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European Technical Assessment

**ETA-21/0784
of 30/09/2021**

General part

Technical Assessment Body issuing the European Technical Assessment

Instytut Techniki Budowlanej

Trade name of the construction product

SDC5, DDC5, DDC12

Product family to which the construction product belongs

Fastening screws for sandwich panels

Manufacturer

SFS intec AG
RosenbergsaustraÙe 10
9435 Heerbrugg
Switzerland

Manufacturing plant(s)

Factories of SFS intec AG

This European Technical Assessment contains

18 pages including 14 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"

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Specific part

1. Technical description of the product

The fastening screws, listed in Table 1, are self-drilling screws made of carbon steel with anticorrosion coating, with sealing washers made of steel and EPDM seal. For details see the Annexes 3 to 14.

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

Table 1

No.	Screw	Description	Material	Application	Annex
1	SDC5-T16-6,3xL	Self drilling screw with sealing washer $\geq \varnothing$ 16 mm	Carbon steel, Durocoat® 480	Steel	3 and 4
2	SDC5-T19-6,3xL	Self drilling screw with sealing washer $\geq \varnothing$ 19 mm	Carbon steel, Durocoat® 480	Steel	5 and 6
3	SDC5-S29-6,3xL	Self drilling screw with sealing washer $\geq \varnothing$ 29 mm	Carbon steel, Durocoat® 480	Steel	7 and 8
4	DDC5-T19-5,5xL	Self drilling screw with sealing washer $\geq \varnothing$ 19 mm	Carbon steel	Steel	9
5	DDC12-T19-5,5xL	Self drilling screw with sealing washer $\geq \varnothing$ 19 mm	Carbon steel	Steel	10
6	SDC5-T16-6,3xL	Self drilling screw with sealing washer $\geq \varnothing$ 16 mm	Carbon steel, Durocoat® 480	Timber	11
7	SDC5-T19-6,3xL	Self drilling screw with sealing washer $\geq \varnothing$ 19 mm	Carbon steel, Durocoat® 480	Timber	12
8	SDC5-S29-6,3xL	Self drilling screw with sealing washer $\geq \varnothing$ 29 mm	Carbon steel, Durocoat® 480	Timber	13
9	DDC5-T19-5,5xL	Self drilling screw with sealing washer $\geq \varnothing$ 19 mm	Carbon steel	Timber	14

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 3 to 14. 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 applications.

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

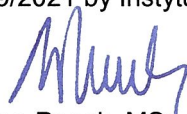
According to EC Decision 1998/214/EC, amended by 2001/596/EC, of the European Commission the system 2+ of AVCP applies (see Annex V to regulation (EU) No 305/2011).

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.

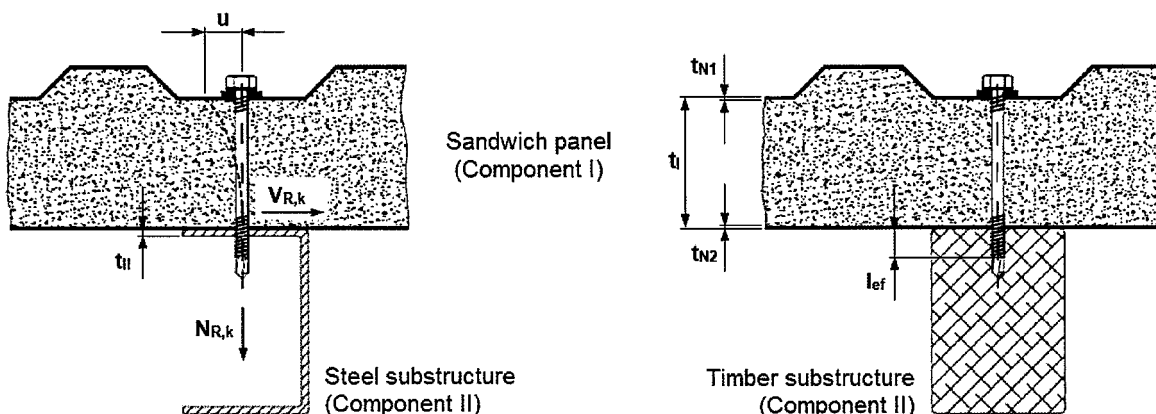
For type testing the results of the tests performed as part of the assessment for the European Technical Assessment shall be used unless there are changes in the production line or plant. In such cases the necessary type testing has to be agreed between Instytut Techniki Budowlanej and the notified body.

Issued in Warsaw on 30/09/2021 by Instytut Techniki Budowlanej



Anna Panek, MSc
Deputy Director of ITB

Exemplary executions of connections with fastening screws



Components of connections with fastening screws

- Component I** Sandwich panel with outer skin and inner skin made of steel
- Component II** Steel or timber substructure
- Fastener** Fastening screw
- Washer** Sealing washer of the fastening screw

Dimensions of the components:

- t_I** Minimum thickness of sandwich panel at fixing position
- t_{N1}** Minimum thickness of sandwich panel outer skin
- t_{N2}** Minimum thickness of sandwich panel inner skin
- t_{II}** Minimum thickness of steel substructure
- l_{ef}** Effective screw-in length in timber substructure (without drill point)

Characteristic values of connections with fastening screws

- N_{R,k}** Characteristic value of tension resistance
- V_{R,k}** Characteristic value of shear resistance
- 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
- N_{R,II,k}** Characteristic value of pull-out resistance
- M_{y,Rk}** Characteristic value of yield moment of the fastening screw (timber substructure)
- f_{ax,k}** Characteristic value of withdrawal strength (timber substructure)

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

Characteristic values of resistance of connections with fastening screws

The tension resistance ($N_{R,k}$) corresponds to the minimum value between pull-out resistance ($N_{R,II,k}$) and pull-through resistance ($N_{R,I,k}$).

The pull-out resistance ($N_{R,II,k}$) considers the pull-out resistance of the substructure and the tension breaking resistance of the fastening screw.

The pull-through resistance ($N_{R,I,k}$) considers the pull-through resistance of the sandwich panel outer skin, the tension breaking resistance of the fastening screw and additionally a reduction factor of 2/3 to take into account the influence of repeated wind loads.

The shear resistance ($V_{R,k}$) considers the shear stress in the connection between the sandwich panel and the steel substructure as well as the shear breaking resistance of the fastener. In case of fastening onto a timber substructure, EN 1995-1-1 equation 8.9 has been taken into account.

Tension and shear resistance ($N_{R,k}$ and $V_{R,k}$) for component thicknesses between declared thicknesses (t_{N1} , t_{N2} and t_{II}) may be determined by linear interpolation. The same applies to screw-in lengths in timber substructure (l_{ef}).

If the part of threaded section of fastening screw protrud the steel substructure the thickness of steel substructure is the load-bearing screw-in depth of the fastening screw.

An installation of the fastening screw according to EN 1090-4 chapter 8.1 and 8.2 is a prerequisite for the use of characteristic values.

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 to declared thickness of sandwich panel outer skin (t_{N1}), sandwich panel inner skin (t_{N2}) and steel substructure (t_{II}) of minimum tensile strength (360 N/mm^2) or effective screw-in length in case of timber substructure (l_{ef}) of minimum characteristic density (350 kg/dm^3). In case of failure of the fastener, the minimum tension or shear breaking resistance of the fastening screw has been taken into account.

Bending capacity of fastening screws

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

Determination of design values of connections with fastening screws

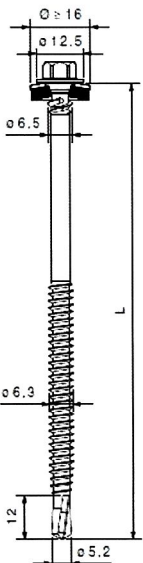
The characteristic values of tension and shear resistance ($N_{R,k}$ and $V_{R,k}$) have to be divided by a global partial safety factor (γ_M) according to EN 1993-1-1 and EN 1995-1-1. Recommended is $\gamma_M = 1.33$ unless otherwise stated in national regulations.

In case of timber substructure, the characteristic value of pull-out resistance ($N_{R,II,k}$) has to be multiplied by a modification coefficient (k_{mod}) according to EN 1995-1-1 chapter 3.1. Recommended is $k_{mod} = 0.90$ unless otherwise stated in national regulations.

Any reduction factors, due to eccentric connections or asymmetric substructures, have to be taken into account according to EN 1090-4 annex B5 and EN 1993-1-1 chapter 8.3(7).

Combined tension and shear forces have to be taken into account according to EN 1993-1-3 equation 8.2.

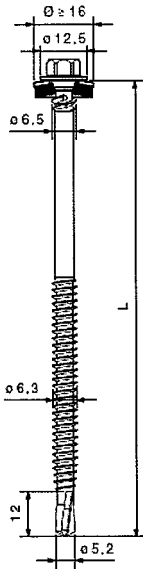
Fastening screws for sandwich panels	Annex 2 of European Technical Assessment ETA-21/0784
Basics and explanations	

	Materials Fastener: Carbon steel with anticorrosion coating Washer: Carbon steel with anticorrosion coating and with EPDM seal Component I: S280GD to S350GD - 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]							$N_{R,I,k}$ [kN] Pull-through																	
		1.00	1.25	1.50	2.00	2.50	3.00	4.00																		
$V_{R,k}$ [kN]	0.40	0.85							<table border="1"> <tr><td>1.28</td><td>1.92¹</td></tr> <tr><td>1.65</td><td>2.47¹</td></tr> <tr><td>2.02</td><td>3.02¹</td></tr> <tr><td>2.37</td><td>3.56¹</td></tr> <tr><td>2.73</td><td>4.10¹</td></tr> <tr><td>2.95</td><td>4.42¹</td></tr> <tr><td>3.16</td><td>4.75¹</td></tr> <tr><td>3.32</td><td>4.98¹</td></tr> </table>		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
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3.32	4.98 ¹																									
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	1.28	1.28	1.28	1.28	1.28	<table border="1"> <tr><td>1.28</td><td>1.92¹</td></tr> <tr><td>1.65</td><td>2.47¹</td></tr> <tr><td>2.02</td><td>3.02¹</td></tr> <tr><td>2.37</td><td>3.56¹</td></tr> <tr><td>2.73</td><td>4.10¹</td></tr> <tr><td>2.95</td><td>4.42¹</td></tr> <tr><td>3.16</td><td>4.75¹</td></tr> <tr><td>3.32</td><td>4.98¹</td></tr> </table>		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
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	2.95	4.42 ¹																								
	3.16	4.75 ¹																								
3.32	4.98 ¹																									
0.45	1.31	1.65	1.65	1.65	1.65	1.65	1.65																			
0.50	1.31	1.68	2.02	2.02	2.02	2.02	2.02																			
0.55	1.31	1.68	2.17	2.37	2.37	2.37	2.37																			
t_{N1} [mm]	0.60	1.31	1.68	2.17	2.73	2.73	2.73																			
	0.63	1.31	1.68	2.17	2.95	2.95	2.95																			
	0.70	1.31	1.68	2.17	3.16	3.16	3.16																			
	≥ 0.75	1.31	1.68	2.17	3.32	3.32	3.32																			
$N_{R,II,k}$ [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																							

$N_{R,I,k}$ may be increased by 8.3% for component I made of S320GD and 16.6% for component I made of S350GD.
 $N_{R,II,k}$ may be increased by 8.3% for component II made of S320GD and 16.6% for component II made of S350GD to S450GD, S275 and S355.
 $V_{R,k}$ may be increased by 8.3% for component I made of S320GD and 16.6% for component I made of S350GD.
 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
SDC5-T16-6,3xL with sealing washer $\geq \varnothing 16 \text{ mm}$	

	<p>Materials</p> <p>Fastener: Carbon steel with anticorrosion coating</p> <p>Washer: Carbon steel with anticorrosion coating and with EPDM seal</p> <p>Component I: S280GD to S350GD - EN 10346</p> <p>Component II: S235 to S355 - EN 10025 S280GD to S450GD - EN 10346</p>
	<p>Drilling-capacity $\Sigma(t_{N1} + t_{N2} + t_i) \leq 6.00 \text{ mm}$</p>

	t_i [mm]						$N_{R,I,k}$ [kN] Pull-through			
	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	1.28	1.28	1.28	1.28	1.28	1.28	1.92 ¹	
	0.45	1.65	1.65	1.65	1.65	1.65	1.65	1.65	2.47 ¹	
	0.50	1.86	2.02	2.02	2.02	2.02	2.02	2.02	3.02 ¹	
	0.55	1.86	2.09	2.30	2.37	2.37	2.37	2.37	3.56 ¹	
	t_{N1} [mm]	0.60	1.86	2.09	2.30	2.73	2.73	2.73	2.73	4.10 ¹
		0.63	1.86	2.09	2.30	2.94	2.95	2.95	2.95	4.42 ¹
		0.70	1.86	2.09	2.30	2.94	3.16	3.16	3.16	4.75 ¹
		≥ 0.75	1.86	2.09	2.30	2.94	3.32	3.32	3.32	4.98 ¹
$N_{R,II,k}$ [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]	80	4.8								
	≥ 100	6.0								

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

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

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

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
SDC5-T16-6,3xL with sealing washer $\geq \text{Ø } 16 \text{ mm}$	

Materials

Fastener: Carbon steel with anticorrosion coating

Washer: Carbon steel with anticorrosion coating and with EPDM seal

Component I: S280GD to S350GD - 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]	0.60	1.62					
		0.63	1.65					
		0.70	1.91					
	≥ 0.75	2.09						
$N_{R,k}$ [kN]	0.40	1.31	1.50	1.50	1.50	1.50	1.50	
	0.45	1.31	1.68	1.92	1.92	1.92	1.92	
	0.50	1.31	1.68	2.17	2.34	2.34	2.34	
	0.55	1.31	1.68	2.17	2.65	2.65	2.65	
	t_{N1} [mm]	0.60	1.31	1.68	2.17	2.96	2.96	2.96
		0.63	1.31	1.68	2.17	3.15	3.15	3.15
		0.70	1.31	1.68	2.17	3.51	3.66	3.66
	≥ 0.75	1.31	1.68	2.17	3.51	4.02	4.02	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]	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

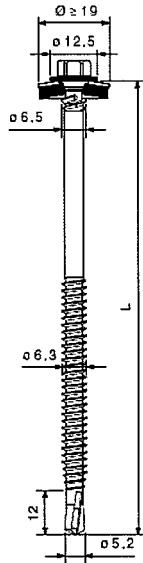
$N_{R,I,k}$ may be increased by 8.3% for component I made of S320GD and 16.6% for component I made of S350GD.

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

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

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
SDC5-T19-6,3xL with sealing washer $\geq \varnothing 19 \text{ mm}$	

	Materials Fastener: Carbon steel with anticorrosion coating Washer: Carbon steel with anticorrosion coating and with EPDM seal Component I: S280GD to S350GD - EN 10346 Component II: S235 to S355 - EN 10025 S280GD to S450GD - EN 10346
	Drilling-capacity $\Sigma(t_{N1} + t_{N2} + t_{II}) \leq 6.00 \text{ mm}$

		$t_{II} \text{ [mm]}$						
		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	1.50	1.50	1.50	1.50	1.50	1.50	
	0.45	1.86	1.92	1.92	1.92	1.92	1.92	
	0.50	1.86	2.09	2.30	2.34	2.34	2.34	
	0.55	1.86	2.09	2.30	2.65	2.65	2.65	
	t_{N1} [mm]	0.60	1.86	2.09	2.30	2.94	2.96	2.96
		0.63	1.86	2.09	2.30	2.94	3.15	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						
t_I [mm]	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

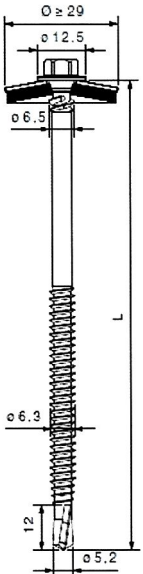
$N_{R,I,k}$ may be increased by 8.3% for component I made of S320GD and 16.6% for component I made of S350GD.

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

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

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
SDC5-T19-6,3xL with sealing washer $\geq \varnothing 19 \text{ mm}$	



Materials

Fastener: Carbon steel with anticorrosion coating

Washer: Stainless steel A2 with EPDM seal

Component I: S280GD to S350GD - 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]							
		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	3.79	3.79	
	0.45	1.31	1.68	2.17	3.51	4.29	4.29	4.29	
	0.50	1.31	1.68	2.17	3.51	4.58	4.80	4.80	
	0.55	1.31	1.68	2.17	3.51	4.58	4.95	4.95	
	t_{N1} [mm]	0.60	1.31	1.68	2.17	3.51	4.58	5.11	5.11
		0.63	1.31	1.68	2.17	3.51	4.58	5.21	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							
	80	4.8							
t_I [mm]	≥ 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 S320GD and 16.6% for component I made of S350GD.

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

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

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
SDC5-S29-6,3xL with sealing washer $\geq \varnothing 29$ mm	

	Materials Fastener: Carbon steel with anticorrosion coating Washer: Stainless steel A2 with EPDM seal Component I: S280GD to S350GD - 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]		
		2 x 0.75	2 x 0.88	2 x 1.00	2 x 1.25	2 x 1.50	2 x 2.00	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	1.86	2.09	2.30	2.94	3.54	3.79	3.79	5.69 ¹	
	0.45	1.86	2.09	2.30	2.94	3.54	4.29	4.29	6.44 ¹	
	0.50	1.86	2.09	2.30	2.94	3.54	4.80	4.80	7.19 ¹	
	0.55	1.86	2.09	2.30	2.94	3.54	4.95	4.95	7.43 ¹	
	t_{N1} [mm]	0.60	1.86	2.09	2.30	2.94	3.54	5.11	5.11	7.67 ¹
		0.63	1.86	2.09	2.30	2.94	3.54	5.21	5.21	7.81 ¹
		0.70	1.86	2.09	2.30	2.94	3.54	5.47	6.21	9.32 ¹
		≥ 0.75	1.86	2.09	2.30	2.94	3.54	5.47	6.93	10.39 ¹
$N_{R,II,k}$ [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								

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

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

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

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
SDC5-S29-6,3xL with sealing washer $\geq \phi 29$ mm	

Materials

Fastener: Carbon steel with anticorrosion coating

Washer: Carbon steel with anticorrosion coating and EPDM seal

Component I: S280GD to S350GD - EN 10346

Component II: S235 to S355 - EN 10025
S280GD to S350GD - EN 10346

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

		$t_{II} \text{ [mm]}$							$N_{R,I,k}$ [kN] Pull-through		
		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	1.26	1.26	1.26	1.26	1.26	1.26	1.26	1.90 ¹	
	0.45	1.50	1.77	1.77	1.77	1.77	1.77	1.77	1.77	2.65 ¹	
	0.50	1.50	1.77	2.27	2.27	2.27	2.27	2.27	2.27	3.40 ¹	
	0.55	1.50	1.77	2.33	2.45	2.45	2.45	2.45	2.45	3.68 ¹	
	t_{N1} [mm]	0.60	1.50	1.77	2.33	2.64	2.64	2.64	2.64	2.64	3.96 ¹
		0.63	1.50	1.77	2.33	2.75	2.75	2.75	2.75	2.75	4.13 ¹
		0.70	1.50	1.77	2.33	2.90	3.46	3.46	3.46	3.46	5.19 ¹
		≥ 0.75	1.50	1.77	2.33	2.90	3.96	3.96	3.96	3.96	5.94 ¹
$N_{R,II,k}$ [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									

$N_{R,I,k}$ may be increased by 8.3% for component I made of S320GD and 16.6% for component I made of S350GD.
 $N_{R,II,k}$ may be increased by 8.3% for component II made of S320GD and 16.6% for component II made of S350GD, S275 and S355.
 $V_{R,k}$ may be increased by 8.3% for component I made of S320GD and 16.6% for component I made of S350GD.
 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
DDC5-T19-5,5xL with sealing washer $\geq \varnothing 19 \text{ mm}$	

	<p>Materials</p> <p>Fastener: Carbon steel with anticorrosion coating</p> <p>Washer: Carbon steel with anticorrosion coating and with EPDM seal</p> <p>Component I: S280GD to S350GD - EN 10346</p> <p>Component II: S235 to S355 - EN 10025 S280GD to S350GD - EN 10346</p>
	<p>Drilling-capacity $\Sigma(t_{N1} + t_{N2} + t_{II}) \leq 12.00 \text{ mm}$</p>

		$t_{II} \text{ [mm]}$						$N_{R,I,k} \text{ [kN]}$		
		3.00	4.00	5.00	6.00	8.00	10.00 ²	Pull-through		
$V_{R,k} \text{ [kN]}$	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	1.26	1.26	1.26	1.26	1.26	1.26	1.26	1.90 ¹	
	0.45	1.77	1.77	1.77	1.77	1.77	1.77	1.77	2.65 ¹	
	0.50	2.27	2.27	2.27	2.27	2.27	2.27	2.27	3.40 ¹	
	0.55	2.45	2.45	2.45	2.45	2.45	2.45	2.45	3.68 ¹	
	$t_{N1} \text{ [mm]}$	0.60	2.64	2.64	2.64	2.64	2.64	2.64	2.64	3.96 ¹
		0.63	2.75	2.75	2.75	2.75	2.75	2.75	2.75	4.13 ¹
		0.70	3.46	3.46	3.46	3.46	3.46	3.46	3.46	5.19 ¹
		≥ 0.75	3.96	3.96	3.96	3.96	3.96	3.96	3.96	5.94 ¹
$N_{R,II,k} \text{ [kN]}$	Pull-out	4.82	7.67	8.40	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 S320GD and 16.6% for component I made of S350GD.
 $N_{R,II,k}$ may be increased by 8.3% for component II made of S320GD and 16.6% for component II made of S350GD, S275 and S355.

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

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

Index 2: Only valid for component II made of S235 and S275.

<p>Fastening screws for sandwich panels</p>	<p>Annex 10 of European Technical Assessment ETA-21/0784</p>
<p>DDC12-T19-5,5xL with sealing washer $\geq \text{Ø } 19 \text{ mm}$</p>	

	<p>Materials</p> <p>Fastener: Carbon steel with anticorrosion coating</p> <p>Washer: Carbon steel with anticorrosion coating and with EPDM seal</p> <p>Component I: S280GD to S350GD - 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>Characteristics $M_{y,Rk} = 8.91$ Nm, $f_{ax,k} = 8.36$ N/mm² ($l_{ef} \geq 25$ mm)</p>

		l_{ef} [mm]						N_{R,I,k} [kN] Pull-through		
		25	30	35	45	55	65			
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	1.28	1.28	1.28	1.28	1.28	1.92 ¹	
	0.45	1.32	1.58	1.65	1.65	1.65	1.65	1.65	2.47 ¹	
	0.50	1.32	1.58	1.84	2.02	2.02	2.02	2.02	3.02 ¹	
	0.55	1.32	1.58	1.84	2.37	2.37	2.37	2.37	3.56 ¹	
	t_{N1} [mm]	0.60	1.32	1.58	1.84	2.37	2.73	2.73	2.73	4.10 ¹
		0.63	1.32	1.58	1.84	2.37	2.90	2.95	2.95	4.42 ¹
		0.70	1.32	1.58	1.84	2.37	2.90	3.16	3.16	4.75 ¹
		≥ 0.75	1.32	1.58	1.84	2.37	2.90	3.32	3.32	4.98 ¹
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								
t_i [mm]	≥ 100	6.0								

N_{R,I,k} may be increased by 8.3% for component I made of S320GD and 16.6% for component I made of S350GD.
V_{R,k} may be increased by 8.3% for component I made of S320GD and 16.6% for component I made of S350GD.
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
SDC5-T16-6,3xL with sealing washer ≥ Ø 16 mm	

	Materials Fastener: Carbon steel with anticorrosion coating Washer: Carbon steel with anticorrosion coating 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 Characteristics $M_{y,Rk} = 8.91$ Nm, $f_{ax,k} = 8.36$ N/mm ² ($l_{ef} \geq 25$ mm)

		l_{ef} [mm]					
		25	30	35	45	55	65
$V_{R,k}$ [kN]	0.40	0.85					
	0.45	1.17					
	0.50	1.49					
	0.55	1.55					
	0.60	1.62					
	0.63	1.65					
	0.70	1.91					
	≥ 0.75	2.09					
$N_{R,k}$ [kN]	0.40	1.32	1.50	1.50	1.50	1.50	1.50
	0.45	1.32	1.58	1.84	1.92	1.92	1.92
	0.50	1.32	1.58	1.84	2.34	2.34	2.34
	0.55	1.32	1.58	1.84	2.37	2.65	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
$N_{R,II,k}$	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					
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 S320GD and 16.6% for component I made of S350GD.
 $V_{R,k}$ may be increased by 8.3% for component I made of S320GD and 16.6% for component I made of S350GD.
 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
SDC5-T19-6,3xL with sealing washer $\geq \varnothing 19$ mm	

Materials

Fastener: Carbon steel with anticorrosion coating

Washer: Stainless steel A2 with EPDM seal

Component I: S280GD to S350GD - EN 10346

Component II: Coniferous timber ≥ C24 - EN 14081

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

Characteristics $M_{y,Rk} = 8.91 \text{ Nm}$, $f_{ax,k} = 8.36 \text{ N/mm}^2$ ($l_{ef} \geq 25 \text{ mm}$)

		l_{ef} [mm]					
		25	30	35	45	55	65
$V_{R,k}$ [kN]	0.40	0.85					
	0.45	1.17					
	0.50	1.49					
	0.55	1.55					
	0.60	1.62					
	0.63	1.65					
	0.70	1.91					
	≥ 0.75	2.09					
$N_{R,k}$ [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
$N_{R,II,k}$		1.32	1.58	1.84	2.37	2.90	3.42
u [mm]	40	2.4					
	60	3.6					
	80	4.8					
t_i [mm]	≥ 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 S320GD and 16.6% for component I made of S350GD.
 $V_{R,k}$ may be increased by 8.3% for component I made of S320GD and 16.6% for component I made of S350GD.
 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
SDC5-S29-6,3xL with sealing washer ≥ Ø 29 mm	

	<p>Materials</p> <p>Fastener: Carbon steel with anticorrosion coating</p> <p>Washer: Carbon steel with anticorrosion coating and EPDM seal</p> <p>Component I: S280GD to S350GD - EN 10346</p> <p>Component II: Coniferous timber \geq C24 - EN 14081</p>
	<p>Drilling capacity $\Sigma(t_{N1} + t_{N2}) \leq 2.00$ mm</p> <p>Characteristics $M_{y,Rk} = 6.26$ Nm, $f_{ax,k} = 6.13$ N/mm² ($l_{ef} \geq 25$ mm)</p>

		l_{ef} [mm]						$N_{R,I,k}$ [kN]		
		25	30	35	40	45	50	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	0.84	1.01	1.18	1.26	1.26	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							4.8		
	≥ 100							6.0		

$N_{R,I,k}$ may be increased by 8.3% for component I made of S320GD and 16.6% for component I made of S350GD.
 $V_{R,k}$ may be increased by 8.3% for component I made of S320GD and 16.6% for component I made of S350GD.
 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
DDC5-T19-5,5xL with sealing washer $\geq \varnothing 19$ mm	