3.54	5.47
$N_{R,II,k}$ [kN]	Pull-out	1.86	2.09	2.30	2.94	3.54	5.47	
u [mm]	40	2.4						
	60	3.6						
t_i [mm]	80	4.8						
	≥ 100	6.0						

$N_{R,I,k}$ [kN]
Pull-through

3.79	5.69 ¹
4.29	6.44 ¹
4.80	7.19 ¹
4.95	7.43 ¹
5.11	7.67 ¹
5.21	7.81 ¹
6.21	9.32 ¹
6.93	10.39 ¹

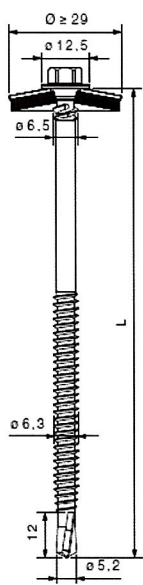
$N_{R,I,k}$ may be increased by 8.3% for component I made of steel S320GD and by 16.6% for component I made of steel S350GD to S450GD.

$N_{R,II,k}$ may be increased by 8.3% for component II made of steel S320GD and by 16.6% for component II made of steel S350GD to S450GD, S275 and S355.

$V_{R,k}$ may be increased by 8.3% for component I made of steel S320GD and by 16.6% for component I made of steel S350GD to S450GD.

Index 1: Without reduction factor 2/3 for repeated wind loads.

Fastening screws for sandwich panels	Annex 10 of European Technical Assessment ETA-21/0784
Self-drilling screw SDC5-S29-6,3xL with sealing washer $\geq \text{Ø } 29 \text{ mm}$	



Materials

Fastener: Carbon steel with anticorrosion coating (Durocoat® 480)

Washer: Stainless steel A2 with EPDM seal

Component I: S280GD to S450GD - EN 10346

Component II: Coniferous timber ≥ C24 - EN 14081

Drilling capacity $\Sigma(t_{N1} + t_{N2}) \leq 2.00 \text{ mm}$

Timber structure:
 $M_{y,Rk} = 12.68 \text{ Nm}$
 $f_{ax,k} = 8.36 \text{ N/mm}^2$ for $l_{ef} \geq 25 \text{ mm}$, $\rho_a = 350 \text{ kg/m}^3$

		$l_{ef} \text{ [mm]}$					
		25	30	35	45	55	65
$V_{R,k} \text{ [kN]}$	0.40	0.81					
	0.45	0.99					
	0.50	1.17					
	0.55	1.26					
	0.60	1.35					
	0.63	1.40					
	0.70	1.53					
	≥ 0.75	1.62					
$N_{R,k} \text{ [kN]}$	0.40	1.32	1.58	1.84	2.37	2.90	3.42
	0.45	1.32	1.58	1.84	2.37	2.90	3.42
	0.50	1.32	1.58	1.84	2.37	2.90	3.42
	0.55	1.32	1.58	1.84	2.37	2.90	3.42
	0.60	1.32	1.58	1.84	2.37	2.90	3.42
	0.63	1.32	1.58	1.84	2.37	2.90	3.42
	0.70	1.32	1.58	1.84	2.37	2.90	3.42
	≥ 0.75	1.32	1.58	1.84	2.37	2.90	3.42
$N_{R,II,k} \text{ [kN]}$	Pull-out	1.32	1.58	1.84	2.37	2.90	3.42
$u \text{ [mm]}$	40	2.4					
	60	3.6					
	80	4.8					
	≥ 100	6.0					

$N_{R,I,k} \text{ [kN]}$
Pull-through

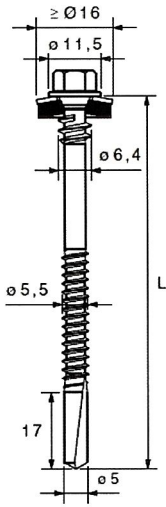
3.79	5.69 ¹
4.29	6.44 ¹
4.80	7.19 ¹
4.95	7.43 ¹
5.11	7.67 ¹
5.21	7.81 ¹
6.21	9.32 ¹
6.93	10.39 ¹

$N_{R,I,k}$ may be increased by 8.3% for component I made of steel S320GD and by 16.6% for component I made of steel S350GD to S450GD.

$V_{R,k}$ may be increased by 8.3% for component I made of steel S320GD and by 16.6% for component I made of steel S350GD to S450GD.

Index ¹: Without reduction factor 2/3 for repeated wind loads.

Fastening screws for sandwich panels	Annex 11 of European Technical Assessment ETA-21/0784
Self-drilling screw SDC5-S29-6,3xL with sealing washer ≥ Ø 29 mm	

	Materials Fastener: Carbon steel with anticorrosion coating (Durocoat® 480) Washer: Carbon steel with anticorrosion coating (galvanized) or stainless steel A2 and with EPDM seal Component I: S280GD to S450GD - EN 10346 Component II: S235 to S355 - EN 10025 S280GD to S450GD - EN 10346	
	Drilling capacity: $\Sigma(t_{N1} + t_{N2} + t_{II}) \leq 14.00$ mm	

		t_{II} [mm]							$N_{R,I,k}$ [kN]		
		3.00	4.00	5.00	6.00	8.00	10.00	12.00	Pull-through		
$V_{R,k}$ [kN]	0.40	0.88									
	0.45	1.15									
	0.50	1.42									
	0.55	1.53									
	t_{N2} [mm]	0.60	1.63								
		0.63	1.70								
		0.70	1.98								
		≥ 0.75	2.17								
$N_{R,k}$ [kN]	0.40	1.14							1.14	1.71 ¹	
	0.45	1.51							1.51	2.27 ¹	
	0.50	1.88							1.88	2.83 ¹	
	0.55	2.08							2.08	3.13 ¹	
	t_{N1} [mm]	0.60	2.28							2.28	3.43 ¹
		0.63	2.40							2.40	3.61 ¹
		0.70	2.84							2.84	4.26 ¹
		≥ 0.75	3.15							3.15	4.73 ¹
$N_{R,II,k}$ [kN]	Pull-out	4.82	7.67	8.40	9.12	9.12	9.12	9.12			
u [mm]	40	2.4									
	60	3.6									
	80	4.8									
t_I [mm]	80	4.8									
	≥ 100	6.0									

$N_{R,I,k}$ may be increased by 8.3% for component I made of steel S320GD and by 16.6% for component I made of steel S350GD to S450GD.

$N_{R,II,k}$ may be increased by 8.3% for component II made of steel S320GD and by 16.6% for component II made of steel S350GD, S275 and S355.

$V_{R,k}$ may be increased by 8.3% for component I made of steel S320GD and by 16.6% for component I made of steel S350GD to S450GD.

Index ¹: Without reduction factor 2/3 for repeated wind loads.

Fastening screws for sandwich panels	Annex 12 of European Technical Assessment ETA-21/0784
Self-drilling screws SDC14-T16-5,5xL, SDC14-S16-5,5xL with sealing washer $\geq \text{Ø} 16$ mm	

Materials

Fastener: Carbon steel with anticorrosion coating (Durocoat® 480)

Washer: Carbon steel with anticorrosion coating (galvanised) or stainless steel A2 and with EPDM seal

Component I: S280GD to S450GD - EN 10346

Component II: S235 to S355 - EN 10025
S280GD to S450GD - EN 10346

Drilling capacity: $\Sigma(t_{N1} + t_{N2} + t_{II}) \leq 14.00$ mm

		t_{II} [mm]							$N_{R,I,k}$ [kN]		
		3.00	4.00	5.00	6.00	8.00	10.00	12.00	Pull-through		
$V_{R,k}$ [kN]	0.40	0.88									
	0.45	1.15									
	0.50	1.42									
	0.55	1.53									
	t_{N2} [mm]	0.60	1.63								
		0.63	1.70								
		0.70	1.98								
		≥ 0.75	2.17								
$N_{R,k}$ [kN]	0.40	1.26							1.26	1.90 ¹	
	0.45	1.77							1.77	2.65 ¹	
	0.50	2.27							2.27	3.40 ¹	
	0.55	2.45							2.45	3.68 ¹	
	t_{N1} [mm]	0.60	2.64							2.64	3.96 ¹
		0.63	2.75							2.75	4.13 ¹
		0.70	3.46							3.46	5.19 ¹
		≥ 0.75	3.96							3.96	5.94 ¹
$N_{R,II,k}$ [kN]	Pull-out	4.82	7.67	8.40	9.12	9.12	9.12	9.12			
u [mm]	40	2.4									
	60	3.6									
t_i [mm]	80	4.8									
	≥ 100	6.0									

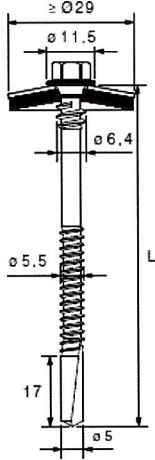
$N_{R,I,k}$ may be increased by 8.3% for component I made of steel S320GD and by 16.6% for component I made of steel S350GD to S450GD.

$N_{R,II,k}$ may be increased by 8.3% for component II made of steel S320GD and by 16.6% for component II made of steel S350GD to S450GD, S275 and S355.

$V_{R,k}$ may be increased by 8.3% for component I made of steel S320GD and by 16.6% for component I made of steel S350GD to S450GD.

Index ¹: Without reduction factor 2/3 for repeated wind loads.

Fastening screws for sandwich panels	Annex 13 of European Technical Assessment ETA-21/0784
Self-drilling screws SDC14-T19-5,5xL, SDC14-S19-5,5xL with sealing washer $\geq \varnothing 19$ mm	

	Materials Fastener: Carbon steel with anticorrosion coating (Durocoat® 480) Washer: Stainless steel A2 with EPDM seal Component I: S280GD to S450GD - EN 10346 Component II: S235 to S355 - EN 10025 S280GD to S450GD - EN 10346
	Drilling capacity: $\Sigma(t_{N1} + t_{N2} + t_{II}) \leq 14.00 \text{ mm}$

		$t_{II} \text{ [mm]}$							$N_{R,I,k} \text{ [kN]}$ Pull-through		
		3.00	4.00	5.00	6.00	8.00	10.00	12.00			
$V_{R,k} \text{ [kN]}$	0.40	0.88									
	0.45	1.15									
	0.50	1.42									
	0.55	1.53									
	$t_{N2} \text{ [mm]}$	0.60	1.63								
		0.63	1.70								
		0.70	1.98								
		≥ 0.75	2.17								
$N_{R,k} \text{ [kN]}$	0.40	3.79							3.79	5.69 ¹	
	0.45	4.29							4.29	6.44 ¹	
	0.50	4.80							4.80	7.19 ¹	
	0.55	4.82	4.95					4.95	7.43 ¹		
	$t_{N1} \text{ [mm]}$	0.60	4.82	5.11					5.11	7.67 ¹	
		0.63	4.82	5.21					5.21	7.81 ¹	
		0.70	4.82	6.21					6.21	9.32 ¹	
		≥ 0.75	4.82	6.93					6.93	10.39 ¹	
$N_{R,II,k} \text{ [kN]}$	Pull-out	4.82	7.67	8.40	9.12	9.12	9.12	9.12			
$u \text{ [mm]}$	40	2.4									
	60	3.6									
	80	4.8									
$t_i \text{ [mm]}$	≥ 100	6.0									

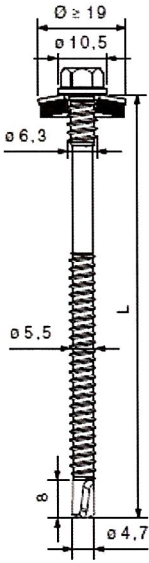
$N_{R,I,k}$ may be increased by 8.3% for component I made of steel S320GD and by 16.6% for component I made of steel S350GD to S450GD

$N_{R,II,k}$ may be increased by 8.3% for component II made of steel S320GD and by 16.6% for component II made of steel S350GD to S450GD, S275 and S355.

$V_{R,k}$ may be increased by 8.3% for component I made of steel S320GD and by 16.6% for component I made of steel S350GD to S450GD

Index ¹: Without reduction factor 2/3 for repeated wind loads.

Fastening screws for sandwich panels	Annex 14 of European Technical Assessment ETA-21/0784
Self-drilling screw SDC14-S29-5,5xL with sealing washer $\geq \text{Ø} 29 \text{ mm}$	



Materials

Fastener: Carbon steel with anticorrosion coating (galvanized)

Washer: Carbon steel with anticorrosion coating (galvanized) and with EPDM seal

Component I: S280GD to S350GD - EN 10346

Component II: S235 to S275 - EN 10025
S280GD to S350GD - EN 10346

Drilling capacity: $\Sigma(t_{N1} + t_{N2} + t_{II}) \leq 6.00$ mm

		t_{II} [mm]							
		1.25	1.50	1.75	2.00	2.50	3.00	4.00	
$V_{R,k}$ [kN]	0.40	0.88							
	0.45	1.15							
	0.50	1.42							
	0.55	1.53							
	t_{N2} [mm]	0.60	1.63						
		0.63	1.70						
		0.70	1.98						
		≥ 0.75	2.17						
$N_{R,k}$ [kN]	0.40	1.26							
	0.45	1.50	1.77						
	0.50	1.50	1.77	2.27					
	0.55	1.50	1.77	2.33	2.45				
	t_{N1} [mm]	0.60	1.50	1.77	2.33	2.64			
		0.63	1.50	1.77	2.33	2.75			
		0.70	1.50	1.77	2.33	2.90	3.46		
		≥ 0.75	1.50	1.77	2.33	2.90	3.96		
$N_{R,II,k}$ [kN]	Pull-out	1.50	1.77	2.33	2.90	4.05	5.20	7.48	
u [mm]	40	2.4							
	60	3.6							
	80	4.8							
t_i [mm]	≥ 100	6.0							

$N_{R,I,k}$ [kN]
Pull-through

1.26	1.90 ¹
1.77	2.65 ¹
2.27	3.40 ¹
2.45	3.68 ¹
2.64	3.96 ¹
2.75	4.13 ¹
3.46	5.19 ¹
3.96	5.94 ¹

$N_{R,I,k}$ may be increased by 8.3% for component I made of steel S320GD and by 16.6% for component I made of steel S350GD.

$N_{R,II,k}$ may be increased by 8.3% for component II made of steel S320GD and by 16.6% for component II made of steel S350GD and S275.

$V_{R,k}$ may be increased by 8.3% for component I made of steel S320GD and by 16.6% for component I made of steel 350GD.

Index ¹: Without reduction factor 2/3 for repeated wind loads.

Fastening screws for sandwich panels	Annex 15 of European Technical Assessment ETA-21/0784
Self-drilling screw DDC5-T19-5,5xL with sealing washer $\geq \varnothing 19$ mm	

Materials

Fastener: Carbon steel with anticorrosion coating (galvanized)

Washer: Carbon steel with anticorrosion coating (galvanized) and with EPDM seal

Component I: S280GD to S350GD - EN 10346

Component II: Coniferous timber \geq C24 - EN 14081

Drilling capacity: $\Sigma(t_{N1} + t_{N2}) \leq 2.00$ mm

Timber structure:
 $M_{y,Rk} = 13.38$ Nm
 $f_{ax,k} = 6.13$ N/mm² for $l_{ef} \geq 25$ mm, $\rho_a = 350$ kg/m³

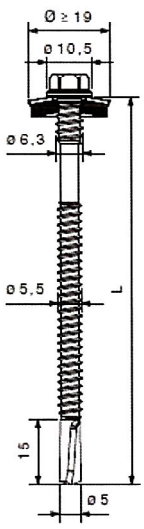
		l_{ef} [mm]						$N_{R,I,k}$ [kN] Pull-through		
		25	30	35	40	45	50			
$V_{R,k}$ [kN]	0.40	0.33								
	0.45	0.37								
	0.50	0.41								
	0.55	0.52								
	t_{N2} [mm]	0.60								
	0.63	0.70								
	0.70	0.85								
	≥ 0.75	0.95								
$N_{R,k}$ [kN]	0.40	0.84	1.01	1.18	1.26			1.26	1.90 ¹	
	0.45	0.84	1.01	1.18	1.35	1.52	1.69	1.77	2.65 ¹	
	0.50	0.84	1.01	1.18	1.35	1.52	1.69	2.27	3.40 ¹	
	0.55	0.84	1.01	1.18	1.35	1.52	1.69	2.45	3.68 ¹	
	t_{N1} [mm]	0.60	0.84	1.01	1.18	1.35	1.52	1.69	2.64	3.96 ¹
	0.63	0.84	1.01	1.18	1.35	1.52	1.69	2.75	4.13 ¹	
	0.70	0.84	1.01	1.18	1.35	1.52	1.69	3.46	5.19 ¹	
	≥ 0.75	0.84	1.01	1.18	1.35	1.52	1.69	3.96	5.94 ¹	
$N_{R,II,k}$ [kN]	Pull-out	0.84	1.01	1.18	1.35	1.52	1.69			
u [mm]	40	2.4								
	60	3.6								
	t_i [mm]	80								
	≥ 100	6.0								

$N_{R,I,k}$ may be increased by 8.3% for component I made of steel S320GD and by 16.6% for component I made of steel S350GD.

$V_{R,k}$ may be increased by 8.3% for component I made of steel S320GD and by 16.6% for component I made of steel S350GD.

Index 1: Without reduction factor 2/3 for repeated wind loads.

Fastening screws for sandwich panels	Annex 16 of European Technical Assessment ETA-21/0784
Self-drilling screw DDC5-T19-5,5xL with sealing washer $\geq \varnothing 19$ mm	

	Materials Fastener: Carbon steel with anticorrosion coating (galvanized) Washer: Carbon steel with anticorrosion coating (galvanized) and with EPDM seal Component I: S280GD to S350GD - EN 10346 Component II: S235 to S275 - EN 10025 S280GD to S350GD - EN 10346
	Drilling-capacity: $\Sigma(t_{N1} + t_{N2} + t_{II}) \leq 12.00$ mm

		t_{II} [mm]						$N_{R,I,k}$ [kN] Pull-through		
		3.00	4.00	5.00	6.00	8.00	10.00			
$V_{R,k}$ [kN]	0.40	0.88								
	0.45	1.15								
	0.50	1.42								
	0.55	1.53								
	t_{N2} [mm]	0.60	1.63							
		0.63	1.70							
		0.70	1.98							
		≥ 0.75	2.17							
$N_{R,k}$ [kN]	0.40	1.26						1.26	1.90 ¹	
	0.45	1.77						1.77	2.65 ¹	
	0.50	2.27						2.27	3.40 ¹	
	0.55	2.45						2.45	3.68 ¹	
	t_{N1} [mm]	0.60	2.64						2.64	3.96 ¹
		0.63	2.75						2.75	4.13 ¹
		0.70	3.46						3.46	5.19 ¹
		≥ 0.75	3.96						3.96	5.94 ¹
$N_{R,II,k}$ [kN]	Pull-out	4.82	7.67	8.40	9.12	9.12	9.12			
u [mm]	40	2.4								
	60	3.6								
	80	4.8								
t_I [mm]	≥ 100	6.0								

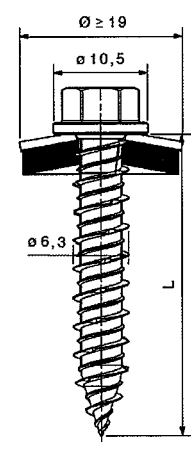
$N_{R,I,k}$ may be increased by 8.3% for component I made of steel S320GD and by 16.6% for component I made of steel S350GD.

$N_{R,II,k}$ may be increased by 8.3% for component II made of steel S320GD and by 16.6% for component II made of steel S350GD and S275.

$V_{R,k}$ may be increased by 8.3% for component I made of steel S320GD and by 16.6% for component I made of steel S350GD.

Index ¹: Without reduction factor 2/3 for repeated wind loads.

Fastening screws for sandwich panels	Annex 17 of European Technical Assessment ETA-21/0784
Self-drilling screw DDC12-T19-5,5xL with sealing washer $\geq \phi 19$ mm	



Materials

Fastener: Carbon steel with anticorrosion coating (galvanized)

Washer: Carbon steel with anticorrosion coating (galvanized) and with EPDM seal

Component I: S280GD to S350GD - EN 10346

Component II: S235 to S275 - EN 10025
S280GD to S350GD - EN 10346

Predrill diameter: d_{pd} = see table

		t_{II} [mm]							
		0.63	0.75	0.88	1.00	1.25	1.50	2.00	3.00
d_{pd} [mm]		3.50	4.0	4.50			5.0		
$V_{R,k}$ [kN]	0.40	0.99							
	0.45	1.13							
	0.50	1.28							
	0.55	1.47							
	0.60	1.65							
	0.63	1.77							
	0.70	2.42							
t_{N2} [mm]	≥ 0.75	2.88							
$N_{R,k}$ [kN]	0.40	0.90	0.96	1.02	1.09	1.50			
	0.45	0.90	0.96	1.02	1.09	1.50	1.94	1.96	
	0.50	0.90	0.96	1.02	1.09	1.50	1.94	2.34	
	0.55	0.90	0.96	1.02	1.09	1.50	1.94	2.57	2.65
	0.60	0.90	0.96	1.02	1.09	1.50	1.94	2.57	2.96
	0.63	0.90	0.96	1.02	1.09	1.50	1.94	2.57	3.15
	0.70	0.90	0.96	1.02	1.09	1.50	1.94	2.57	3.66
t_{N1} [mm]	≥ 0.75	0.90	0.96	1.02	1.09	1.50	1.94	2.57	4.02
$N_{R,II,k}$ [kN]	Pull-out	0.90	0.96	1.02	1.09	1.50	1.94	2.57	4.16
u [mm]	40	2.4							
	60	3.6							
	80	4.8							
t_I [mm]	≥ 100	6.0							

$N_{R,I,k}$ [kN]
Pull-through

1.50	2.26 ¹
1.96	2.94 ¹
2.34	3.51 ¹
2.65	3.95 ¹
2.96	4.44 ¹
3.15	4.72 ¹
3.66	5.49 ¹
4.02	6.03 ¹

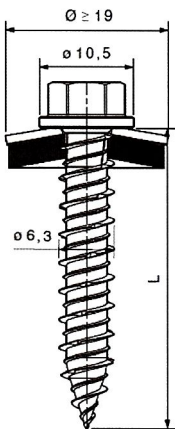
$N_{R,I,k}$ may be increased by 8.3% for component I made of steel S320GD and by 16.6% for component I made of steel S350GD.

$N_{R,II,k}$ may be increased by 8.3% for component II made of steel S320GD and 16.6% for component II made of steel S350GD and S275.

$V_{R,k}$ may be increased by 8.3% for component I made of steel S320GD and 16.6% for component I made of steel S350GD.

Index 1: Without reduction factor 2/3 for repeated wind loads.

Fastening screws for sandwich panels	Annex 18 of European Technical Assessment ETA-21/0784
Self-tapping screw MDW-T19-6,3xL with sealing washer $\geq \varnothing 19$ mm	



Materials

Fastener: Carbon steel with anticorrosion coating (galvanized)

Washer: Carbon steel with anticorrosion coating (galvanized) and with EPDM seal

Component I: S280GD to S350GD - EN 10346

Component II: Coniferous timber \geq C24 - EN 14081

Predrill diameter: d_{pd} = see table

Timber structure:
 $M_{y,Rk} = 20.53$ Nm
 $f_{ax,k} = 6.91$ N/mm² for $l_p \geq 20$ mm, $\rho_a = 350$ kg/m³
 $= 7.95$ N/mm² for $l_p \geq 30$ mm, $\rho_a = 350$ kg/m³

		l_p [mm]						
		20	25	30	35	40	45	50
d_{pd} [mm]		4.0						
$V_{R,k}$ [kN]	0.40	0.47						
	0.45	0.60						
	0.50	0.74						
	0.55	0.82						
	0.60	0.89						
t_{N2} [mm]	0.63	0.94						
	0.70	0.99						
	≥ 0.75	1.03						
$N_{R,k}$ [kN]	0.40	0.87	1.19	1.50				
	0.45	0.87	1.19	1.50	1.75	1.96		
	0.50	0.87	1.19	1.50	1.75	2.00	2.25	2.34
	0.55	0.87	1.19	1.50	1.75	2.00	2.25	2.50
	0.60	0.87	1.19	1.50	1.75	2.00	2.25	2.50
	0.63	0.87	1.19	1.50	1.75	2.00	2.25	2.50
	0.70	0.87	1.19	1.50	1.75	2.00	2.25	2.50
	≥ 0.75	0.87	1.19	1.50	1.75	2.00	2.25	2.50
$N_{R,II,k}$ [kN]	Pull-out	0.87	1.19	1.50	1.75	2.00	2.25	2.50
u [mm]	40	2.4						
	60	3.6						
t_i [mm]	80	4.8						
	≥ 100	6.0						

$N_{R,II,k}$ [kN]
Pull-through

1.50	2.26 ¹
1.96	2.94 ¹
2.34	3.51 ¹
2.65	3.95 ¹
2.96	4.44 ¹
3.15	4.72 ¹
3.66	5.49 ¹
4.02	6.03 ¹

$N_{R,I,k}$ may be increased by 8.3% for component I made of steel S320GD and by 16.6% for component I made of steel S350GD.

$N_{R,II,k}$ may be increased by 8.3% for component II made of steel S320GD and by 16.6% for component II made of steel S350GD, S275 and S355.

$V_{R,k}$ may be increased by 8.3% for component I made of steel S320GD and by 16.6% for component I made of steel S350GD.

Index 1: Without reduction factor 2/3 for repeated wind loads.

Fastening screws for sandwich panels	Annex 19
Self-tapping screw MDW-T19-6,3xL with sealing washer $\geq \varnothing 19$ mm	of European Technical Assessment ETA-21/0784