

# **European Technical Approval ETA-13/0183**

Handelsbezeichnung <i>Trade nam</i> e	SX, SXC, SXCW, SDT, SDTW, SWTZ, SXW, TDA, TDB
Zulassungsinhaber Holder of approval	SFS intec AG Rosenbergsaustraße 10 9435 HEERBRUGG SCHWEIZ
Zulassungsgegenstand und Verwendungszweck	Befestigungsschrauben für Sandwichelemente
Generic type and use of construction product	Fastening screws for sandwichpanels
Geltungsdauer: vom Validity: from	14 June 2013
bis to	14 June 2018
Herstellwerke Manufacturing plants	SFS intec AG FasteningSystems Rosenbergsaustraße 10 9435 HEERBRUGG SCHWEIZ SFS intec SAS 39, rue Georges Méliès BP 55 26902 Valence Cedex 9 FRANKREICH

English translation prepared by DIBt - Original version in German language

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43 Seiten einschließlich 33 Anhänge

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### I LEGAL BASES AND GENERAL CONDITIONS

- 1 This European technical approval is issued by Deutsches Institut für Bautechnik in accordance with:
  - Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products<sup>1</sup>, modified by Council Directive 93/68/EEC<sup>2</sup> and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council<sup>3</sup>;
  - Gesetz über das In-Verkehr-Bringen von und den freien Warenverkehr mit Bauprodukten zur Umsetzung der Richtlinie 89/106/EWG des Rates vom 21. Dezember 1988 zur Angleichung der Rechts- und Verwaltungsvorschriften der Mitgliedstaaten über Bauprodukte und anderer Rechtsakte der Europäischen Gemeinschaften (Bauproduktengesetz - BauPG) vom 28. April 1998<sup>4</sup>, as amended by Article 2 of the law of 8 November 2011<sup>5</sup>;
  - Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex to Commission Decision 94/23/EC<sup>6</sup>.
- 2 Deutsches Institut für Bautechnik is authorized to check whether the provisions of this European technical approval are met. Checking may take place in the manufacturing plant. Nevertheless, the responsibility for the conformity of the products to the European technical approval and for their fitness for the intended use remains with the holder of the European technical approval.
- 3 This European technical approval is not to be transferred to manufacturers or agents of manufacturers other than those indicated on page 1, or manufacturing plants other than those indicated on page 1 of this European technical approval.
- 4 This European technical approval may be withdrawn by Deutsches Institut für Bautechnik, in particular pursuant to information by the Commission according to Article 5(1) of Council Directive 89/106/EEC.
- 5 Reproduction of this European technical approval including transmission by electronic means shall be in full. However, partial reproduction can be made with the written consent of Deutsches Institut für Bautechnik. In this case partial reproduction has to be designated as such. Texts and drawings of advertising brochures shall not contradict or misuse the European technical approval.
- 6 The European technical approval is issued by the approval body in its official language. This version corresponds fully to the version circulated within EOTA. Translations into other languages have to be designated as such.

<sup>&</sup>lt;sup>1</sup> Official Journal of the European Communities L 40, 11 February 1989, p. 12

Official Journal of the European Communities L 220, 30 August 1993, p. 1

<sup>&</sup>lt;sup>3</sup> Official Journal of the European Union L 284, 31 October 2003, p. 25

<sup>&</sup>lt;sup>4</sup> Bundesgesetzblatt Teil I 1998, p. 812

<sup>&</sup>lt;sup>5</sup> Bundesgesetzblatt Teil I 2011, p. 2178

Official Journal of the European Communities L 17, 20 January 1994, p. 34



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### II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

#### 1 Definition of product/ products and intended use

#### 1.1 Definition of the construction product

The fastening screws for sandwich panels are self drilling and self tapping screws listed in Table 1. The fastening screws for sandwich panels are made of stainless steel or case hardened carbon steel. They are completed with metallic washers and EPDM sealing rings. For details see the appropriate Annexes.

Screws or washers for which the stainless steel grade A2 according to EN ISO 3506-1 is given in the respective Annexes (e. g. 1.4301 or 1.4567) may be made of stainless steel grade A4 (e. g. 1.4401 or 1.4578) as well.

Examples of fastening screws for sandwich panels and a corresponding connection are shown in Annex 1.

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

Annex	Fastening screw	Description
Annex 2	SFS SXC5 - S16 - 5,5 x L SFS SXC5 - L12 - S16 - 5,5 x L	Self-drilling screw with hexagon head or irius®-drive and sealing washer $\ge \emptyset$ 16 mm
	SFS SXC5 - S19 - 5,5 x L SFS SXC5 - L12 - S19 - 5,5 x L	Self-drilling screw with hexagon head or irius®-drive and sealing washer $\ge \emptyset$ 19 mm
	SFS SXC14 - S16 - 5,5 x L SFS SXC14 - L12 - S16 - 5,5 x L	Self-drilling screw with hexagon head or irius®-drive and sealing washer $\ge \emptyset$ 16 mm
	SFS SXC14 - S19 - 5,5 x L SFS SXC14 - L12 - S19 - 5,5 x L	Self-drilling screw with hexagon head or irius®-drive and sealing washer $\ge \emptyset$ 19 mm
	SFS SX5 - S14 - 5,5 x L SFS SX5 - L12 - S14 - 5,5 x L SFS SX5 - D12 - S14 - 5,5 x L	Self-drilling screw with hexagon head, torx or Irius®-drive and sealing washer $\ge \emptyset$ 14 mm
	SFS SX5 - S16 - 5,5 x L SFS SX5 - L12 - S16 - 5,5 x L SFS SX5 - D12 - S16 - 5,5 x L	Self-drilling screw with hexagon head, torx or Irius®-drive and sealing washer $\ge \emptyset$ 16 mm
	SFS SX5 - S19 - 5,5 x L SFS SX5 - L12 - S19 - 5,5 x L SFS SX5 - D12 - S19 - 5,5 x L	Self-drilling screw with hexagon head, torx or Irius®-drive and sealing washer $\ge \emptyset$ 19 mm
Annex 9	SFS SX5 - S22 - 5,5 x L SFS SX5 - L12 - S22 - 5,5 x L SFS SX5 - D12 - S22 - 5,5 x L	Self-drilling screw with hexagon head, torx or Irius®-drive and sealing washer $\ge \emptyset$ 22 mm

**Table 1** Different types of the fastening screws for sandwich panels



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Annex	Fastening screw	Description
Annex 10	SFS SX14 - S16 - 5,5 x L SFS SX14 - L12 - S16 - 5,5 x L	Self-drilling screw with hexagon head or Irius®-drive and sealing washer $\ge \emptyset$ 16 mm
Annex 11	SFS SX14 - S19 - 5,5 x L SFS SX14 - L12 - S19 - 5,5 x L	Self-tapping screw with hexagon head or Irius®-drive and sealing washer $\ge \emptyset$ 19 mm
Annex 12	SFS TDB - S - S16 - 6,3 x L	Self-tapping screw with hexagon head and sealing washer $\ge \emptyset$ 16 mm
Annex 13	SFS TDB - S - S19 - 6,3 x L	Self-tapping screw with hexagon head and sealing washer $\ge \emptyset$ 19 mm
Annex 14	SFS TDB - S - S16 - 6,3 x L - W38	Self- tapping screw with hexagon head and sealing washer $\ge \emptyset$ 16 mm
Annex 15	SFS TDB - S - S19 - 6,3 x L - W38	Self- tapping screw with hexagon head and sealing washer $\geq \emptyset$ 19 mm
Annex 16	SFS SDT5 - S16 - 5,5 x L SFS SDT5 - L12 - S16 - 5,5 x L	Self-drilling screw with hexagon head or Irius®-drive and sealing washer $\ge \emptyset$ 16 mm
Annex 17	SFS SDT5 - S19 - 5,5 x L SFS SDT5 - L12 - S19 - 5,5 x L	Self-drilling screw with hexagon head or Irius®-drive and sealing washer $\ge \emptyset$ 19 mm
Annex 18	SFS SDT5 - A16 - 5,5 x L SFS SDT5 - L12 - A16 - 5,5 x L	Self-drilling screw with hexagon head or Irius®-drive and sealing washer $\ge \emptyset$ 16 mm
Annex 19	SFS SDT5 - A19 - 5,5 x L SFS SDT5 - L12 - A19 - 5,5 x L	Self-drilling screw with hexagon head or Irius®-drive and sealing washer $\ge \emptyset$ 19 mm
Annex 20	SFS SDT14 - S16 - 5,5 x L SFS SDT14 - L12 - S16 - 5,5 x L	Self-drilling screw with hexagon head or Irius®-drive and sealing washer $\ge \emptyset$ 16 mm
Annex 21	SFS SDT14 - S19 - 5,5 x L SFS SDT14 - L12 - S19 - 5,5 x L	Self-drilling screw with hexagon head or Irius®-drive and sealing washer $\ge \emptyset$ 19 mm
Annex 22	SFS SDT14 - A16 - 5,5 x L SFS SDT14 - L12 - A16 - 5,5 x L	Self-drilling screw with hexagon head or Irius®-drive and sealing washer $\ge \emptyset$ 16 mm
Annex 23	SFS SDT14 - A19 - 5,5 x L SFS SDT14 - L12 - A19 - 5,5 x L	Self-drilling screw with hexagon head or Irius®-drive and sealing washer $\ge \emptyset$ 19 mm
Annex 24	SFS TDB - T - A16 - 6,3 x L	Self-tapping screw with hexagon head and sealing washer $\geq \emptyset$ 16 mm
Annex 25	SFS TDB - T - T16 - 6,3 x L	Self-tapping screw with hexagon head and sealing washer $\ge \emptyset$ 16 mm
Annex 26*	SFS SXCW - S16 - 6,5 x L SFS SXCW - L12 - S16 - 6,5 x L	Self-drilling screw with hexagon head or Irius®-drive and sealing washer $\ge \emptyset$ 16 mm
Annex 27*	SFS SXCW - S19 - 6,5 x L SFS SXCW - L12 - S19 - 6,5 x L	Self-drilling screw with hexagon head or Irius®-drive and sealing washer $\ge \emptyset$ 19 mm
Annex 28*	SFS SXW - S16 - 6,5 x L SFS SXW - L12 - S16 - 6,5 x L	Self-drilling screw with hexagon head or Irius®-drive and sealing washer $\ge \emptyset$ 16 mm



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Annex	Fastening screw	Description
Annex 29*		Self-tapping screw with hexagon head and sealing washer $\geq \emptyset$ 16 mm
	SFS SDTW - L12 - S16 - 6,5 x L	Self-drilling screw with hexagon head or Irius®-drive and sealing washer $\geq \emptyset$ 16 mm
Annex 31*	-	Self-drilling screw with hexagon head or Irius®-drive and sealing washer $\geq \emptyset$ 19 mm
Annex 32*		Self-drilling screw with zamac head and sealing washer $\ge \emptyset$ 19 mm
Annex 33*		Self-drilling screw with hexagon head and sealing washer $\geq \emptyset$ 16 mm

\*) This fastening screws for sandwich panels are applicable for fastening to timber substructure

#### 1.2 Intended use

The fastening screws for sandwich panels are intended to be used for fastening of flat, lightly profiled or profiled sandwich panels to metal supporting structures and as far as stated in Table 1 to timber supporting structures. The core material of the sandwich panel shall be made of polystyrene (PS) - or polyurethane (PUR) – ridged foam or mineral wool with a minimum compression resistance of the core material of 0.04 N/mm<sup>2</sup> (according to the specifications to the sandwich elements for instance in the CE-marking). The sandwich panels can either be used as wall or as roof cladding.

The component to be fastened is component I and the supporting structure is component II.

The intended use comprises fastening screws for sandwich panels and connections for indoor and outdoor applications. Fastening screws for sandwich panels are made of stainless steel are intended to be used in external environments with a high or very high corrosion category.

The intended use comprises connections with predominantly static loads (e.g. wind loads, dead loads).

The provisions made in this European technical approval are based on an assumed working life of the fastening screws for sandwich panels of 25 years when installed in the works or 50 years if the screws are not accessible after installation and they are sufficient protected against corrosion (e. g. made of stainless steel). 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.

#### 2 Characteristics of product and methods of verification

#### 2.1 Characteristics of product

The fastening screws for sandwich panels shall correspond to the drawings given in the appropriate Annexes (see Table 1).

The characteristic material values, dimensions and tolerances of the fastening screws for sandwich panels neither indicated in this section nor in the Annexes shall correspond to the respective values laid down in the technical documentation<sup>7</sup> to this European technical approval.

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The technical documentation to this European technical approval is deposited at Deutsches Institut für Bautechnik and, as far as relevant fort the tasks of the approved bodies involved in the attestation of conformity procedure is handed over to the approved bodies.



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The characteristic values of the shear and tension resistance of the connections made with the fastening screws for sandwich panels as well as the maximum head displacement are given in the appropriate Annexes or in section 4.2.

The fastening screws for sandwich panels are considered to satisfy the requirements of performance class A1 of the characteristic reaction to fire.

#### 2.2 Methods of verification

The assessment of the fitness of the fastening screws for sandwich panels for the intended use in relation to the Essential Requirements ER 1 (Mechanical resistance and stability), ER 2 (Safety in case of fire), ER 4 (Safety in use) and additional aspects of durability has been made in accordance with section 3.2 of the Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex to Commission Decision  $94/23/EC^6$ .

The assessment of the resistance to fire performance is only relevant to the assembled system (fastening screws for sandwich panels, sandwich panels, supporting structure) which is not part of the European technical approval.

The fastening screws for sandwich panels are considered to satisfy the requirements of performance class A 1 of the characteristic reaction to fire, in accordance with the provisions of the EC Decision 96/603/EC (as amended) without the need for testing on the basis of its listing in that decision.

Concerning Essential Requirements No. 1 (Mechanical resistance and stability) and No. 4 (Safety in use) the following applies:

The characteristic values of resistance given in the Annexes were determined by shear and tension tests and the values for the maximum head displacement were determined by bending tests.

The formulas to calculate the design resistance are given in clause 4.2.1.

#### 3 Evaluation and attestation of conformity and CE marking

#### 3.1 System of attestation of conformity

According to the Decision 99/92/EC of the European Commission<sup>8</sup> system 2+ of the attestation of conformity applies.

System 2+: Declaration of conformity of the product by the manufacturer on the basis of:

- (a) Tasks for the manufacturer:
  - (1) initial type-testing of the product;
  - (2) factory production control;
  - (3) testing of samples taken at the factory in accordance with a prescribed test plan.
- (b) Tasks for the approved body:
  - (4) certification of factory production control on the basis of:
    - initial inspection of factory and of factory production control;
    - continuous surveillance, assessment and approval of factory production control.

Note: Approved bodies are also referred to as "notified bodies".

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#### 3.2 Responsibilities

#### 3.2.1 Tasks for the manufacturer

3.2.1.1 Factory production control

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall insure that the product is in conformity with this European technical approval.

The factory production control shall be in accordance with the control plan which is part of the technical documentation of this European technical approval. The control plan is laid down in the context of the factory production control system operated by the manufacturer and deposited with Deutsches Institut für Bautechnik.<sup>9</sup>

The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

#### 3.2.1.2 Other tasks for the manufacturer

The manufacturer shall, on the basis of a contract, involve a body which is approved for the tasks referred to in section 3.1 in the field of prefabricated structural components made of hot-rolled steel products in order to undertake the actions laid down in section 3.2.2. For this purpose, the control plan referred to in sections 3.2.1.1 and 3.2.2 shall be handed over by the manufacturer to the approved body involved.

The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of this European technical approval.

#### 3.2.2 Tasks for the approved bodies

The approved body shall perform the

- initial inspection of factory and of factory production control,
- continuous surveillance, assessment and approval of factory production control
- in accordance with the provisions laid down in the control plan.

The approved body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in written reports.

The approved certification body involved by the manufacturer shall issue an EC certificate of conformity of the factory production control stating the conformity with the provisions of this European technical approval.

In cases where the provisions of the European technical approval and its control plan are no longer fulfilled the certification body shall withdraw the certificate of conformity and inform Deutsches Institut für Bautechnik without delay.

#### 3.3 CE marking

The CE marking shall be affixed on the accompanying commercial documents. The letters "CE" shall be followed by the identification number of the approved certification body, where relevant, and be accompanied by the following additional information:

- the name and address of the producer (legal entity responsible for the manufacture),
- the last two digits of the year in which the CE marking was affixed,
- the number of the EC certificate for the factory production control,
- the number of the European technical approval,
- the name of the product.

<sup>9</sup> 

The control plan is a confidential part of the European technical approval and only handed over to the approved bodies involved in the procedure of attestation of conformity. See section 3.2.2.



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# 4 Assumptions under which the fitness of the product for the intended use was favourably assessed

#### 4.1 Manufacturing

The fastening screws for sandwich panels are manufactured in accordance with the provisions of the European technical approval using the manufacturing process as laid down in the technical documentation.

The European technical approval is issued for the product on the basis of agreed data/information, deposited with Deutsches Institut für Bautechnik, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to Deutsches Institut für Bautechnik before the changes are introduced. Deutsches Institut für Bautechnik will decide whether or not such changes affect the approval and consequently the validity of the CE marking on the basis of the approval and if so whether further assessment or alterations to the approval shall be necessary.

#### 4.2 Design

#### 4.2.1 General

Fastening screws for sandwich panels completely or partly exposed to external weather or similar conditions are made of stainless steel or are protected against corrosion. For the corrosion protection the rules given in EN 1090-2:2008 + A1:2011, EN 1993-1-3:2006 + AC:2009 and EN 1993-1-4:2006 are taken into account.

In the following and in the Annexes the structural components to be fastened are called component I and the supporting structure or base material are called component II. Furthermore the following symbols are used, see also Annex 1:

- d or D Thickness of the sandwich panel
- $t_{N1}$  Thickness of the outer face / top plate (on the side of the screw head)
- $t_{N2}$  Thickness of the inner face / bottom plate (on the side of the supporting structure)
- t<sub>II</sub> Thickness of the supporting structure
- u from screw axes measured screw head displacement, resulting from the displacement of the outer face of the sandwich panels by thermal expansion e.g. caused by solar radiation
- max u maximum allowed screw head displacement, u < max u

For calculation of shear resistance of the connection the value for the plate thickness  $t_{N2}$  (plate in contact with the supporting structure) is used as relevant. For calculation of tension resistance of the connection and pull-over the relevant thickness is plate thickness  $t_{N1}$  (plate in contact with screw head).

The loading is predominantly static. (Remark: Wind loads are regarded as predominantly static.)

Dimensions, material properties, torque moments  $M_{t,nom}$ , minimum effective screw-in length  $l_{ef}$ , nominal material thicknesses  $t_{N1}$  and  $t_{N2}$  and maximum head displacement as stated in the European technical approval or in the Annexes are observed.

The verification concept stated in EN 1990:2002 + A1:2005 + A1:2005/AC:2010 is used for the design of the connections made with the fastening screws for sandwich panels. The characteristic values (shear and tension resistance) stated in the Annexes are used for the design of the entire connections.

For intermediate thicknesses of component I or component II the characteristic value for the thinner component is taken.



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The following formulas are used to calculate the values of design resistance:

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

The recommended partial safety factor  $\gamma_M = 1.33$  is used in order to determine the corresponding design resistances, provided no values are given in national regulations of the member state in which the fastening screws for sandwich panels are used or in the respective National Annex to Eurocode 3.

In case of combined tension and shear forces the linear interaction formula according to EN 1993-1-3:2006 + AC:2009, section 8.3 (8) is taken into account.

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

The possibly required reduction of the tension resistance to 70% of the characteristic values of tension resistance given in the Annexes is taken into account for connections of sandwich panels to thin-walled (plate thickness t < 5mm) asymmetric profiles like Z - or C - shaped profiles.

### 4.2.2 Additional rules for connections with timber substructures

As far as no other provisions are made in the following EN 1995-1-1:2004 + A1:2008 applies.

Drill points of self drilling screws are not taken into account for the effective screw-in length. The following terms are used:

- I<sub>g</sub> Screw-in length part of thread screwed into component II including drill point.
- $I_{b}$  Length of unthreaded part of the drill-point.

 $I_{ef}$  - effective screw-in length  $I_{ef} = I_g - I_b$ 

 $N_{R,k}$  =  $F_{ax,Rk} \cdot k_{mod}$ 

 $V_{R,k}$  =  $F_{v,Rk} \cdot k_{mod}$ 

F<sub>ax,Rk</sub> according to EN 1995-1-1:2004 + A1:2008, equation (8.40a)

Remark:  $F_{ax,Rk} = F_{ax,\alpha,Rk}$  with  $\alpha = 90^{\circ}$ 

F<sub>v,Rk</sub> according to EN 1995-1-1:2004 + A1:2008, clause 8.2.3

k<sub>mod</sub> according to EN 1995-1-1:2004 + A1:2008, Table 3.1

 $M_{y,Rk}$  in equation (8.9) of EN 1995-1-1:2004 + A1:2008 and  $f_{ax,k}$  in equation (8.40a) of EN 1995-1-1:2004 + A1:2008 are given in the Annexes of this European technical approval.

The characteristic values for pullout and bearing resistance (timber substructure) calculated according to EN 1995-1-1:2004 + A1:2008 are compared with the characteristic values for component I (pull over and bearing resistance) stated in the therefore foreseen column or line of the table in the appropriate Annexes. The lower value is used for further calculations.



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#### 4.3 Installation

The installation is only carried out according to the manufacturer's instructions. The manufacturer hands over the assembly instructions to the assembler.

It is guaranteed by the execution that no bimetallic corrosion will occur.

Screws with washers and EPDM sealing rings exposed to external weather are screwed-in with electric screw driver with appropriate set depth stop.

The use of impact wrenches is not allowed.

The fastening elements are fixed rectangular to the surface of the components to guarantee a correct load bearing and if necessary rain-proof connection.

Component I and component II are in contact to each other in the connection area. The use of compression resistant thermal insulation strips up to a thickness of 3 mm is allowed.

During installation of fastening screws admissible for timber substructures, except self-drilling screws, the components I and II which shall be connected are predrilled with  $d_{pd} = 0.7 d$  (d nominal screw diameter) as long as no other instructions are given in the Annexes.

Fastening screws for steel substructures are screwed-in with the cylindrical part of the thread

- through the material if component II has a thickness up to 6 mm and

- at least 6 mm if component II has a thickness over 6 mm.

Welded drill bits or hardened tips are therefore not be taken into account.

The manufacturer's information about the maximum clamp length is considered.

Already loaded screws in regular load bearing connections are if required only replaced by thread forming screws with a larger diameter. Therefore the hole has to be predrilled for the thicker fastening screw.

The conformity of the installed fasteners with the provisions of the European technical approval is attested by the executing company.

#### 5 Indications to the manufacturer

It is in the responsibility of the manufacturer to ensure that the information on the specific conditions according to 1, 2, 4.2 and 4.3 (including Annexes referred to) is given to those who are concerned. This information may be given by reproduction of the respective parts of the European technical approval.

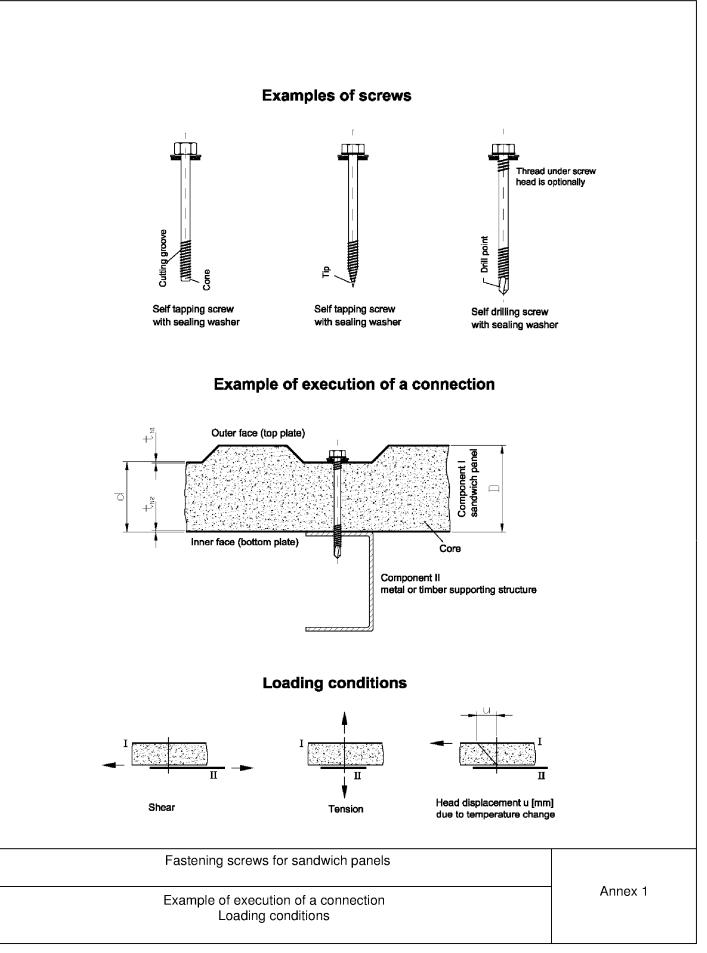
In addition all installation data (e. g. application limits) shall be shown clearly on the package and/or on an enclosed instruction sheet, preferably using illustration(s).

Andreas Kummerow p. p. Head of Department *beglaubigt:* Hahn

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English translation prepared by DIBt





#### Page 12 of European technical approval ETA-13/0183 of 14 June 2013

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-	ø10-11 ø16			Materials					
			Fastener:		s steel, EN 1 -Nr. 1.4567				
ø 7,1				Washer: Stainless steel, EN 10088 Material-Nr. 1.4301 with v				zed EPDM-s	seal
ŧ	+	4	+	Component I:	S280GD	, S320GD o	r S350GD -	EN 10346	
1,81				Component II		275 or S355 ), S320GD o			
© 5,5	ø 5,5 ø 5,5 ø 12		9	Drilling-capac	city:	Σt <sub>i</sub> ≤ 5,0 mm			
12			+	Timber substi	ructures:				
-	ø4,7-4,8	3	Internet	No performar	nce determi	ned			
t <sub>ii</sub> (m	m] =	1,50	2,00	2,50	3,00	4,00	-	-	
M <sub>t,n</sub>	om =				0	-			
	0,40	0,67	0,85	0,85	0,85	0,85	5	-	5
5	0,50	1,12	1,28	1,28	1,28	1,28	-	-	-
] <sup>1</sup> 2	0,55	1,34	1,50	1,50	1,50	1,50	-	-	-
<u> </u>	0,63	1,70	1,84	1,84	1,84	1,84	-	-	-
V <sub>R,k</sub> [kN] for t <sub>N2</sub> [mm]	0,75	1,70	1,99	2,01	2,02	2,02	-	-	-
	0,88	1,70	1,99	2,01	2,02	2,02	-	-	-
	1,00	1,70	1,99	2,01	2,02	2,02	-	-	-
	0,40	1,48	1,48 <sup>a)</sup>	1,48 <sup>a)</sup>	1,48 <sup>a)</sup>	1,48 <sup>a)</sup>	-	-	-
5	0,50	1,79	1,79 <sup>a)</sup>	1,79 <sup>a)</sup>	1,79 <sup>a)</sup>	1,79 <sup>a)</sup>	-	-	-
2	0,55	1,97	2,04 <sup>a)</sup>	2,04 <sup>a)</sup>	2,04 <sup>a)</sup>	2,04 <sup>a)</sup>	-	-	-
N <sub>R,k</sub> [kN] for t <sub>N1</sub> [mm]	0,63	1,97	2,33	2,46 <sup>a)</sup>	2,46 <sup>a)</sup>	2,46 <sup>a)</sup>	-	-	-
A <sub>R,k</sub> t <sub>N1</sub>	0,75	1,97	2,33	3,07	3,07 <sup>a)</sup>	3,07 <sup>a)</sup>	-	-	-
<u> </u>	0,88	1,97	2,33	3,31	3,86 <sup>a)</sup>	3,86 <sup>a)</sup>	-	-	-
	1,00	1,97	2,33	3,31	4,29	4,66 <sup>a)</sup>	-	-	-
n e	30,0	14,0	14,0	1,5	1,5	1,5	-	-	-
f thi	40,0	17,0	18,7	4,7	4,7	3,3	-	-	-
max. head displacement u [mm] as a function of the sandwich element thickness	50,0	21,0	23,3	7,8	7,8	5,2	-	-	-
ad displac a function twich elen thickness	60,0	24,0	28,0	11,0	11,0	7,0	-	-	-
dist ch e Kne	70,0	28,0	32,7	14,2	14,2	8,7	-	-	-
ad dwii thic	80,0	32,0	37,3	17,3	17,3	10,3	-	-	-
he ח] מי מחול	100,0	40,0	40,0	23,7	23,7	13,7	-	-	-
ax. nr	120,0	40,0	40,0	30,0	30,0	17,0	-	-	-
	<u>&gt;</u> 140,0	40,0	40,0	36,3	36,3	20,3	-	-	

For  $t_{N2}$  of S320GD or S350GD the values of  $V_{R,k}$  can be increased by 8,3 % - Index <sup>a)</sup>: For  $t_{N1}$  of S320GD or S350GD the indicated values of  $N_{R,k}$  can be increased by 8,3 %

Self-drilling screw

SFS SXC5-S16-5,5 x L SFS SXC5-L12-S16-5,5 x L with hexagon head or *irius*<sup>®</sup> drive and sealing washer  $\geq \emptyset$  16 mm



ø10÷11		ø19		Materials					
				Fastener:		s steel, EN 1 -Nr. 1.4567 o			
ø 7,1	1,81	8		Washer:		s steel, EN 1 -Nr. 1.4301 w		zed EPDM-s	seal
ŧ	+	<b>-</b>	*	Component I:	S280GE	), S320GD or	S350GD -	EN 10346	
1,81	Component II: S235, S275 or S355 EN 10025-1								
© 5,5	<u>• 5,5</u>			Drilling-capac	<u>ity:</u>	Σt <sub>i</sub> ≤ 5,0 mm			
12			3,3	<u>Timber substr</u>	uctures:				
	ø4,7-4,8	3	hanne	No performan	ce determi	ined			
t <sub>ii</sub> [m	m] =	1,50	2,00	2,50	3,00	4,00	-	-	-
Mt,n						-			
	0,40	0,67	0,85	0,85	0,85	0,85	-	-	-
_	0,50	1,12	1,28	1,28	1,28	1,28	-	i-1	-
V <sub>R,k</sub> [kN] for t <sub>N2</sub> [mm]	0,55	1,34	1,50	1,50	1,50	1,50	-	-	÷
<u>V</u> <u>E</u>	0,63	1,70	1,84	1,84	1,84	1,84	-	3 <b>-</b> 2	-
/ <sub>R,k</sub> t <sub>N2</sub>	0,75	1,70	1,99	2,01	2,02	2,02	-	-	-
-	0,88	1,70	1,99	2,01	2,02	2,02	-	-	-
	1,00	1,70	1,99	2,01	2,02	2,02	-	-	-
	0,40	1,53	1,53 <sup>a)</sup>	1,53 <sup>a)</sup>	1,53 <sup>a)</sup>	1,53 <sup>a)</sup>	-	-	-
<u> </u>	0,50	1,84	1,84 <sup>a)</sup>	1,84 <sup>a)</sup>	1,84 <sup>a)</sup>	1,84 <sup>a)</sup>	-	-	-
N <sub>R,k</sub> [kN] for t <sub>N1</sub> [mm]	0,55	1,97	2,10 <sup>a)</sup>	2,10 <sup>a)</sup>	2,10 <sup>a)</sup>	2,10 <sup>a)</sup>	-	-	-
آتا (kN	0,63	1,97	2,33	2,53 <sup>a)</sup>	2,53 <sup>a)</sup>	2,53 <sup>a)</sup>	-	-	-
la,k t <sub>N1</sub>	0,75	1,97	2,33	3,17	3,17 <sup>a)</sup>	3,17 <sup>a)</sup>	-	-	-
2	0,88	1,97	2,33	3,31	3,99 <sup>a)</sup>	3,99 <sup>a)</sup>	-	-	-
	1,00	1,97	2,33	3,31	4,29	4,80 <sup>a)</sup>	-	-	-
<b>ک</b> م	30,0	14,0	14,0	1,5	1,5	1,5	-	-	-
ent the	40,0	17,0	18,7	4,7	4,7	3,3	-	-	-
max. head displacement u [mm] as a function of the sandwich element thickness	50,0	21,0	23,3	7,8	7,8	5,2	-	-	-
lac otion sss	60,0	24,0	28,0	11,0	11,0	7,0	-	-	-
ad displac a function twich elen thickness	70,0	28,0	32,7	14,2	14,2	8,7	-	-	-
ad c a f twic thic	80,0	32,0	37,3	17,3	17,3	10,3	-	-	-
he: ] as anc	100,0	40,0	40,0	23,7	23,7	13,7	-	-	-
max. [mm]	120,0	40,0	40,0	30,0	30,0	17,0	-	-	-
<u>ت</u> ع	<u>&gt;</u> 140,0	40,0	40,0	36,3	36,3	20,3	-	-	_

- Index <sup>a)</sup>: For  $t_{N1}$  of S320GD or S350GD the indicated values of  $N_{B,k}$  can be increased by 8,3 %

Self-drilling screw	
SFS SXC5-S19-5,5 x L SFS SXC5-L12-S19-5,5 x L with hexagon head or <i>irius</i> <sup>®</sup> drive and sealing washer $\geq \emptyset$ 19 mm	Annex 3



L Ø	10-11	, ø1	6	Materials					
4,2-4,5	4,5			Fastener:		s steel, EN -Nr. 1.4567			
3 07,1	1,81		3	Washer:		s steel, EN <sup>-</sup> -Nr. 1.4301		zed EPDM-s	eal
		ø1	6	Component I:	S280GE	), S320GD o	or S350GD -	EN 10346	
Ø5,5	↓ 1,81	SF CS	5	Component II		275 or S355 ), S320GD o			
Ť	+	ø1	2, 3,3	Drilling-capac	<u>ity:</u>	Σt <sub>i</sub> ≤ 14,0 m	m		
17			3,3	Timber substr	uctures:				
<u>ø5,0-5,1</u>	<b>-●</b>   <sub>•</sub>			No performan	ce determ	ined			
t <sub>ii</sub> (m	m] =	4,00	5,00	6,00	8,00	10,00	12,00	13,00	
M <sub>t,nc</sub>	om =				\$	-			
	0,40	0,86	0,86	0,86	0,86	0,86	0,86	0,86	
5	0,50	1,18	1,18	1,18	1,18	1,18	1,18	1,18	-
] <sup>2</sup>	0,55	1,32	1,32	1,32	1,32	1,32	1,32	1,32	7
<u> </u>	0,60	1,45	1,45	1,45	1,45	1,45	1,45	1,45	-
V <sub>R,k</sub> [kN] for t <sub>N2</sub> [mm]	0,63	1,52	1,52	1,52	1,52	1,52	1,52	1,52	-
_	0,75	2,18	2,18	2,18	2,18	2,18	2,18	2,18	-
	0,88	2,18	2,18	2,18	2,18	2,18	2,18	2,18	-
	0,40	1,16	1,16	1,16	1,16	1,16	1,16	1,16	-
	0,50	1,65	1,65	1,65	1,65	1,65	1,65	1,65	-
2	0,55	1,96	1,96	1,96	1,96	1,96	1,96	1,96	-
ŢŢ	0,60	2,25	2,25	2,25	2,25	2,25	2,25	2,25	-
독특	0,63	2,43	2,43	2,43	2,43	2,43	2,43	2,43	-
N <sub>R,k</sub> [kN] for t <sub>N1</sub> [mm]	0,70	2,85	2,85	2,85	2,85	2,85	2,85	2,85	-
-	0,75	3,21	3,21	3,21	3,21	3,21	3,21	3,21	-
	0,88	3,57	3,57	3,57	3,57	3,57	3,57	3,57	-
	1,00	4,32	4,32	4,32	4,32	4,32	4,32	4,32	-
د س	30,0	5,0	4,0	3,0	3,0	3,0	3,0	3,0	-
ich ction	40,0	6,5	6,0	4,0	4,0	4,0	4,0	4,0	-
max. head splacemeni ol as a func the sandwi <u>ment thickn</u>	60,0	11,0	10,0	7,0	7,0	7,0	7,0	7,0	-
x.h Ker sar sar	80,0	16,0	15,0	10,0	10,0	10,0	10,0	10,0	-
na he len	100,0	21,5	20,5	13,0	13,0	13,0	13,0	13,0	_
max. head displacement u nm] as a functio of the sandwich lement thicknes	120,0	27,0	26,0	16,0	16,0	16,0	16,0	16,0	-
max. head displacement u [mm] as a function of the sandwich element thickness	120,0	-							

For  $t_{N2}$  of S320GD or S350GD the values of  $V_{R,k}$  can be increased by 8,3 % For  $t_{N1}$  of S320GD or S350GD the values of  $N_{R,k}$  can be increased by 8,3 %

Self-drilling screw

 $\begin{array}{l} SFS\ SXC14\text{-}S16\text{-}5,5\ x\ L\\ SFS\ SXC14\text{-}L12\text{-}S16\text{-}5,5\ x\ L\\ \text{with hexagon head or $irius^{\ensuremath{\mathbb{S}}}$ drive and sealing washer $\geq \ensuremath{\mathcal{O}}$ 16 mm } \end{array}$ 

Annex 4

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ι Ø	10-11	ø	19	Materials						
4,2-4,5	4,5		Fastener:		s steel, EN -Nr. 1.4567					
3 07,1	1,81	8		Washer:	Asher: Stainless steel, EN 10088 Material-Nr. 1.4301 with vulcanized EPDM-seal					
		ø1	0	Component I:	S280GE	), S320GD o	or S350GD -	EN 10346		
Ø5,5	ا ب ب ب ب ب ب ب ب ب ب ا		1	Component II		275 or S355 ), S320GD o				
t		ø1	- ·	Drilling-capac	<u>city:</u>	Σt <sub>i</sub> ≤ 14,0 m	m			
17		11	3,3	,3 <u>Timber substructures:</u>						
<u>ø5,0-5,1</u>	<b>-•</b>			No performar	nce determ	ined				
t <sub>ii</sub> (m	im] =	4,00	5,00	6,00	8,00	10,00	12,00	13,00	-	
M <sub>t,n</sub>	om =				5	-				
	0,40	0,86	0,86	0,86	0,86	0,86	0,86	0,86	π.	
5	0,50	1,18	1,18	1,18	1,18	1,18	1,18	1,18	-	
V <sub>R,k</sub> [kN] for t <sub>N2</sub> [mm]	0,55	1,32	1,32	1,32	1,32	1,32	1,32	1,32	7	
	0,60	1,45	1,45	1,45	1,45	1,45	1,45	1,45	-	
V <sub>R,k</sub> t <sub>N2</sub>	0,63	1,52	1,52	1,52	1,52	1,52	1,52	1,52		
-	0,75	2,18	2,18	2,18	2,18	2,18	2,18	2,18	-	
	0,88	2,18	2,18	2,18	2,18	2,18	2,18	2,18	-	
	0,40	1,24	1,24	1,24	1,24	1,24	1,24	1,24	-	
	0,50	2,04	2,04	2,04	2,04	2,04	2,04	2,04	-	
r	0,55	2,34	2,34	2,34	2,34	2,34	2,34	2,34	-	
n] fc m]	0,60	2,64	2,64	2,64	2,64	2,64	2,64	2,64		
<sub>R,k</sub> [kN] fc t <sub>N1</sub> [mm]	0,63	2,82	2,82	2,82	2,82	2,82	2,82	2,82	-	
N <sub>R,k</sub> [kN] for t <sub>N1</sub> [mm]	0,70	3,20	3,20	3,20	3,20	3,20	3,20	3,20		
-	0,75	3,52	3,52	3,52	3,52	3,52	3,52	3,52	-	
	0,88	4,46	4,46	4,46	4,46	4,46	4,46	4,46	-	
	1,00	5,40	5,40	5,40	5,40	5,40	5,40	5,40	-	
പം	30,0	5,0	4,0	3,0	3,0	3,0	3,0	3,0	-	
it u ctio lesi	40,0	6,5	6,0	4,0	4,0	4,0	4,0	4,0	-	
ieac fun ickr	60,0	11,0	10,0	7,0	7,0	7,0	7,0	7,0	-	
max. head splacement as a func the sandwi	80,0	16,0	15,0	10,0	10,0	10,0	10,0	10,0	-	
		21,5	20,5	13,0	13,0	13,0	13,0	13,0	-	
max. splace [1] as the s nent	100,0					1	1 100			
max. nead displacement u [mm] as a function of the sandwich element thickness	120,0	27,0 32,0	26,0	16,0	16,0	16,0	16,0	16,0	-	

For  $t_{N2}$  of S320GD or S350GD the values of  $V_{R,k}$  can be increased by 8,3 % For  $t_{N1}$  of S320GD or S350GD the values of  $N_{R,k}$  can be increased by 8,3 %

Self-drilling screw

 $\begin{array}{l} SFS\ SXC14-S19-5,5\ x\ L\\ SFS\ SXC14-L12-S19-5,5\ x\ L\\ with\ hexagon\ head\ or\ \emph{irius}^{\$}\ drive\ and\ sealing\ washer\ \geq \ensuremath{\mathcal{O}}\ 19\ mm \end{array}$ 



Ø1	Ø14 Ø14		4	<u>Materials</u> Fastener:					
		SF	SF5 S			s steel, EN 1 -Nr. 1.4301,	10088 1.4567, 1.44	01 or 1.45	78
$\mathbf{Y}$	8			Washer:		s steel, EN 1 -Nr. 1.4301	10088 with vulcaniz	ed EPDM-s	seal
ø10	D:11	irius <sup>®</sup> ø1	2	Component I:	S280GD	, S320GD o	or S350GD -	EN 10346	
4,2-4,5	1,81	12	3,3	Component II:			EN 10025-1 or S350GD -		
Ø 5,5		Torx	<u>т</u>	Drilling-capac	ty:	Σt <sub>i</sub> ≤ 5,0 mm	I		
12		T25 Ø1	2,3	Timber substr	uctures:				
ø 4	.5	2		No performan	ce determi	ned			
t <sub>ii</sub> (m	ım] =	1,50	1,75	2,00	2,50	3,00	4,00		-
M <sub>t,n</sub>	om =				10	-			
	0,40	0,81 <sup>a)</sup>	0,81 <sup>a)</sup>	0,81 <sup>a)</sup>	0,81 <sup>a)</sup>	0,81 <sup>a)</sup>	0,81 <sup>a)</sup>	-	=
5	0,50	1,14 <sup>a)</sup>	1,14 <sup>a)</sup>	1,14 <sup>a)</sup>	1,14 <sup>a)</sup>	1,14 <sup>a)</sup>	1,14 <sup>a)</sup>	-	-
V <sub>R,k</sub> [kN] for t <sub>N2</sub> [mm]	0,55	1,29 <sup>a)</sup>	1,31 <sup>a)</sup>	1,32 <sup>a)</sup>	1,35 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	-	÷
<u> </u>	0,60	1,44 <sup>a)</sup>	1,47 <sup>a)</sup>	1,50 <sup>a)</sup>	1,56 <sup>a)</sup>	1,63 <sup>a)</sup>	1,63 <sup>a)</sup>		
/ <sub>R,k</sub> t <sub>N2</sub>	0,63	1,53 <sup>a)</sup>	1,57 <sup>a)</sup>	1,61 <sup>a)</sup>	1,69 <sup>a)</sup>	1,77 <sup>a)</sup>	1,77 <sup>a)</sup>	-	-
-	0,75	1,89 <sup>a)</sup>	1,97 <sup>a)</sup>	2,05 <sup>a)</sup>	2,20 <sup>a)</sup>	2,36 <sup>a)</sup>	2,36 <sup>a)</sup>	-	-
	0,88	1,89 <sup>a)</sup>	1,97 <sup>a)</sup>	2,05 <sup>a)</sup>	2,20 <sup>a)</sup>	2,36 <sup>a)</sup>	2,36 <sup>a)</sup>		
	0,40	1,07 <sup>b)</sup>	1,07 <sup>b)</sup>	1,07 <sup>b)</sup>	1,07 <sup>b)</sup>	1,07 <sup>b)</sup>	1,07 <sup>b)</sup>	-	-
	0,50	1,34 <sup>b)</sup>	1,34 <sup>b)</sup>	1,34 <sup>b)</sup>	1,34 <sup>b)</sup>	1,34 <sup>b)</sup>	1,34 <sup>b)</sup>	-	-
	0,55	1,69 <sup>b)</sup>	1,69 <sup>b)</sup>	1,69 <sup>b)</sup>	1,69 <sup>b)</sup>	1,69 <sup>b)</sup>	1,69 <sup>b)</sup>	-	-
G	0,60	1,88	2,04 <sup>b)</sup>	2,04 <sup>b)</sup>	2,04 <sup>b)</sup>	2,04 <sup>b)</sup>	2,04 <sup>b)</sup>		
	0,63	1,88	2,25	2,25 <sup>b)</sup>	2,25 <sup>b)</sup>	2,25 <sup>b)</sup>	2,25 <sup>b)</sup>	-	-
N <sub>R,k</sub> [kN] for t <sub>N1</sub> [mm]	0,70	1,88	2,38	2,74	2,74 <sup>b)</sup>	2,74 <sup>b)</sup>	2,74 <sup>b)</sup>		
<del>د</del> آ	0,75	1,88	2,38	2,87	3,09 <sup>b)</sup>	3,09 <sup>b)</sup>	3,09 <sup>b)</sup>	-	-
	0,88	1,88	2,38	2,87	4,00 <sup>b)</sup>	4,00 <sup>b)</sup>	4,00 <sup>b)</sup>	-	-
	1,00	1,88	2,38	2,87	4,34	4,84 <sup>b)</sup>	4,84 <sup>b)</sup>	-	-
	N <sub>R,II,k</sub> <sup>c)</sup>	1,88	2,38	2,87	4,34	5,81	7,28	-	-
_	30.0	18,0	14,0	10,0	3,0	3,0	3,0	-	-
ם פ	40,0	19,0	16,0	14,0	4,0	4,0	4,0	-	-
י דים ר.	50,0	20,0	19,0	18,0	7,0	7,0	7,0	-	-
ement u as a i of the wich ent	] 30,0			22,0	8,0	8,0	8,0	-	-
acement u m] as a tion of the andwich lement	60,0	22,0	22,0	22,0					
displacement u [mm] as a function of the sandwich element	60,0 80,0	22,0 22,0	22,0 22,0	22,0	11,0	11,0	11,0	-	-

- Index <sup>b)</sup>: For  $t_{N1}$  of S320GD or S350GD the indicated values of  $N_{R,k}$  can be increased by 8,3 % - Index <sup>c)</sup>: Pull-out resistance from component II

Self-drilling screw

SFS SX5-S14-5,5 x L, SFS SX5-L12-S14-5,5 x L SFS SX5-D12-S14-5,5 x L with hexagon head, torx or *irius*<sup>®</sup> drive and sealing washer  $\geq \emptyset$  14 mm Annex 6

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English translation prepared by DIBt



ØI			$\overline{\ }$	<u>Materials</u> Fastener:		s steel, EN 1 -Nr. 1.4301,		401 or 1.45	78
Y		C	)	Washer:	Stainles	s steel, EN 1 -Nr. 1.4301	10088		
ø 10	):11	irius <sup>®</sup> 🚽 ø1	2	Component I:	S280GE	, S320GD o	r S350GD -	EN 10346	
4,2-4,5	1,81				: S235, S	275 or S355 ), S320GD o	EN 10025-	1	
Ø 5,5		Torx	· 	Drilling-capac	<u>ity:</u>	Σt <sub>i</sub> ≤ 5,0 mm	l		
12		T25 Ø1	2,3	Timber substr					
ø 4	.5	2	TRA	No performan	ce determi	ined			
t <sub>ii</sub> [m	m] =	1,50	1,75	2,00	2,50	3,00	4,00	-	-
M <sub>t,n</sub>						-			1
	0,40	0,81 <sup>a)</sup>	0,81 <sup>a)</sup>	0,81 <sup>a)</sup>	0,81 <sup>a)</sup>	0,81 <sup>a)</sup>	0,81 <sup>a)</sup>	-	-
	0,50	1,14 <sup>a)</sup>	1,14 <sup>a)</sup>	1,14 <sup>a)</sup>	1,14 <sup>a)</sup>	1,14 <sup>a)</sup>	1,14 <sup>a)</sup>	-	-
f	0,55	1,29 <sup>a)</sup>	1,31 <sup>a)</sup>	1,32 <sup>a)</sup>	1,35 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	-	÷
V <sub>R,k</sub> [kN] for t <sub>N2</sub> [mm]	0,60	1,44 <sup>a)</sup>	1,47 <sup>a)</sup>	1,50 <sup>a)</sup>	1,56 <sup>a)</sup>	1,63 <sup>a)</sup>	1,63 <sup>a)</sup>	5 <b>-</b> 0	-
r,k t <sub>N2</sub>	0,63	1,53 <sup>a)</sup>	1,57 <sup>a)</sup>	1,61 <sup>a)</sup>	1,69 <sup>a)</sup>	1,77 <sup>a)</sup>	1,77 <sup>a)</sup>	-	-
>	0,75	1,89 <sup>a)</sup>	1,97 <sup>a)</sup>	2,05 <sup>a)</sup>	2,20 <sup>a)</sup>	2,36 <sup>a)</sup>	2,36 <sup>a)</sup>	-	-
	0,88	1,89 <sup>a)</sup>	1,97 <sup>a)</sup>	2,05 <sup>a)</sup>	2,20 <sup>a)</sup>	2,36 <sup>a)</sup>	2,36 <sup>a)</sup>	-	-
	0,40	1,15 <sup>b)</sup>	1,15 <sup>b)</sup>	1,15 <sup>b)</sup>	1,15 <sup>b)</sup>	1,15 <sup>b)</sup>	1,15 <sup>b)</sup>	-	-
	0,50	1,52 <sup>b)</sup>	1,52 <sup>b)</sup>	1,52 <sup>b)</sup>	1,52 <sup>b)</sup>	1,52 <sup>b)</sup>	1,52 <sup>b)</sup>	-	-
	0,55	1,88	1,91 <sup>b)</sup>	1,91 <sup>b)</sup>	1,69 <sup>b)</sup>	1,69 <sup>b)</sup>	1,69 <sup>b)</sup>	-	-
Q	0,60	1,88	2,31	2,31 <sup>b)</sup>	2,31 <sup>b)</sup>	2,31 <sup>b)</sup>	2,31 <sup>b)</sup>	-	-
	0,63	1,88	2,38	2,55 <sup>b)</sup>	2,55 <sup>b)</sup>	2,55 <sup>b)</sup>	2,55 <sup>b)</sup>	-	-
N <sub>R,k</sub> [kN] for t <sub>N1</sub> [mm]	0,70	1,88	2,38	2,87	3,10 <sup>b)</sup>	3,10 <sup>b)</sup>	3,10 <sup>b)</sup>	-	-
L L	0,75	1,88	2,38	2,87	3,50 <sup>b)</sup>	3,50 <sup>b)</sup>	3,50 <sup>b)</sup>	-	-
	0,88	1,88	2,38	2,87	4,34	4,52 <sup>b)</sup>	4,52 <sup>b)</sup>	-	-
	1,00	1,88	2,38	2,87	4,34	5,47	5,47 <sup>b)</sup>	-	-
	N <sub>R,II,k</sub> <sup>c)</sup>	1,88	2,38	2,87	4,34	5,81	7,28	-	-
	י יה,וו,א		1	10.0	3,0	3,0	3,0	-	-
	30,0	18,0	14,0	10,0					1
a the the	30,0	18,0 19,0	14,0 16,0	10,0	4,0	4,0	4,0	-	-
ement u as a wich wich	30,0				4,0 7,0	4,0 7,0	4,0 7,0	-	-
acement u m] as a tion of the andwich lement	30,0	19,0	16,0	14,0					
displacement u [mm] as a function of the sandwich element	30,0	19,0 20,0	16,0 19,0	14,0 18,0	7,0	7,0	7,0	-	-

- Index <sup>c)</sup>: Pull-out resistance from component II

Self-drilling screw

Self-utiling Selfew

SFS SX5-S16-5,5 x L, SFS SX5-L12-S16-5,5 x L SFS SX5-D12-S16-5,5 x L with hexagon head, torx or *irius*<sup>®</sup> drive and sealing washer  $\geq \emptyset$  16 mm



ØI				<u>Materials</u> Fastener:		s steel, EN 1 -Nr. 1.4301,		401 or 1.45	78
				Washer: Stainless steel, EN 10088 Material-Nr. 1.4301 with vulcanized EPDM-seal					
ø 10	)÷11	irius <sup>®</sup>	2	Component I:	S280GD	, S320GD o	r S350GD -	EN 10346	
	1,81	1	3,3	Component II		275 or S355 ), S320GD o			
Ø`5,5		Torx		Drilling-capac	city:	Σt <sub>i</sub> ≤ 5,0 mm	1		
12	5	T25 Ø1	2,3	<u>Timber substr</u> No performar		ned			
t <sub>ii</sub> (m	m] =	1,50	1,75	2,00	2,50	3,00	4,00	-	-
M <sub>t,n</sub>	om =				0	-	-		
	0,40	0,81 <sup>a)</sup>	0,81 <sup>a)</sup>	0,81 <sup>a)</sup>	0,81 <sup>a)</sup>	0,81 <sup>a)</sup>	0,81 <sup>a)</sup>	-	-
5	0,50	1,14 <sup>a)</sup>	1,14 <sup>a)</sup>	1,14 <sup>a)</sup>	1,14 <sup>a)</sup>	1,14 <sup>a)</sup>	1,14 <sup>a)</sup>	-	-
V <sub>R,k</sub> [kN] for t <sub>N2</sub> [mm]	0,55	1,29 <sup>a)</sup>	1,31 <sup>a)</sup>	1,32 <sup>a)</sup>	1,35 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	-	-
<u> </u>	0,60	1,44 <sup>a)</sup>	1,47 <sup>a)</sup>	1,50 <sup>a)</sup>	1,56 <sup>a)</sup>	1,63 <sup>a)</sup>	1,63 <sup>a)</sup>	· - ·	-
<ul> <li>K</li> <li>CR, κ</li> <li>t<sub>N</sub></li> </ul>	0,63	1,53 <sup>a)</sup>	1,57 <sup>a)</sup>	1,61 <sup>a)</sup>	1,69 <sup>a)</sup>	1,77 <sup>a)</sup>	1,77 <sup>a)</sup>	-	-
-	0,75	1,89 <sup>a)</sup>	1,97 <sup>a)</sup>	2,05 <sup>a)</sup>	2,20 <sup>a)</sup>	2,36 <sup>a)</sup>	2,36 <sup>a)</sup>	-	-
	0,88	1,89 <sup>a)</sup>	1,97 <sup>a)</sup>	2,05 <sup>a)</sup>	2,20 <sup>a)</sup>	2,36 <sup>a)</sup>	2,36 <sup>a)</sup>	-	-
	0,40	1,43 <sup>b)</sup>	1,43 <sup>b)</sup>	1,43 <sup>b)</sup>	1,43 <sup>b)</sup>	1,43 <sup>b)</sup>	1,43 <sup>b)</sup>	-	-
	0,50	1,87	1,87 <sup>b)</sup>	1,87 <sup>b)</sup>	1,87 <sup>b)</sup>	1,87 <sup>b)</sup>	1,87 <sup>b)</sup>	-	-
	0,55	1,88	2,36	2,36 <sup>b)</sup>	2,36 <sup>b)</sup>	2,36 <sup>b)</sup>	2,36 <sup>b)</sup>	-	-
_ fo	0,60	1,88	2,38	2,38 <sup>b)</sup>	2,38 <sup>b)</sup>	2,38 <sup>b)</sup>	2,38 <sup>b)</sup>	-	-
N <sub>R,k</sub> [kN] for t <sub>N1</sub> [mm]	0,63	1,88	2,38	2,87	3,14 <sup>b)</sup>	3,14 <sup>b)</sup>	3,14 <sup>b)</sup>	-	-
± ⊑ 1 =	0,70	1,88	2,38	2,87	3,82 <sup>b)</sup>	3,82 <sup>b)</sup>	3,82 <sup>b)</sup>	-	-
L T L	0,75	1,88	2,38	2,87	4,31	4,31 <sup>b)</sup>	4,31 <sup>b)</sup>	-	-
-	0,88	1,88	2,38	2,87	4,34	5,57	5,57 <sup>b)</sup>	-	-
	1,00	1,88	2,38	2,87	4,34	5,81	6,74	-	-
	()	1,88	2,38	2,87	4,34	5,81	7,28	-	-
	N <sub>R,II,k</sub> <sup>c)</sup>				3,0	3,0	3,0	-	-
	N <sub>R,II,k</sub> <sup>cy</sup> 30,0	18,0	14,0	10,0	0,0	-,-	0,0		
antu the t	30,0		14,0 16,0	10,0 14,0	4,0	4,0	4,0	-	-
ement u as a n of the wich nent	30,0	18,0				-		-	-
lacement u nm] as a stion of the andwich element	30,0	18,0 19,0	16,0	14,0	4,0	4,0	4,0		
displacement u [mm] as a function of the sandwich element	30,0	18,0 19,0 20,0	16,0 19,0	14,0 18,0	4,0 7,0	4,0 7,0	4,0 7,0	-	

Self-drilling screw

SFS SX5-S19-5,5 x L, SFS SX5-L12-S19-5,5 x L SFS SX5-D12-S19-5,5 x L with hexagon head, torx or *irius*<sup>®</sup> drive and sealing washer  $\geq \emptyset$  19 mm

Annex 8

Electronic copy of the ETA by DIBt: ETA-13/0183



		Ø22		<u>Materials</u> Fastener:		s steel, EN 1 -Nr. 1.4301,		401 or 1.45	78
			$\mathcal{I}$	Washer:		s steel, EN 1 -Nr. 1.4301		zed EPDM-s	seal
- 8		irius <sup>®</sup>	_	Component I:	S280GD	), S320GD o	r S350GD -	EN 10346	
4,2-4,5 1 2			3,3	Component II		275 or S355 ), S320GD o			
Ø 5,5	1,81	-	<u> </u>	Drilling-capac	city:	Σt <sub>i</sub> ≤ 5,0 mm	1		
12		Torx T25 Ø12	2	Timber subst	ructures:				
ø 4	5 .5	12	1,0	No performar	nce determi	ined			
t <sub>ii</sub> (m	im] =	1,50	1,75	2,00	2,50	3,00	4,00	-	-
	om =					-			I
	0,40	0,81 <sup>a)</sup>	0,81 <sup>a)</sup>	0,81 <sup>a)</sup>	0,81 <sup>a)</sup>	0,81 <sup>a)</sup>	0,81 <sup>a)</sup>	-	-
L	0,50	1,14 <sup>a)</sup>	1,14 <sup>a)</sup>	1,14 <sup>a)</sup>	1,14 <sup>a)</sup>	1,14 <sup>a)</sup>	1,14 <sup>a)</sup>	-	-
<u> </u>	0,55	1,29 <sup>a)</sup>	1,31 <sup>a)</sup>	1,32 <sup>a)</sup>	1,35 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	-	-
t <sub>N2</sub> [kN] fc t <sub>N2</sub> [mm]	0,60	1,44 <sup>a)</sup>	1,47 <sup>a)</sup>	1,50 <sup>a)</sup>	1,56 <sup>a)</sup>	1,63 <sup>a)</sup>	1,63 <sup>a)</sup>		
V <sub>R,k</sub> [kN] for t <sub>N2</sub> [mm]	0,63	1,53 <sup>a)</sup>	1,57 <sup>a)</sup>	1,61 <sup>a)</sup>	1,69 <sup>a)</sup>	1,77 <sup>a)</sup>	1,77 <sup>a)</sup>	-	-
~	0,75	1,89 <sup>a)</sup>	1,97 <sup>a)</sup>	2,05 <sup>a)</sup>	2,20 <sup>a)</sup>	2,36 <sup>a)</sup>	2,36 <sup>a)</sup>	-	-
	0,88	1,89 <sup>a)</sup>	1,97 <sup>a)</sup>	2,05 <sup>a)</sup>	2,20 <sup>a)</sup>	2,36 <sup>a)</sup>	2,36 <sup>a)</sup>	-	-
	0,40	1,88	1,90 <sup>b)</sup>	1,90 <sup>b)</sup>	1,90 <sup>b)</sup>	1,90 <sup>b)</sup>	1,90 <sup>b)</sup>	-	-
	0,50	1,88	2,33	2,33 <sup>b)</sup>	2,33 <sup>b)</sup>	2,33 <sup>b)</sup>	2,33 <sup>b)</sup>	-	-
	0,55	1,88	2,38	2,87	2,94 <sup>b)</sup>	2,94 <sup>b)</sup>	2,94 <sup>b)</sup>	-	-
_ fo	0,60	1,88	2,38	2,38 <sup>b)</sup>	2,38 <sup>b)</sup>	2,38 <sup>b)</sup>	2,38 <sup>b)</sup>		
ĺ, Ĕ	0,63	1,88	2,38	2,87	3,91 <sup>b)</sup>	3,91 <sup>b)</sup>	3,91 <sup>b)</sup>	-	-
N <sub>R,k</sub> [kN] for t <sub>N1</sub> [mm]	0,70	1,88	2,38	2,87	3,82 <sup>b)</sup>	3,82 <sup>b)</sup>	3,82 <sup>b)</sup>		
ž	0,75	1,88	2,38	2,87	4,34	5,37	5,37 <sup>b)</sup>	-	-
	0,88	1,88	2,38	2,87	4,34	5,81	6,95	-	-
	1,00	1,88	2,38	2,87	4,34	5,81	7,28	-	-
	N <sub>R,II,k</sub> <sup>c)</sup>	1,88	2,38	2,87	4,34	5,81	7,28	-	-
⊐ o	30,0	18,0	14,0	10,0	3,0	3,0	3,0	-	-
۲ ۲ ۲ ۲ ۲ ۳ ۳	40,0	19,0	16,0	14,0	4,0	4,0	4,0	-	-
ニのごしし	50,0	20,0	19,0	18,0	7,0	7,0	7,0	-	-
ne Tvi ation ation	60,0	22,0	22,0	22,0	8,0	8,0	8,0	-	-
nacem nm] a: ction c andwi sleme		22,0	22,0	22,0	11,0	11,0	11,0	-	-
displacement u [mm] as a function of the sandwich element	80,0	22,0	22,0	22,0	12,0	12,0	12,0		

- Index <sup>c)</sup>: Pull-out resistance from component II

Self-drilling screw

SFS SX5-S22-5,5 x L, SFS SX5-L12-S22-5,5 x L SFS SX5-D12-S22-5,5 x L with hexagon head, torx or *irius*<sup>®</sup> drive and sealing washer  $\geq \emptyset$  22 mm

English translation prepared by DIBt



Ø	16	Ø	16	Materials					
	8 SFS S			Fastener:		ss Steel, DIN I-Nr. 1.4301,		401 or 1.45	78
	3	C	Ĺ	Washer:	Materia	ss steel, DIN I-Nr. 1.4301			
Ø10	0÷11	ø	12			canized EPD			
4,2-4,5			3,3	Component I:		D to S350GD			
12	1,81	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$							326
Ø5,5				Drilling-capaci	ty:	Σt <sub>i</sub> ≤ 14,00 n	nm		
17				Timber substru	uctures:				
ø5,0				No performan	ce determ	nined			
t <sub>ii</sub> [m	m] =	4,00	5,00	6,00	8,00	10,00	12,00	13,00	25,00
M <sub>t,nc</sub>					6	-			
	0,40	0,86	0,86	0,86	0,86	0,86	0,86	0,86	-
<u> </u>	0,50	1,18	1,18	1,18	1,18	1,18	1,18	1,18	_
V <sub>R.k</sub> [kN] for t <sub>N2</sub> [mm]	0,55	1,32	1,32	1,32	1,32	1,32	1,32	1,32	—
<u> </u>	0,63	1,52	1,52	1,52	1,52	1,52	1,52	1,52	—
L <sub>N2</sub> /R,k	0,75	2,18	2,18	2,18	2,18	2,18	2,18	2,18	—
-	0,88	2,18	2,18	2,18	2,18	2,18	2,18	2,18	_
	1,00	2,18	2,18	2,18	2,18	2,18	2,18	2,18	_
	0,40	1,16	1,16	1,16	1,16	1,16	1,16	1,16	_
2	0,50	1,65	1,65	1,65	1,65	1,65	1,65	1,65	_
<u> </u>	0,55	1,96	1,96	1,96	1,96	1,96	1,96	1,96	_
소트	0,63	2,43	2,43	2,43	2,43	2,43	2,43	2,43	_
N <sub>R,k</sub> [kN] for t <sub>N1</sub> [mm]	0,75	3,21	3,21	3,21	3,21	3,21	3,21	3,21	
	0,88	3,57	3,57	3,57	3,57	3,57	3,57	3,57	
	1,00	4,32	4,32	4,32	4,32	4,32	4,32	4,32	_
D o	30,0	5,0	4,0	3,0	3,0	3,0	3,0	3,0	_
ent af th	40,0	6,5	6,0	4,0	4,0	4,0	4,0	4,0	_
	50,0	9,0	8,0	5,5	5,5	5,5	5,5	5,5	_
head displaceme n] as a function of t sandwich element thickness	60,0	11,0	10,0	7,0	7,0	7,0	7,0	7,0	_
k - dis	80,0	16,0	15,0	10,0	10,0	10,0	10,0	10,0	_
ead is a dwi	90,0	19,0	18,0	11,5	11,5	11,5	11,5	11,5	_
. he n] a san	100,0	21,5	20,5	13,0	13,0	13,0	13,0	13,0	_
max. head displacement u [mm] as a function of the sandwich element thickness	120,0	27,0	26,0	16,0	16,0	16,0	16,0	16,0	_
	≥ 140,0	32,0	31,0	19,0	19,0	19,0	19,0	19,0	_

For  $t_{N2}$  of S320GD or S350GD the values of  $V_{B,k}\,can$  be increased by 8,3 % For  $t_{N1}$  of S320GD or S350GD the values of  $N_{B,k}\,can$  be increased by 8,3 %

Self-drilling screw

### SFS SX14-S16-5,5 x L, SFS SX14-L12-S16-5,5 x L

with hexagon head or  $irius^{\text{@}}$  drive and sealing washer  $\geq \emptyset$  16,0 mm



Ø1	9	Ø19		Materials					
(ISP		6	$\overline{)}$	Fastener:		s Steel, DIN -Nr. 1.4301,		401 or 1.45	78
	1	S	)	Washer:	Material	s steel, DIN -Nr. 1.4301 canized EPD			
Ø10	÷11	ø12	- ·	Component I:		) to S350GD		0326	
4,2-4,5			3,3						
12		2	T I	Component II:		), S320GD o			326
Ø5,5	1,81 1,81 L	1	-	Drilling-capac		Σt <sub>i</sub> ≤ 14,00 n			
17			<u>Timber substructures:</u> No performance determined						
ø5,0	-								
t <sub>ii</sub> [m	m] =	4,00	5,00	6,00	8,00	10,00	12,00	13,00	25,00
M <sub>t,n</sub>	om =			•		_			
	0,40	0,86	0,86	0,86	0,86	0,86	0,86	0,86	2 <del>111</del> 0
<u> </u>	0,50	1,18	1,18	1,18	1,18	1,18	1,18	1,18	-
⊒_fo	0,55	1,32	1,32	1,32	1,32	1,32	1,32	1,32	-
V <sub>R.k</sub> [kN] for t <sub>N2</sub> [mm]	0,63	1,52	1,52	1,52	1,52	1,52	1,52	1,52	_
<pre></pre>	0,75	2,18	2,18	2,18	2,18	2,18	2,18	2,18	_
-	0,88	2,18	2,18	2,18	2,18	2,18	2,18	2,18	_
	1,00	2,18	2,18	2,18	2,18	2,18	2,18	2,18	_
	0,40	1,24	1,24	1,24	1,24	1,24	1,24	1,24	_
	0,50	2,04	2,04	2,04	2,04	2,04	2,04	2,04	_
N <sub>R.k</sub> [kN] for t <sub>N1</sub> [mm]	0,55	2,34	2,34	2,34	2,34	2,34	2,34	2,34	_
	0,63	2,82	2,82	2,82	2,82	2,82	2,82	2,82	_
N <sub>R,k</sub> t <sub>N1</sub>	0,75	3,52	3,52	3,52	3,52	3,52	3,52	3,52	_
	0,88	4,46	4,46	4,46	4,46	4,46	4,46	4,46	_
	1,00	5,40	5,40	5,40	5,40	5,40	5,40	5,40	_
n e	30,0	5,0	4,0	3,0	3,0	3,0	3,0	3,0	_
it the	40,0	6,5	6,0	4,0	4,0	4,0	4,0	4,0	_
	50,0	9,0	8,0	5,5	5,5	5,5	5,5	5,5	_
olac ctio ess	60,0	11,0	10,0	7,0	7,0	7,0	7,0	7,0	_
ch e dist	80,0	16,0	15,0	10,0	10,0	10,0	10,0	10,0	_
s a dwi thic	90,0	19,0	18,0	11,5	11,5	11,5	11,5	11,5	_
<ul> <li>head displaceme</li> <li>n] as a function of t sandwich element thickness</li> </ul>	100,0	21,5	20,5	13,0	13,0	13,0	13,0	13,0	_
max. head displacement u [mm] as a function of the sandwich element thickness	120,0	27,0	26,0	16,0	16,0	16,0	16,0	16,0	_
	≥ 140,0	32,0	31,0	19,0	19,0	19,0	19,0	19,0	_

For  $t_{N2}$  of S320GD or S350GD the values of  $V_{R,k}$  can be increased by 8,3 % For  $t_{N1}$  of S320GD or S350GD the values of  $N_{R,k}$  can be increased by 8,3 %

Self-drilling screw

## SFS SX14-S19-5,5 x L, SFS SX14-L12-S19-5,5 x L

with hexagon head or  $irius^{\text{@}}$  drive and sealing washer  $\geq \emptyset$  19,0 mm



ø 10÷1	1	1	ø 10÷11		Ma	terials						
1	14,2-4,5					stener:			DIN EN 10 301, 1.440			
2		1,81			Wa	sher:	Materi	al-Nr. 1.43	DIN EN 10 301 EPDM sea			
1,81			Ē		Co	mponent I	· S2800	D to S35	DGD – DIN	J EN 1032	26	
	L		9			mponent I			55 – DIN B			
			Ø6,3		001	nponenti			aD or S35			26
86.3			d 4.0	ŀ								100
i i		-	ø16		Dri	lling-capa	<u>city:</u>	see table	е			
		/		-								
9	+	16	SFS									
Ø6,3		((	SFS S		Tim	nber subst	ructures:					
		$\setminus$			No	performa	nce deterr	mined				
	8											
									-	-		
t <sub>II</sub> [m	m] =	1,50	2,00	2,50	0	3,00	4,00	5,00	6,00	8,00	10,00	>10,0 <sup>b)</sup>
d		5,00		2,50         3,00         4,00         5,00         6,00         8,00         10,00							5,80	
M <sub>t,nc</sub>							-	_				
	0,40	-	-	-	_	-	-	-	-	-	-	-
_ for	0,50	0,92	0,92	0,92	_	0,92 <sup>a)</sup>						
Z E	0,55	1,11	1,11 1,38	1,1 <sup>-</sup> 1,38		1,11 <sup>a)</sup> 1,38 <sup>a)</sup>						
V <sub>R,k</sub> [kN] for t <sub>N2</sub> [mm]	0,63 0,75	1,38 1,38	1,38	1,30		1,38 <sup>a)</sup>						
Lt C	0,75	1,38	1,38	1,38		1,38 <sup>a)</sup>						
	1,00	1,38	1,38	1,38		1,38 <sup>a)</sup>						
	0,40	-	-		_	-	-	-	-	-	-	-
	0,50	1,35	1,51	1,5	1	1,51	1,51	1,51	1,51	1,51	1,51	1,51
] fo	0,55	1,71	1,91	1,9		1,91	1,91	1,91	1,91	1,91	1,91	1,91
N <sub>R,k</sub> [kN] for t <sub>N1</sub> [mm]	0,63	2,50	2,80	2,80		2,80	2,80	2,80	2,80	2,80	2,80	2,80
t <sub>N1</sub>	0,75	2,60	3,10	3,35		3,60	3,60	3,60	3,60	3,60	3,60	3,60
Z	0,88	2,70	3,30	3,55	5	3,80	3,80	3,80	3,80	3,80	3,80	3,80
	1,00	2,70	3,40	3,70		4,00	4,00	4,00	4,00	4,00	4,00	4,00
1 t +	30,0	6,0	3,5	3,0		2,0	2,0	2,0	2,0	2,0	2,0	2,0
max. head displacement u [mm] as a function of the sandwich element thickness	40,0	8,0	5,5	4,5		3,0	3,0	3,0	3,0	3,0	3,0	3,0
, le m scio ∥, le m	50,0	10,0	7,0	6,0		4,5	4,5	4,5	4,5	4,5	4,5	4,5
spla h e ess	60,0	12,0	9,0	7,5		6,0	6,0	6,0	6,0	6,0	6,0	6,0
ead displa as a func ndwich ele thickness	80,0	14,0	11,0	9,5		8,0	8,0	8,0	8,0	8,0	8,0	8,0
thi a:	90,0	16,0	13,0	11,5		10,0	10,0	10,0	10,0	10,0	10,0	10,0
e sí u	100,0	20,0	17,5	16,2		15,0	15,0	15,0	15,0	15,0	15,0	15,0
n mail	120,0	24,0	23,0	22,0		21,0	21,0	21,0	21,0	21,0	21,0	21,0
11	≥ 140,0	28,0	28,0	28,0	J	28,0	28,0	28,0	28,0	28,0	28,0	28,0

Index <sup>a)</sup>: For t<sub>N2</sub> of S320GD or S350GD the indicated values of V<sub>B,k</sub> can be increased by 8,3 % Index <sup>b)</sup>: Only for component II made of S235 or S280GD --

Self-tapping screw

SFS TDB-S-S16-6,3 x L

with hexagon head and sealing washer  $\ge \emptyset$  16,0 mm

Annex 12

Electronic copy of the ETA by DIBt: ETA-13/0183

#### Page 23 of European technical approval ETA-13/0183 of 14 June 2013

English translation prepared by DIBt



Ø 10:11	4,2-4,5		10:11 4,	10.55	<u>erials</u> tener:		ss steel, E al-Nr. 1.43		1 or 1.454	17	
		1,81		Wa	sher:	Materia	ss steel, [ al-Nr. 1.43 Icanized E	01			
1,81	L		Ø19         Drilling-capacity:         see table								
		Ø	Ø19     Drilling-capacity:     see table       Timber substructures:								
Ø6,3	<u> </u>		5	-							
			8	No	performan	ice detern	nined				
t <sub>ii</sub> (m	m] =	1,50	2,00	2,50	3,00	4,00	5,00	6,00	8,00	10,0	>10,0 °
Pre-dri	lling Ø	5,0			5,3			5,5	5	,7	5,8
M <sub>t,nc</sub>					-	-		-	-		
	0,50	1,00	1,00	1,00	1,00 <sup>a)</sup>						
n]	0,55	1,20	1,20	1,20	1,20 <sup>a)</sup>						
V <sub>R,k</sub> [kN] for t <sub>N2</sub> [mm]	0,63	1,50	1,50	1,50	1,50 <sup>a)</sup>						
R,k [ tn2	0,75	1,50	1,50	1,50	1,50 <sup>a)</sup>	1,50 <sup>a</sup>					
>	0,88	1,50	1,50	1,50	1,50 <sup>a)</sup>						
	1,00	1,50	1,50	1,50	1,50 <sup>a)</sup>	1,50 <sup>a</sup>					
L	0,50	1,35	1,51	1,51	1,51 <sup>b)</sup>						
] fo	0,55	1,71	1,91	1,91	2,00 <sup>b)</sup> 2,80 <sup>b)</sup>						
[m [m	0,63	2,50	2,80	2,80	2,80 <sup>°</sup>	2,80 3,60 <sup>b)</sup>	3,60 <sup>b)</sup>	2,80 3,60 <sup>b)</sup>	2,80 3,60 <sup>b)</sup>	2,80 <sup>5</sup> 3,60 <sup>b)</sup>	2,80 <sup>b</sup>
N <sub>R,k</sub> [kN] for t <sub>N1</sub> [mm]	0,75 0,88	2,60 2,70	3,10 3,30	3,35 3,55	3,60 <sup>5</sup> 3,80 <sup>b)</sup>	3,60 <sup>5</sup>	3,60 <sup>3</sup>	3,60 <sup>5</sup>	3,60 <sup>5</sup>	3,80 <sup>b)</sup>	3,60 <sup>b</sup>
~	1,00	2,70	3,30	3,35	4,00 <sup>b)</sup>	4,00 <sup>b</sup>					
_	30,0	6,0	3,40	3,70	2,0	4,00 2,0	2,0	2,0	2,0	2,0	2,0
nt u the	40,0	8,0	5,5	4,5	3,0	3,0	3,0	3,0	3,0	3,0	3,0
ut je	50,0	10,0	7,0	6,0	4,5	4,5	4,5	4,5	4,5	4,5	4,5
5 2 0 1	-	12,0	9,0	7,5	6,0	6,0	6,0	6,0	6,0	6,0	6,0
lacen tion c leme ss	60,0		· · ·			8,0	8,0	8,0	8,0	8,0	8,0
lisplacen unction ( h eleme kness	60,0 70,0	14,0	11,0	9,5	8,0						
ad displacen a function ( wich eleme thickness			11,0 13,0	9,5 11,5	8,0		10,0	10,0	10,0	10,0	10,0
head displacen ] as a function ( andwich eleme thickness	70,0	14,0				10,0 15,0			10,0 15,0	10,0 15,0	10,0 15,0
max. head displacement u [mm] as a function of the sandwich element thickness	70,0 80,0	14,0 16,0	13,0	11,5	10,0	10,0	10,0	10,0			

- Index <sup>b)</sup>: For  $t_{N1}$  of S350GD the indicated values of  $N_{R,k}$  can be increased by 8,3 % - Index <sup>c)</sup>: Only for component II made of S235 or S280GD.

#### Self-tapping screw

SFS TDB-S-S19-6,3 x L with hexagon head and sealing washer  $\geq \emptyset$  19 mm



ø 10÷11	1		ø 10÷11		Ma	terials						
1	4,2-4,5					stener:		ess steel, l al-Nr. 1.43				
		1,81			Wa	sher:		ess steel, l al-Nr. 1.43			EPDM se	al
, 를		+	5		Co	mponent I	: S2800	D to S35	DGD – DIN	I EN 1032	26	
1,81	Ļ					mponent I		S275, S3				
			Ø 6,3		00	mpohenti	S2800	3D, S3200 30 N/mm <sup>2</sup>	D or S35			26
86.3		<b>-</b>	Ø16	Ī	Dri	lling-capa	city:	see table	9			
		1		ŀ								
Ø6,3	+	( (	SFS S		Tim	nber subst	ructures:					
		1						minod				
	8					performa	ice deten	nneu				
		1-	<b>←</b> ►									
t <sub>ii</sub> [m	m] =	1,50	2,00	2,5	0	3,00	4,00	5,00	6,00	8,00	10,00	>10,0 <sup>b)</sup>
d		5,00				5,30			5,50			5,80
M <sub>t,nc</sub>	om =			5,30 5,50 5,70								
	0,40	-	-	-		-	-	-	-	-	-	-
5	0,50	0,92	0,92	0,9	_	0,92 <sup>a)</sup>	0,92 <sup>a)</sup>	0,92 <sup>a)</sup>	0,92 <sup>a)</sup>	0,92 <sup>a)</sup>	0,92 <sup>a)</sup>	0,92 <sup>a)</sup>
Т <sup>щ</sup>	0,55	1,11	1,11	1,1		1,11 <sup>a)</sup>	1,11 <sup>a)</sup>	1,11 <sup>a)</sup>	1,11 <sup>a)</sup>	1,11 <sup>a)</sup>	1,11 <sup>a)</sup>	1,11 <sup>a)</sup>
V <sub>R,k</sub> [kN] for t <sub>N2</sub> [mm]	0,63	1,38	1,38	1,3		1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>
Lt <sub>N</sub>	0,75	1,38	1,38	1,3		1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>
	0,88	1,38	1,38	1,3		1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>
	1,00	1,38	1,38	1,3	8	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>
	0,40 0,50	1,35	1,51	1,5	<u>.</u> н	- 1,51	1,51	- 1,51	- 1,51	- 1,51	- 1,51	- 1,51
ļā –	0,50	1,33	1,91	1,9		1,91	1,91	1,91	1,91	1,91	1,91	1,91
N <sub>R,k</sub> [kN] for t <sub>N1</sub> [mm]	0,55	2,50	2,80	2,8		2,80	2,80	2,80	2,80	2,80	2,80	2,80
	0,03	2,50	3,10	3,3		3,60	3,60	3,60	3,60	3,60	3,60	2,60
ž	0,78	2,70	3,30	3,5		3,80	3,80	3,80	3,80	3,80	3,80	3,80
	1,00	2,70	3,40	3,7		4,00	4,00	4,00	4,00	4,00	4,00	4,00
	30,0	6,0	3,5	3,0		2,0	2,0	2,0	2,0	2,0	2,0	2,0
ant ⊐of	40,0	8,0	5,5	4,		3,0	3,0	3,0	3,0	3,0	3,0	3,0
cen	50,0	10,0	7,0	6,0		4,5	4,5	4,5	4,5	4,5	4,5	4,5
ll al c	60,0	12,0	9,0	7,5		6,0	6,0	6,0	6,0	6,0	6,0	6,0
ax. head displacemen J [mm] as a function of the sandwich element thickness	80,0	14,0	11,0	9,9		8,0	8,0	8,0	8,0	8,0	8,0	8,0
thic as	90,0	16,0	13,0	11,		10,0	10,0	10,0	10,0	10,0	10,0	10,0
sa sa	100,0	20,0	17,5	16,		15,0	15,0	15,0	15,0	15,0	15,0	15,0
max. head displacement u [mm] as a function of the sandwich element thickness	120,0	24,0	23,0	22,		21,0	21,0	21,0	21,0	21,0	21,0	21,0
	≥ 140,0	28,0	28,0	28,	0	28,0	28,0	28,0	28,0	28,0	28,0	28,0

Index <sup>a)</sup>: For t<sub>N2</sub> of S320GD or S350GD the indicated values of V<sub>R,k</sub> can be increased by 8,3 % Index <sup>b)</sup>: Only for component II made of S235 or S280GD. For component II made of S275, S355, S420, S320GD, S350GD the maximum screw-in depth of the fully threaded part is 25,0 mm

Self-tapping screw

### SFS TDB-S-S16-6,3 x L - W38

with hexagon head and sealing washer  $\ge \emptyset$  16,0 mm

Annex 14

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English translation prepared by DIBt



Ø 10:11 1,81 1,81	4,2-4,5		10:11 4,2-4,5 L 06.3 19	Fast Was Con Con Drill	erials tener: sher: nponent I: nponent II: ling-capaci ber substr performan	Material Stainles Material S280GI S235, S S280GI R <sub>m</sub> ≤ 63 ity:	s steel, EN I-Nr. 1.430 s steel, EN I-Nr. 1.430 D, S320GD 275, S355 D, S320GD 0 N/mm <sup>2</sup> see table	1, 1.4401 o 1 10088 1 with vulca or S350Gl or S420 El or S350Gl	anized EPD D - EN 103 N 10025-1	46	
t <sub>ii</sub> [m Pre-dri	-	1,50 5,0	2,00	2,50	3,00 5,3	4,00	5,00	6,00 5,5	8,00	10,0	>10,0 <sup> c)</sup> 5,8
Mt,nd		5,0			5,5			5,5	5.	,7	5,6
IVI,no	0,50	1,00	1,00	1,00	1,00 <sup>a)</sup>	1,00 <sup>a)</sup>	1,00 <sup>a)</sup>	1,00 <sup>a)</sup>	1,00 <sup>a)</sup>	1,00 <sup>a)</sup>	1,00 <sup>a)</sup>
'n	0,55	1,00		1,20	1,20 <sup>a)</sup>	1,20 <sup>a)</sup>	1,20 <sup>a)</sup>	1,20 <sup>a)</sup>	1,20 <sup>a)</sup>	1,20 <sup>a)</sup>	1,00 <sup>a)</sup>
V <sub>R,k</sub> [kN] for t <sub>N2</sub> [mm]	0,63	1,50		1,50	1,50 <sup>a)</sup>	1,50 <sup>a)</sup>	1,50 <sup>a)</sup>	1,50 <sup>a)</sup>	1,50 <sup>a)</sup>	1,50 <sup>a)</sup>	1,50 <sup>a)</sup>
الله [k	0,75	1,50		1,50	1,50 <sup>a)</sup>	1,50 <sup>a)</sup>	1,50 <sup>a)</sup>	1,50 <sup>a)</sup>	1,50 <sup>a)</sup>	1,50 <sup>a)</sup>	1,50 <sup>a)</sup>
<pre></pre>	0,88	1,50		1,50	1,50 <sup>a)</sup>	1,50 <sup>a)</sup>	1,50 <sup>a)</sup>	1,50 <sup>a)</sup>	1,50 <sup>a)</sup>	1,50 <sup>a)</sup>	1,50 <sup>a)</sup>
	1,00	1,50		1,50	1,50 <sup>a)</sup>	1,50 <sup>a)</sup>	1,50 <sup>a)</sup>	1,50 <sup>a)</sup>	1,50 <sup>a)</sup>	1,50 <sup>a)</sup>	1,50 <sup>a)</sup>
	0,50	1,35		1,51	1,51 <sup>b)</sup>	1,51 <sup>b)</sup>	1,51 <sup>b)</sup>	1,51 <sup>b)</sup>	1,51 <sup>b)</sup>	1,51 <sup>b)</sup>	1,51 <sup>b)</sup>
-	0,55	1,71		1,91	2,00 <sup>b)</sup>	2,00 <sup>b)</sup>	2,00 <sup>b)</sup>	2,00 <sup>b)</sup>	2,00 <sup>b)</sup>	2,00 <sup>b)</sup>	2,00 <sup>b)</sup>
N <sub>R,k</sub> [kN] for t <sub>N1</sub> [mm]	0,63	2,50		2,80	2,80 <sup>b)</sup>	2,80 <sup>b)</sup>	2,80 <sup>b)</sup>	2,80 <sup>b)</sup>	2,80 <sup>b)</sup>	2,80 <sup>b)</sup>	2,80 <sup>b)</sup>
	0,75	2,60		3,35	3,60 <sup>b)</sup>	3,60 <sup>b)</sup>	3,60 <sup>b)</sup>	3,60 <sup>b)</sup>	3,60 <sup>b)</sup>	3,60 <sup>b)</sup>	3,60 <sup>b)</sup>
N <sub>R,I</sub>	0,88	2,70		3,55	3,80 <sup>b)</sup>	3,80 <sup>b)</sup>	3,80 <sup>b)</sup>	3,80 <sup>b)</sup>	3,80 <sup>b)</sup>	3,80 <sup>b)</sup>	3,80 <sup>b)</sup>
	1,00	2,70		3,70	4,00 <sup>b)</sup>	4,00 <sup>b)</sup>	4,00 <sup>b)</sup>	4,00 <sup>b)</sup>	4,00 <sup>b)</sup>	4,00 <sup>b)</sup>	4,00 <sup>b)</sup>
3	30,0	6,0	3,5	3,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0
the	40,0	8,0	5,5	4,5	3,0	3,0	3,0	3,0	3,0	3,0	3,0
<ul> <li>head displaceme</li> <li>n] as a function of sandwich element thickness</li> </ul>	50,0	10,0	7,0	6,0	4,5	4,5	4,5	4,5	4,5	4,5	4,5
otion stion sss	60,0	12,0	9,0	7,5	6,0	6,0	6,0	6,0	6,0	6,0	6,0
ad displac s a functio twich elen thickness	70,0	14,0	11,0	9,5	8,0	8,0	8,0	8,0	8,0	8,0	8,0
ad c s a f Jwic thic	80,0	16,0	13,0	11,5	10,0	10,0	10,0	10,0	10,0	10,0	10,0
he: i] at	100,0	20,0	17,5	16,0	15,0	15,0	15,0	15,0	15,0	15,0	15,0
max. head displacement u [mm] as a function of the sandwich element thickness	120,0	24,0	23,0	22,0	21,0	21,0	21,0	21,0	21,0	21,0	21,0
	<u>≥</u> 140,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0	28,0

 Index <sup>a)</sup>: For t<sub>N2</sub> of S350GD the indicated values of V<sub>R,k</sub> can be increased by 8,3 %
 Index <sup>b)</sup>: For t<sub>N1</sub> of S350GD the indicated values of N<sub>R,k</sub> can be increased by 8,3 %
 Index <sup>c)</sup>: Only for component II made of S235 or S280GD. For component II made of S275, S355, S420, S320GD or S350GD the maximum screw-in depth of the fully threaded part is 25,0 mm

Self-tapping screw

SFS TDB-S-S19-6,5 x L -W38 with hexagon head and sealing washer  $\geq \emptyset$  19 mm

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English translation prepared by DIBt



ø10	÷11	ø16	<b>→</b>	Materials					
4,2:4,5		SFS	2	Fastener:	Carbon galvaniz				
× 6,9	1,81	8		Washer:	Stainles Material	s steel, DIN -Nr. 1.4301 anized EPD			
				Component I	: S280GD	to S350GD	– DIN EN <sup>-</sup>	10326	
1,81		Ø16	5	Component I		275, S355 – ), S320GD o		025-1 - DIN EN 10	326
ø 5,5			)	Drilling-capa	<u>city:</u>	Σt <sub>i</sub> ≤ 5,00 mi	m		
10	ø 4,6-4,7		3,3	<u>Timber subsi</u> No performa		ned			
t <sub>ii</sub> [m	m] =	1,50	2,00	2,50	3,00	4,00	5,00	6,00	8,00
M <sub>t,n</sub>	om =			•	-	_			
	0,40	0,67	0,85	0,85	0,85	0,85	_	-	_
_	0,50	1,12	1,25	1,25	1,25	1,25	_	_	_
fo	0,55	1,34	1,50	1,50	1,50	1,50	_	-	_
V <sub>R.k</sub> [kN] for t <sub>N2</sub> [mm]	0,63	1,70	1,84	1,84	1,84	1,84	_	_	_
/ <sub>R,k</sub> t <sub>N2</sub>	0,75	1,70	1,99	2,01	2,02	2,02	—	—	—
_	0,88	1,70	1,99	2,01	2,02	2,02	—	—	-
	1,00	1,70	1,99	2,01	2,02	2,02	—	-	-
	0,40	1,48	1,48 <sup>a)</sup>	1,48 <sup>a)</sup>	1,48 <sup>a)</sup>	1,48 <sup>a)</sup>	_	_	_
_	0,50	1,79	1,79 <sup>a)</sup>	1,79 <sup>a)</sup>	1,79 <sup>a)</sup>	1,79 <sup>a)</sup>	_	-	_
] fo	0,55	1,97	2,04 <sup>a)</sup>	2,04 <sup>a)</sup>	2,04 <sup>a)</sup>	2,04 <sup>a)</sup>	_	_	_
[mi [WN	0,63	1,97	2,33	2,46 <sup>a)</sup>	2,46 <sup>a)</sup>	2,46 <sup>a)</sup>	_	_	_
N <sub>R.k</sub> [kN] for t <sub>N1</sub> [mm]	0,75	1,97	2,33	3,07	3,07 <sup>a)</sup>	3,07 <sup>a)</sup>	—	_	—
∠ _	0,88	1,97	2,33	3,31	3,86 <sup>a)</sup>	3,86 <sup>a)</sup>	_	_	_
	1.00	1,97	2,33	3,31	4,29	4,66 <sup>a)</sup>	_	_	—
	1,00	1,97							_
	1,00 30,0	1,97	14,0	1,0	1,0	1,0	—		
ent u the t					1,0 2,0	1,0 2,0	-	-	_
ement u n of the nent	30,0	14,0	14,0	1,0				 	
Macement u Stion of the Mement	30,0 40,0	14,0 17,0	14,0 17,0	1,0 2,0	2,0	2,0	_		_
displacement u function of the thelement kness	30,0 40,0 50,0	14,0 17,0 21,0	14,0 17,0 21,0	1,0 2,0 3,0	2,0 3,0	2,0 3,0	_ _		_
ad displacement u s a function of the dwich element thickness	30,0 40,0 50,0 60,0	14,0 17,0 21,0 24,0	14,0 17,0 21,0 24,0	1,0 2,0 3,0 4,0	2,0 3,0 4,0	2,0 3,0 4,0			_ _ _
head displacement u ] as a function of the andwich element thickness	30,0 40,0 50,0 60,0 80,0	14,0 17,0 21,0 24,0 28,0	14,0 17,0 21,0 24,0 28,0	1,0 2,0 3,0 4,0 5,7 6,4	2,0 3,0 4,0 5,7	2,0 3,0 4,0 5,7	_ _ _ _	_ _ _	
max. head displacement u [mm] as a function of the sandwich element thickness	30,0 40,0 50,0 60,0 80,0 90,0	14,0 17,0 21,0 24,0 28,0 32,0	14,0 17,0 21,0 24,0 28,0 32,0	1,0 2,0 3,0 4,0 5,7	2,0 3,0 4,0 5,7 6,4	2,0 3,0 4,0 5,7 6,4	- - - - -	_ _ _ _	_   

For  $t_{N2}$  of S320GD or S350GD the values of  $V_{B,k}$  can be increased by 8,3 % Index  $^{a)}$ : For  $t_{N1}$  of S320GD or S350GD the indicated values of  $N_{B,k}$  can be increased by 8,3 %

Self-drilling screw

## SFS SDT5-S16-5,5 x L, SFS SDT5-L12-S16-5,5 x L

with hexagon head or *irius*<sup>®</sup> drive and sealing washer  $\ge \emptyset$  16,0 mm

Annex 16

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English translation prepared by DIBt



ø10	-11	ø19	*	Materials					
4,2:4,5			2	Fastener:	Carbon s galvaniz				
ø6,9	1,81			Washer:	Material-	s steel, DIN Nr. 1.4301 anized EPD			
		- 10		Component I	: S280GD	to S350GD	– DIN EN 1	0326	
	L	ø19	$\rightarrow$	Component I	: S235 S	275, S355 –	DIN EN 10	025-1	
1,81		1	$\mathcal{N}$			, S320GD o			326
ø 5,5				Drilling-capa	city:	Σt <sub>i</sub> ≤ 5,00 mr	m		
10		ø12	3,3	Timber subst					
	_ø4,6-4,7	3		No performa	nce determi	ned			
t <sub>ii</sub> (m	m] =	1,50	2,00	2,50	3,00	4,00	5,00	6,00	8,00
M <sub>t,nc</sub>	om =				-	_			
	0,40	0,67	0,85	0,85	0,85	0,85	-	_	—
<u> </u>	0,50	1,12	1,28	1,28	1,28	1,28	-	_	—
⊒_f	0,55	1,34	1,50	1,50	1,50	1,50	-	-	_
호트	0,63	1,70	1,84	1,84	1,84	1,84	_	_	_
V <sub>R.k</sub> [kN] for t <sub>N2</sub> [mm]	0,75	1,70	1,99	2,01	2,02	2,02	_	_	_
-	0,88	1,70	1,99	2,01	2,02	2,02	_	_	_
	1,00	1,70	1,99	2,01	2,02	2,02	—	_	_
	0,40	1,53	1,53 <sup>a)</sup>	1,53 <sup>a)</sup>	1,53 <sup>a)</sup>	1,53 <sup>a)</sup>	_	_	_
5	0,50	1,84	1,84 <sup>a)</sup>	1,84 <sup>a)</sup>	1,84 <sup>a)</sup>	1,84 <sup>a)</sup>	—	_	_
	0,55	1,97	2,10 <sup>a)</sup>	2,10 <sup>a)</sup>	2,10 <sup>a)</sup>	2,10 <sup>a)</sup>	_	_	_
N <sub>R.k</sub> [kN] for t <sub>N1</sub> [mm]	0,63	1,97	2,33	2,53 <sup>a)</sup>	2,53 <sup>a)</sup>	2,53 <sup>a)</sup>	_	_	_
t <sub>N</sub> t	0,75	1,97	2,33	3,17	3,17 <sup>a)</sup>	3,17 <sup>a)</sup>	_	_	_
	0.00							1	_
	0,88	1,97	2,33	3,31	3,99 <sup>a)</sup>	3,99 <sup>a)</sup>	_		
	1,00	1,97 1,97	2,33 2,33	3,31 3,31	3,99 <sup>a)</sup> 4,29	3,99 <sup>a)</sup> 4,80 <sup>a)</sup>	—	_	_
	1,00 30,0	1,97 14,0		3,31 1,0	4,29 1,0				_ _
	1,00 30,0 40,0	1,97	2,33	3,31	4,29	4,80 <sup>a)</sup>	_		_ _ _
	1,00 30,0 40,0 50,0	1,97 14,0	2,33 14,0	3,31 1,0	4,29 1,0	4,80 <sup>a)</sup> 1,0			
	1,00 30,0 40,0	1,97 14,0 17,0	2,33 14,0 17,0	3,31 1,0 2,0	4,29 1,0 2,0	4,80 <sup>a)</sup> 1,0 2,0	_ 	_	_
	1,00 30,0 40,0 50,0 60,0 80,0	1,97 14,0 17,0 21,0 24,0 28,0	2,33 14,0 17,0 21,0	3,31 1,0 2,0 3,0	4,29 1,0 2,0 3,0	4,80 <sup>a)</sup> 1,0 2,0 3,0	- - -	_ _	
	1,00 30,0 40,0 50,0 60,0 80,0 90,0	1,97 14,0 17,0 21,0 24,0	2,33 14,0 17,0 21,0 24,0	3,31 1,0 2,0 3,0 4,0 5,7 6,4	4,29 1,0 2,0 3,0 4,0 5,7 6,4	4,80 <sup>a)</sup> 1,0 2,0 3,0 4,0 5,7 6,4	- - - -	_ _	_ _ _
head displacement u ] as a function of the andwich element thickness	1,00 30,0 40,0 50,0 60,0 80,0 90,0 100,0	1,97 14,0 17,0 21,0 24,0 28,0	2,33 14,0 17,0 21,0 24,0 28,0	3,31 1,0 2,0 3,0 4,0 5,7	4,29 1,0 2,0 3,0 4,0 5,7 6,4 7,1	4,80 <sup>a)</sup> 1,0 2,0 3,0 4,0 5,7	- - - - -		_ _ _ _
	1,00 30,0 40,0 50,0 60,0 80,0 90,0	1,97 14,0 17,0 21,0 24,0 28,0 32,0	2,33 14,0 17,0 21,0 24,0 28,0 32,0	3,31 1,0 2,0 3,0 4,0 5,7 6,4	4,29 1,0 2,0 3,0 4,0 5,7 6,4	4,80 <sup>a)</sup> 1,0 2,0 3,0 4,0 5,7 6,4	- - - - - -	- - - -	- - - -

For  $t_{N2}$  of S320GD or S350GD the values of  $V_{B,k}$  can be increased by 8,3 % Index  $^{a)}$ : For  $t_{N1}$  of S320GD or S350GD the indicated values of  $N_{B,k}$  can be increased by 8,3 %

Self-drilling screw

## SFS SDT5-S19-5,5 x L, SFS SDT5-L12-S19-5,5 x L

with hexagon head or *irius*<sup>®</sup> drive and sealing washer  $\ge \emptyset$  19,0 mm

Annex 17

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English translation prepared by DIBt



-	0-11	ø16	; 	Materials							
		SP T		Fastener:	Carbon Case ha	Steel Irdened and	galavanized	Н			
ø 6,9	1,81	8	7	Washer:		g3, DIN EN canized EPD					
÷	∻	<b> -</b>		Component I:	S280GE	to S350GD	– DIN EN	10326			
1,81		ø1	5	Component II		275, S355 – ), S320GD o			326		
ø 5,5			/	Drilling-capac	<u>ity:</u>	Σt <sub>i</sub> ≤ 5,00 mi	m				
10		<u>\$4,6-4,7</u> 3,3 <u>Timber substructures:</u> No performance determined									
-	ø4,6-4,7	3	Innon a	No performan	ce determi	ined					
t <sub>ii</sub> [m	ım] =	1,50	2,00	2,50	3,00	4,00	5,00	6,00	8,00		
M <sub>t,n</sub>				-							
	0,40	0,67	0,85	0,85	0,85	0,85	-	-	-		
5	0,50	1,12	1,28	1,28	1,28	1,28	-	-	_		
] fo ]	0,55	1,34	1,50	1,50	1,50	1,50	-	—	-		
<u>V</u>	0,63	1,70	1,84	1,84	1,84	1,84	_	_			
V <sub>R,k</sub> [kN] for t <sub>N2</sub> [mm]	0,75	1,70	1,99	2,01	2,02	2,02	_	_	_		
-	0,88	1,70	1,99	2,01	2,02	2,02	_	-	_		
	1,00	1,70	1,99	2,01	2,02	2,02	_	-	-		
	0,40	0,78	0,78	0,78	0,78	0,78	_	_	_		
r	0,50	1,46	1,46	1,46	1,46	1,46	_	-	-		
۲] fc m]	0,55	1,70	1,70	1,70	1,70	1,70	_	_	_		
N <sub>R,k</sub> [kN] for t <sub>N1</sub> [mm]	0,63	1,97	2,08	2,08	2,08	2,08	_		—		
L t <sub>N</sub>	0,75	1,97	2,33	2,66	2,66	2,66	_				
	0,88	1,97	2,33	3,28	3,28	3,28	_	-	_		
	1,00	1,97	2,33	3,31	3,85	3,85	_	-			
e u	30,0	14,0	14,0	1,0	1,0	1,0	_				
of th It	40,0	17,0	17,0	2,0	2,0	2,0	_	_	_		
cerr on d mer	50,0	21,0	21,0	3,0	3,0	3,0	_		_		
ad displac a functio łwich elen thickness	60,0	24,0	24,0	4,0	4,0	4,0	_	_	_		
kn kn	80,0	28,0	28,0	5,7	5,7	5,7	_	-	—		
	90,0	32,0	32,0	6,4	6,4	6,4	_	_	_		
ead c is a f dwic thic	100,0	37,0	37,0	7,1	7,1	7,1	_	_	_		
. head displaceme n] as a function of sandwich element thickness					8,6	8,6	_	l —	_		
max. head displacement u [mm] as a function of the sandwich element thickness	120,0 ≥ 140,0	37,0 37,0	37,0 37,0	8,6	10,0	10,0					

Self-drilling screw

## SFS SDT5-A16-5,5 x L, SFS SDT5-L12-A16-5,5 x L

with hexagon head or *irius*<sup>®</sup> drive and sealing washer  $\ge \emptyset$  16,0 mm

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English translation prepared by DIBt



ø10	11	ø19	-	Materials							
4,2:4,5		SFS	$\sum$	Fastener:	Carbon galvaniz						
ø6,9	1,81 Washer: AW-AIMo3 DIN EN 485										
+	+	Component I: S280GD to S350GD – DIN EN 10326 Component II: S235, S275, S355 – DIN EN 10025-1 S280GD, S320GD or S350GD – DIN EN 10326									
		<sup>ø19</sup> Component II: S235, S275, S355 – DIN EN 10025-1 S280GD, S320GD or S350GD – DIN EN 10326									
1,81		S280GD, S320GD or S350GD – DIN EN 1032							326		
ø 5,5		C	))	Drilling-capa	<u>city:</u>	Σt <sub>i</sub> ≤ 5,00 m	m				
10		ø12	3,3	Timber substructures: No performance determined							
-	ø4,6-4,7	3		No performa	nce determ	ined					
t <sub>ii</sub> [m	m] =	1,50	2,00	2,50	3,00	4,00	5,00	6,00	8,00		
M <sub>t,n</sub>	5m =								_		
	0,40	0,67	0,85	0,85	0,85	0,85	-	-	-		
5	0,50	1,12	1,28	1,28	1,28	1,28	_	_	_		
f	0,55	1,34	1,50	1,50	1,50	1,50	-	-	-		
	0,63	1,70	1,84	1,84	1,84	1,84	_	_	_		
V <sub>R,k</sub> [kN] for t <sub>N2</sub> [mm]	0,75	1,70	1,99	2,01	2,02	2,02	_	_	_		
F	0,88	1,70	1,99	2,01	2,02	2,02	_	_	-		
	1,00	1,70	1,99	2,01	2,02	2,02	_	_	_		
	0,40	1,18	1,18	1,18	1,18	1,18	_	_	_		
ŗ	0,50	1,46	1,46	1,46	1,46	1,46	_	_			
ה [חר] ה	0,55	1,70	1,70	1,70	1,70	1,70	_		_		
N <sub>R,k</sub> [kN] for t <sub>N1</sub> [mm]	0,63	1,97	2,08	2,08	2,08	2,08	_	_			
D <sub>R,</sub> ]	0,75	1,97	2,33	2,66	2,66	2,66	_	_	_		
	0,88	1,97	2,33	3,29	3,29	3,29	_		_		
	1,00	1,97	2,33	3,31	3,87	3,87					
nt u	30,0	14,0	14,0	1,0	1,0	1,0	_	_	-		
of th	40,0	17,0	17,0	2,0	2,0	2,0	_	_	—		
one	50,0	21,0	21,0	3,0	3,0	3,0	_	_	_		
spla ncti ele	60,0	24,0	24,0	4,0	4,0	4,0	_	-	_		
d dis a ful vich									_		
max. head displacement u [mm] as a function of the sandwich element thickness	40,0       17,0       17,0       2,0       2,0       -       -       -         50,0       21,0       21,0       3,0       3,0       3,0       -       -       -         60,0       24,0       24,0       4,0       4,0       -       -       -         80,0       28,0       28,0       5,7       5,7       5,7       -       -         90,0       32,0       32,0       6,4       6,4       6,4       -       -         100,0       37,0       37,0       7,1       7,1       7,1       -       -						_				
x. h m]: sai	100,0	37,0	37,0	7,1	7,1	7,1	_	-	_		
[m ma	120,0 ≥ 140,0	37,0	37,0	8,6	8,6	8,6	_	_	_		
		37,0	37,0	10,0 values of V <sub>R,k</sub> ca	10,0	10,0	_				

Self-drilling screw

## SFS SDT5-A19-5,5 x L, SFS SDT5-L12-A19-5,5 x L

with hexagon head or  $irius^{\text{@}}$  drive and sealing washer  $\geq \emptyset$  19,0 mm

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ø1	6	ø16		Materials					
	D	SF5 T		Fastener:	Carbon galvaniz				
4,2-4,5 4,2-4,5	-1	ø12	±3,3	Washer:	Stainles Material	s steel, DIN -Nr. 1.4301 canized EPD			
3 06,9	1,81	3	1	Component I:		to S350GD		0326	
00,5	<b>-</b>			Component II:					
						), S320GD o			326
Ø5,5	1,81			Drilling-capacit	ty:	Σt <sub>i</sub> ≤ 14,00 n	าm		
	1,01			Timbor substru	inturne :				
15				Timber substru					
Ø 5,0-5,1				No performance	e determ	inea			
•	-								
t <sub>II</sub> [m	m] =	4,00	5,00	6,00	8,00	10,00	12,00	13,00	25,00
M <sub>t,n</sub>	om =					_			
	0,40	0,86	0,86	0,86	0,86	0,86	0,86	0,86	-
-	0,50	1,18	1,18	1,18	1,18	1,18	1,18	1,18	—
fo	0,55	1,32	1,32	1,32	1,32	1,32	1,32	1,32	_
<sub>R,k</sub> [kN] fo t <sub>N2</sub> [mm]	0,60	1,45	1,45	1,45	1,45	1,45	1,45	1,45	_
V <sub>R.k</sub> [kN] for t <sub>N2</sub> [mm]	0,63	1,52	1,52	1,52	1,52	1,52	1,52	1,52	—
_	0,75	2,18	2,18	2,18	2,18	2,18	2,18	2,18	_
	0,88	2,18	2,18	2,18	2,18	2,18	2,18	2,18	_
	0,40	1,16	1,16	1,16	1,16	1,16	1,16	1,16	_
	0,50	1,65	1,65	1,65	1,65	1,65	1,65	1,65	_
<u> </u>	0,55	1,96	1,96	1,96	1,96	1,96	1,96	1,96	_
m] fo	0,60	2,25	2,25	2,25	2,25	2,25	2,25	2,25	_
E	0,63	2,43	2,43	2,43	2,43	2,43	2,43	2,43	_
N <sub>R,k</sub> [kN] for t <sub>N1</sub> [mm]	0,70	2,89	2,89	2,89	2,89	2,89	2,89	2,89	_
	0,75	3,21	3,21	3,21	3,21	3,21	3,21	3,21	_
	0,88	3,57	3,57	3,57	3,57	3,57	3,57	3,57	_
	1,00	4,32	4,32	4,32	4,32	4,32	4,32	4,32	_
L (0	30,0	2,0	1,0	1,0	1,0	1,0	1,0	1,0	_
max. head displacement u [mm] as a function of the sandwich element thickness	40,0	2,5	1,8	1,8	1,8	1,8	1,8	1,8	_
max. head displacement u mm] as a functio of the sandwich element thicknes:	60,0	3,5	3,3	3,3	3,3	3,3	3,3	3,3	_
K. h cen saf sar tthi	80,0	4,6	4,6	4,6	4,6	4,6	4,6	4,6	_
ma: spla [] as [he	100,0	5,7	5,7	5,7	5,7	5,7	5,7	5,7	—
	120,0	6,9	6,9	6,9	6,9	6,9	6,9	6,9	_
je di di	0,0	0,0	-,-	0,0	- ) -	- , -		,	

- For  $t_{N2}$  of S320GD or S350GD the values of  $V_{R,k}$  can be increased by 8,3 %

- For  $t_{N1}$  of S320GD or S350GD the values of  $N_{R,k}$  can be increased by 8,3 %

Self-drilling screw

### SFS SDT14-S16-5,5 x L, SFS SDT14-L12-S16-5,5 x L

with hexagon head or *irius*<sup>®</sup> drive and sealing washer  $\ge \emptyset$  16,0 mm

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$\label{eq:results} \begin{split} & \begin{array}{c} & \end{array} \\ & \end{array} \\ & \begin{array}{c} & \end{array} \\ & \end{array} \\ & \begin{array}{c} & \end{array} \\ & \begin{array}{c} & \end{array} \\ & \end{array} \\ & \begin{array}{c} & \end{array} \\ & \begin{array}{c} & \end{array} \\ & \begin{array}{c} & \end{array} \\ & \end{array} \\ & \begin{array}{c} & \end{array} \\ & \begin{array}{c} & \end{array} \\ & \begin{array}{c} & \end{array} \\ & \end{array} \\ \\ & \begin{array}{c} & \end{array} \\ & \end{array} \\ \\ & \begin{array}{c} & \end{array} \\ & \begin{array}{c} & \end{array} \\ \\ & \begin{array}{c} & \end{array} \\ \\ & \end{array} \\ \\ & \begin{array}{c} & \end{array} \\ & \end{array} \\ \\ & \begin{array}{c} & \end{array} \\ \\ & \begin{array}{c} & \end{array} \\ \\ & \end{array} \\ \\ & \begin{array}{c} & \end{array} \\ \\ & \end{array} \\ \\ & \begin{array}{c} & \end{array} \\ \\ & \end{array} \\ \\ \\ & \begin{array}{c} & \end{array} \\ \\ & \end{array} \\ \\ \\ & \begin{array}{c} & \end{array} \\ \\ & \end{array} \\ \\ \\ & \begin{array}{c} & \end{array} \\ \\ & \end{array} \\ \\ \\ & \begin{array}{c} & \end{array} \\ \\ & \end{array} \\ \\ \\ & \begin{array}{c} & \end{array} \\ \\ & \end{array} \\ \\ \\ & \end{array} \\ \\ \\ \\ \\ & \begin{array}{c} & \end{array} \\ \\ \\ \\ & \end{array} \\ \\ \\ \\ \\ \\ \\ \\ & \begin{array}{c} & \end{array} \\ \\ \\ \\ & \end{array} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$	ø1:	9	ø19		Materials							
is         galvanized           4245         010-11	( SPS		(SFS)		10.05	Carbon	Steel					
μ         μ						galvaniz	ed					
Materia - Nr. 1.4301 with vulcanized EPDM seal           05.5         1.81           05.5         1.81           05.5         1.81           05.5         1.81           05.5         1.81           05.5         1.81           05.5         1.81           05.5         1.81           05.5         1.81           05.5         1.82           05.5         1.82           0.55         1.82           0.60         8.00           0.50         1.18           0.50         1.18           0.50         1.18           0.40         0.86           0.60         1.82           0.60         1.45           1.18         1.18           1.18         1.18           1.18         1.18           1.18         1.18           1.18         1.145           1.45         1.45           1.45         1.45           1.45         1.45           1.45         1.45           1.45         1.45           1.45         1.45           1.45         1.45      <	1	-1	ø12		Washer:			EN 10088				
δ         δ	4,2-4,5			3,3				Magal				
$ \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c}$	1	1.81	3	t								
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	06,9 <u></u>		17		•							
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $					Component II:					326		
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Ø5.5			ŀ								
$\begin{split} & \begin{array}{c} & \begin{array}{c} \\ & \end{array} \end{array} \end{array} \\ & \begin{array}{c} \\ & \begin{array}{c} \\ & \end{array} \end{array} \\ & \begin{array}{c} \\ & \end{array} \\ & \begin{array}{c} \\ & \end{array} \end{array} \\ & \begin{array}{c} \\ \\ & \end{array} \end{array} \\ & \begin{array}{c} \\ & \end{array} \end{array} \\ \\ & \begin{array}{c} \\ & \end{array} \end{array} \\ & \begin{array}{c} \\ \\ & \end{array} \end{array} \\ \\ & \begin{array}{c} \\ \\ & \end{array} \end{array} \\ \\ & \begin{array}{c} \\ \\ & \end{array} \end{array} \\ \\ & \begin{array}{c} \\ \\ \\ \\ \\ \\ \\ \end{array} \end{array} \\ \\ & \begin{array}{c} \\ \\ \\ \\ \\ \\ \end{array} \end{array} \\ \\ & \begin{array}{c} \\ \\ \\ \\ \\ \\ \end{array} \end{array} \\ \\ & \begin{array}{c} \\ \\ \\ \\ \\ \\ \end{array} \end{array} \\ \\ \\ \\ \\ \\ \end{array} \end{array} \\ \\ \\ \\ \\ \\ \end{array} \end{array} \\ \\ \\ \\ \\ \\ \\ \end{array} \end{array} \\ \\ \\ \\ \\ \\ \\ \\ \\ \end{array} \end{array} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \end{array} \end{array} \\$					Drilling-capaci	ty:	Σt <sub>i</sub> ≤ 14,00 n	nm				
No performance determined           05.0-5.1_+         No performance determined           1         1         1         1         1         0.00         12.00         13.00         25.00           Mumon         0.40         0.86         0.8		1,81		ŀ								
No performance determined           05.0-5.1_+         No performance determined           1         1         1         1         1         0.00         12.00         13.00         25.00           Mumon         0.40         0.86         0.8	T T				Timber substru	ictures.						
05.0-5.1         Image: Second se	15						inod					
$ \frac{M_{1,nom}}{M_{2,nom}} =$	Ø 5,0-5,1	1			No performant	e determi	ineu					
$ \frac{M_{1,nom}}{M_{2,nom}} =$		<b>I</b>										
b         0.40         0.86         0.86         0.86         0.86         0.86         0.86         0.86         0.86	t <sub>II</sub> [m			5,00	6,00	8,00	10,00	12,00	13,00	25,00		
j         j	M <sub>t,n</sub>					-	_					
Image: Second			0,86	0,86	0,86	0,86	0,86	0,86	0,86	_		
0.75         2.18         2.14         1.24         1.24         1.24         1.24         1.24         1.24         1.24         1.24         1.24         1.24         1.24         2.34         2.34         2.34         2.34 <th< td=""><td>5</td><td></td><td></td><td></td><td></td><td>,</td><td></td><td></td><td></td><td>_</td></th<>	5					,				_		
0.75         2.18         2.14         1.24         1.24         1.24         1.24         1.24         1.24         1.24         1.24         1.24         1.24         1.24         2.34         2.34         2.34         2.34 <th< td=""><td>רא] fo</td><td>-</td><td>1,32</td><td>1,32</td><td>1,32</td><td>1,32</td><td>1,32</td><td>1,32</td><td>1,32</td><td>_</td></th<>	רא] fo	-	1,32	1,32	1,32	1,32	1,32	1,32	1,32	_		
0.75         2.18         2.14         1.24         1.24         1.24         1.24         1.24         1.24         1.24         1.24         1.24         1.24         1.24         2.34         2.34         2.34         2.34 <th< td=""><td>Σ_<u>μ</u></td><td></td><td></td><td>1,45</td><td>1,45</td><td>1,45</td><td>1,45</td><td></td><td>1,45</td><td>_</td></th<>	Σ_ <u>μ</u>			1,45	1,45	1,45	1,45		1,45	_		
0.88         2.14         1.24         1.24         1.24         1.24         1.24         1.24         1.24         1.24         1.24         1.24         1.24         1.24         1.24         2.04         2.04         2.04         2.04         2.04         2.04         2.04         2.04         2.04         2.04         2.04         2.04 <th< td=""><td>C<sub>R,</sub></td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td>1,52</td><td>_</td></th<>	C <sub>R,</sub>	-							1,52	_		
Image: set of the set		-	2,18	2,18	2,18	2,18	2,18	2,18	2,18	_		
No         No<		-	2,18	2,18	2,18	2,18	2,18	2,18	2,18	_		
No         No<		0,40	1,24	1,24	1,24	1,24	1,24	1,24	1,24	_		
Image: Section of the sectio		0,50	2,04	2,04	2,04	2,04	2,04	2,04	2,04	_		
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	5	-								_		
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ا الآ لار التا الأ		2,64	2,64	2,64	2,64	2,64	2,64	2,64	_		
$\begin{array}{c c c c c c c c c c c c c c c c c c c $			2,82			2,82		2,82	2,82	_		
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	L L N R'									_		
1,00         5,40         5,40         5,40         5,40         5,40         5,40         5,40         -           30,0         2,0         1,0         1,0         1,0         1,0         1,0         1,0         1,0         -         -           1,00         5,40         2,0         1,0         1,0         1,0         1,0         1,0         -         -           1,00         2,5         1,8         1,8         1,8         1,8         1,8         1,8         -           1,00         2,5         1,8         1,8         1,8         1,8         1,8         1,8         -           1,00         3,5         3,3         3,3         3,3         3,3         3,3         -           1,00         4,6         4,6         4,6         4,6         4,6         -         -           1,00         5,7         5,7         5,7         5,7         5,7         -           100,0         5,7         5,7         5,7         5,7         5,7         -         -           120,0         6,9         6,9         6,9         6,9         6,9         -         -										_		
30,0       2,0       1,0       1,0       1,0       1,0       1,0       1,0          y       40,0       2,5       1,8       1,8       1,8       1,8       1,8       1,8       1,8       1,8       1,8          y       60,0       3,5       3,3       3,3       3,3       3,3       3,3       3,3           y       60,0       3,5       5,7       5,7       5,7       5,7       5,7          y       60,0       3,5       5,3       3,3       3,3       3,3       3,3          y       9       9       9       6,9       6,9       6,6           y       9       9       6,9       6,9       6,9       6,9           y       120,0       6,9		-					1					
n bit       1.8 <th< td=""><td> </td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>5,40</td><td>_</td></th<>									5,40	_		
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$		30,0								_		
$ \begin{bmatrix} \ddot{0} & \bar{0} & \bar{0} & \bar{0} & \bar{0} \\ \hline 0 & \bar{0} & \bar{0} & \bar{0} & \bar{0} \\ \hline 0 & \bar{0} & \bar{0} & \bar{0} & \bar{0} \\ \hline 0 & \bar{0} & \bar{0} & \bar{0} & \bar{0} \\ \hline 0 & \bar{0} & \bar{0} & \bar{0} & \bar{0} \\ \hline 0 & \bar{0} & \bar{0} & \bar{0} & \bar{0} \\ \hline 0 & \bar{0} & \bar{0} & \bar{0} & \bar{0} \\ \hline 0 & \bar{0} & \bar{0} & \bar{0} & \bar{0} \\ \hline 0 & \bar{0} & \bar{0} & \bar{0} & \bar{0} \\ \hline 0 & \bar{0} & \bar{0} & \bar{0} & \bar{0} \\ \hline 0 & \bar{0} & \bar{0} & \bar{0} & \bar{0} \\ \hline 0 & \bar{0} & \bar{0} & \bar{0} & \bar{0} \\ \hline 0 & \bar{0} & \bar{0} & \bar{0} & \bar{0} \\ \hline 0 & \bar{0} & \bar{0} & \bar{0} & \bar{0} \\ \hline 0 & \bar{0} & \bar{0} & \bar{0} & \bar{0} \\ \hline 0 & \bar{0} & \bar{0} & \bar{0} & \bar{0} & \bar{0} \\ \hline 0 & \bar{0} & \bar{0} & \bar{0} & \bar{0} & \bar{0} \\ \hline 0 & \bar{0} & \bar{0} & \bar{0} & \bar{0} & \bar{0} \\ \hline 0 & \bar{0} & \bar{0} & \bar{0} & \bar{0} & \bar{0} & \bar{0} \\ \hline 0 & \bar{0} & \bar{0} & \bar{0} & \bar{0} & \bar{0} & \bar{0} \\ \hline 0 & \bar{0} \\ \hline 0 & \bar{0} & \bar{0} & \bar{0} & \bar{0} & \bar{0} & \bar{0} \\ \hline 0 & \bar{0} \\ \hline 0 & \bar{0} \\ \hline 0 & \bar{0} \\ \hline 0 & \bar{0} \\ \hline 0 & \bar{0} \\ \hline 0 & \bar{0} \\ \hline 0 & \bar{0} \\ \hline 0 & \bar{0} \\ \hline 0 & \bar{0} \\ \hline 0 & \bar{0} & $	d ll ctic rich	40,0								_		
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	fun fun ick	60,0								_		
$\begin{bmatrix} \breve{e} & \breve{e} & \breve{e} & \breve{e} & 100,0 & 5,7 & 5,7 & 5,7 & 5,7 & 5,7 & 5,7 & - & \\ & \breve{e} & \breve{e} & \breve{e} & 120,0 & 6,9 & 6,9 & 6,9 & 6,9 & 6,9 & 6,9 & - & \\ & \geq 140,0 & 8,0 & 8,0 & 8,0 & 8,0 & 8,0 & 8,0 & 8,0 & - & \\ \end{bmatrix}$	x. ł ace s a nt th	80,0	1							_		
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	ma splء the the	100,0		5,7			1		5,7	_		
≥ 140,0   8,0   8,0   8,0   8.0   8.0   8.0   8.0   8.0   8.0   -	eler di	120,0										
		≥ 140,0	8,0	8,0	8,0	8,0	8,0	8,0	8,0	—		

- For  $t_{N2}$  of S320GD or S350GD the values of  $V_{R,k}$  can be increased by 8,3 %

- For  $t_{N1}$  of S320GD or S350GD the values of  $N_{R,k}$  can be increased by 8,3 %

Self-drilling screw

## SFS SDT14-S19-5,5 x L, SFS SDT14-L12-S19-5,5 x L

with hexagon head or *irius*<sup>®</sup> drive and sealing washer  $\ge \emptyset$  19,0 mm

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English translation prepared by DIBt



øl	Ø16 (1955)			Materials							
	1	SF5 T		Fastener:	Carbon galvaniz						
4,2-4,5	-1	ø12		Washer:		lg3, DIN EN canized EPD					
1	1,81	1	1,0,0	Component I: S280GD to S350GD – DIN EN 10326							
3106,9	· · · · · ·	「骨		Component II	S235 S	275. S355 -	DIN EN 10	025-1			
				e empenent n		), S320GD o			326		
Ø5,5				Drilling-capac	ity:	Σt <sub>i</sub> ≤ 14,00 n	าm				
	1,81										
				Timber substr	uctures:						
15				No performan	ce determ	ined					
Ø 5,0-5,1	-										
t fue		4,00	5.00	0.00	0.00	10.00	10.00	10.00	05.00		
	t <sub>ii</sub> [mm] =		5,00	6,00	8,00	10,00	12,00	13,00	25,00		
M <sub>t,nom</sub> =		0.00	0.00	0.00	0.00		0.00	0.00	_		
	0,40	0,86	0,86	0,86	0,86	0,86	0,86	0,86			
Ę	0,55	1,18	1,18	1,18	1,18	1,18	1,18	1,18	_		
V <sub>R.k</sub> [kN] for t <sub>N2</sub> [mm]	0,60	1,32 1,45	1,32	1,32	1,32 1,45	1,32	1,32	1,32			
, k [	0,63	1,45	1,45 1,52	1,45	1,45	1,45 1,52	1,45 1,52	1,45 1,52			
>	0,00	2,18	2,18	2,18	2,18	2,18	2,18	2,18	_		
	0,88	2,18	2,18	2,18	2,18	2,18	2,18	2,18	_		
	0,40	0,62	0,62	0,62	0,62	0,62	0,62	0,62	_		
	0,50	1,34	1,34	1,34	1,34	1,34	1,34	1,34	_		
ے تو	0,55	1,60	1,60	1,60	1,60	1,60	1,60	1,60	_		
	0,63	2,03	2,03	2,03	2,03	2,03	2,03	2,03	_		
N <sub>R,k</sub> [kN] for t <sub>N1</sub> [mm]	0,75	2,66	2,66	2,66	2,66	2,66	2,66	2,66			
Z	0,88	3,28	3,28	3,28	3,28	3,28	3,28	3,28	_		
	1,00	3,85	3,85	3,85	3,85	3,85	3,85	3,85	_		
⊃ ₀	30,0	2,0	1,0	1,0	1,0	1,0	1,0	1,0	_		
	40,0	2,5	1,8	1,8	1,8	1,8	1,8	1,8	_		
head displaceme n] as a function of sandwich element thickness	50,0	3,0	2,5	2,5	2,5	2,5	2,5	2,5	_		
sss	60,0	3,5	3,3	3,3	3,3	3,3	3,3	3,3	_		
ad displac s a functio twich elen thickness	80,0	4,6	4,6	4,6	4,6	4,6	4,6	4,6	—		
t hic	90,0	5,2	5,2	5,2	5,2	5,2	5,2	5,2	_		
he: i] as	100,0	5,7	5,7	5,7	5,7	5,7	5,7	5,7	_		
max. head displacement u [mm] as a function of the sandwich element thickness	120,0	6,9	6,9	6,9	6,9	6,9	6,9	6,9	—		
	≥ 140,0	8,0	8,0	8,0	8,0	8,0	8,0	8,0	—		
	( 000000					~					

- For  $t_{N2}$  of S320GD or S350GD the values of  $V_{R,k}$  can be increased by 8,3 %

- For  $t_{N1}$  of S320GD or S350GD the values of  $N_{R,k}$  can be increased by 8,3 %

Self-drilling screw

## SFS SDT14-A16-5,5 x L, SFS SDT14-L12-A16-5,5 x L

with hexagon head or *irius*<sup>®</sup> drive and sealing washer  $\ge \emptyset$  16,0 mm

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English translation prepared by DIBt



ø1	9	ø19	1	Materials							
	1	(SFS T	)	Fastener:	Carbon galvaniz						
4,2-4,5	*	ø12		Washer:		lg3, DIN EN canized EPD					
1	1,81	1	710,0	Component I: S280GD to S350GD – DIN EN 10326							
31 06,9	- 1,01			Component II	: S235. S	275. S355 -	DIN EN 10	025-1			
						), S320GD c			326		
Ø5,5				Drilling-capac	<u>city:</u>	Σt <sub>i</sub> ≤ 14,00 n	nm				
	1,81			<u>Timber subst</u>	ructures:						
15				No performar	nce determ	ined					
Ø 5,0-5,1	1										
	-										
	t <sub>II</sub> [mm] =		5,00	6,00	8,00	10,00	12,00	13,00	25,00		
M <sub>t,nc</sub>						_					
	0,40	0,86	0,86	0,86	0,86	0,86	0,86	0,86	-		
5	0,50	1,18	1,18	1,18	1,18	1,18	1,18	1,18	_		
, T T	0,55	1,32	1,32	1,32	1,32	1,32	1,32	1,32	_		
친구	0,60	1,45	1,45	1,45	1,45	1,45	1,45	1,45	_		
V <sub>R,k</sub> [kN] for t <sub>N2</sub> [mm]	0,63	1,52	1,52	1,52	1,52	1,52	1,52	1,52	_		
	0,75	2,18	2,18	2,18	2,18	2,18	2,18	2,18	—		
	0,88	2,18	2,18	2,18	2,18	2,18	2,18	2,18	—		
	0,40	0,94	0,94	0,94	0,94	0,94	0,94	0,94	_		
5	0,50	1,34	1,34	1,34	1,34	1,34	1,34	1,34	_		
N <sub>R,k</sub> [kN] for t <sub>N1</sub> [mm]	0,55	1,60	1,60	1,60	1,60	1,60	1,60	1,60	—		
1 <u>x</u>	0,63	2,03	2,03	2,03	2,03	2,03	2,03	2,03	_		
L tr. X	0,75	2,66	2,66	2,66	2,66	2,66	2,66	2,66	_		
	0,88	3,29	3,29	3,29	3,29	3,29	3,29	3,29	_		
	1,00	3,87	3,87	3,87	3,87	3,87	3,87	3,87	_		
De .	30,0	2,0	1,0	1,0	1,0	1,0	1,0	1,0			
max. head displacement u [mm] as a function of the sandwich element thickness	40,0	2,5	1,8	1,8	1,8	1,8	1,8	1,8			
	50,0	3,0	2,5	2,5	2,5	2,5	2,5	2,5	_		
lefer eler ess	60,0	3,5	3,3	3,3	3,3	3,3	3,3	3,3	_		
. head displaceme n] as a function of sandwich element thickness	80,0	4,6	4,6	4,6	4,6	4,6	4,6	4,6	_		
thi:	90,0	5,2	5,2	5,2	5,2	5,2	5,2	5,2	_		
he . ה] מ san	100,0	5,7	5,7	5,7	5,7	5,7	5,7	5,7	—		
	120,0	6,9	6,9	6,9	6,9	6,9	6,9	6,9	—		
l a l	≥ 140,0	· · · ·			,	· · · · ·		1			

- For  $t_{N2}$  of S320GD or S350GD the values of  $V_{R,k}$  can be increased by 8,3 %

- For  $t_{N1}$  of S320GD or S350GD the values of  $N_{R,k}$  can be increased by 8,3 %

Self-drilling screw

## SFS SDT14-A19-5,5 x L, SFS SDT14-L12-A19-5,5 x L

with hexagon head or *irius*<sup>®</sup> drive and sealing washer  $\ge \emptyset$  19,0 mm

English translation prepared by DIBt



Ø 10:11 4,2-4,5 1,81 06.3 Ø 16 0 0 0 0 0 0 0 0 0 0 0 0 0					Fas Wa Col Col	<u>terials</u> stener: sher: mponent I mponent I <u>lling-capa</u>	With v : S2800 I: S235, S2800 <u>city:</u>		EPDM se DGD – DIN 55 – DIN E	al N EN 1032 EN 10025-	26	26
tu (m	m] =	1,50	2,00	2,5		performa	4,00	5,00	6,00	8,00	10,00	>10,00
	$\frac{t_{II} [mm] =}{d_{dp}} = \frac{1,50}{5,00} = \frac{2,00}{2}$		2,0	0	5,30	4,00	0,00	5,50		70	5,80	
	M <sub>t,nom</sub> =				0,00	-	_	0,00	0,		0,00	
	0,40	-	-	-		-	-	-	-	-	-	-
	0,50	0,92	0,92	0,9	2	0,92 <sup>a)</sup>	0,92 <sup>a)</sup>	0,92 <sup>a)</sup>	0,92 <sup>a)</sup>	0,92 <sup>a)</sup>	0,92 <sup>a)</sup>	0,92 <sup>a)</sup>
] <sup>1</sup> 2	0,55	1,11	1,11	1,1	1.1	1,11 <sup>a)</sup>	1,11 <sup>a)</sup>	1,11 <sup>a)</sup>	1,11 <sup>a)</sup>	1,11 <sup>a)</sup>	1,11 <sup>a)</sup>	1,11 <sup>a)</sup>
V <sub>R,k</sub> [kN] for t <sub>N2</sub> [mm]	0,63	1,38	1,38	1,38		1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>
t <sub>N2</sub>	0,75	1,38	1,38	1,3	8	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>
	0,88	1,38	1,38	1,3	8	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>
	1,00	1,38	1,38	1,3	8	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>
	0,40	0,78	0,78	0,7	8	0,78	0,78	0,78	0,78	0,78	0,78	0,78
5	0,50	1,46	1,46	1,4	.6	1,46	1,46	1,46	1,46	1,46	1,46	1,46
ا <u>ا</u> <u>آ</u>	0,55	1,70	1,70	1,7		1,70	1,70	1,70	1,70	1,70	1,70	1,70
N <sub>R,k</sub> [kN] for t <sub>N1</sub> [mm]	0,63	2,08	2,08	2,0		2,08	2,08	2,08	2,08	2,08	2,08	2,08
L <sup>t</sup> N	0,75	2,66	2,66	2,6		2,66	2,66	2,66	2,66	2,66	2,66	2,66
	0,88	2,70	3,28	3,2		3,28	3,28	3,28	3,28	3,28	3,28	3,28
	1,00	2,70	3,60	3,8		3,85	3,85	3,85	3,85	3,85	3,85	3,85
ut of ent	30,0 40,0	4,0	4,0	4,0		4,0	1,0	1,0	1,0	1,0	1,0	1,0
me me	40,0 50,0	<u>4,8</u> 5,6	4,8 5,6	4,8 5,6		4,8 5,6	1,7 2,4	1,7	1,7 2,4	1,7 2,4	1,7 2,4	1,7 2,4
ss ele	60,0	<u>5,6</u> 6,4	5,6 6,4	5,0 6,4		5,6 6,4	<u>2,4</u> 3,1	2,4 3,1	2,4 3,1	2,4 3,1	2,4 3,1	<u>2,4</u> 3,1
max. head displacement u [mm] as a function of the sandwich element thickness	80,0	<u>8,4</u> 8,0	8,4 8,0	8,0		8,0	4,5	4,5	4,5	4,5	4,5	4,5
hick as	90,0	<u> </u>	9,0	9,0		9,0	<u>4,3</u> 5,1	<u>4,5</u> 5,1	5,1	5,1	4,3 5,1	5,1
san J	100,0	10,0	10,0	10,		10,0	5,6	5,6	5,6	5,6	5,6	5,6
he ax.	120,0	12,0	12,0	12,		12,0	6,8	6,8	6,8	6,8	6,8	6,8
	≥ 140,0	14,0	14,0	14,		14,0	7,9	7,9	7,9	7,9	7,9	7,9
				,								

-

For  $t_{N2}$  of S320GD the values of  $V_{R,k}$  can be increased by 8,3 % Index  $^{a)}$ : For  $t_{N1}$  of S350GD the indicated values of  $V_{R,k}$  can be increased by 8,3 % -

Self-	tap	ping	screw
-------	-----	------	-------

SFS TDB-T-A16-6,3 x L

with hexagon head and sealing washer  $\ge \emptyset$  16,0 mm

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ø 10÷11						terials									
	4,2-4,5		-	-4,5	Fas	stener:	Carbo	n steel							
		1		.,			galvan	ized							
4	-	2			Wa	sher:	Carbo		73 X-24	N 828					
		1,81						hardened							
1,81		HIMM			With vulcanized EPDM seal										
1 =	Ĺ	E				Component I: S280GD to S350GD – DIN EN 10326									
		ø	6,3		Co	Component II: S235, S275, S355 – DIN EN 10025-1 S280GD, S320GD or S350GD – DIN EN 10326									
		ø1	6	ŀ											
					Dri	lling-capa	city:	-							
F	Ļ	(a		ŀ											
Ø6,3					Timber substructures:										
		L	Y												
		-	8		No	performa	nce deteri	mined							
t <sub>ii</sub> [m			2,5	0	3,00	4,00	5,00	6,00	8,00	10,00	>10,00				
	d <sub>dp</sub> 5,00				5,30			5,50	5,	70	5,80				
M <sub>t,n</sub>							-	-							
	0,40	-	-	-		-	-	-	-	-	-	-			
_] for	0,50	0,92	0,92	0,9	1.1	0,92 <sup>a)</sup> 1,11 <sup>a)</sup>	0,92 <sup>a)</sup> 1,11 <sup>a)</sup>	0,92 <sup>a)</sup> 1,11 <sup>a)</sup>	0,92 <sup>a)</sup> 1,11 <sup>a)</sup>	0,92 <sup>a)</sup> 1,11 <sup>a)</sup>	0,92 <sup>a)</sup> 1,11 <sup>a)</sup>	0,92 <sup>a)</sup> 1,11 <sup>a)</sup>			
ΣĒ	0,55 0,63	1,11 1,38	1,11 1,38	1,1 1,3		1,11 <sup>-</sup> 1,38 <sup>a)</sup>	1,11 -/ 1,38 <sup>a)</sup>	1,11 1,38 <sup>a)</sup>	1,11 1,38 <sup>a)</sup>	1,11 <sup>-2</sup> 1,38 <sup>a)</sup>	1,11 -/ 1,38 <sup>a)</sup>	1,11 <sup>-/</sup> 1,38 <sup>a)</sup>			
V <sub>R,k</sub> [KN] for t <sub>N2</sub> [mm]	0,00	1,38	1,38	1,3		1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>			
	0,88	1,38	1,38	1,3		1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>			
	1,00	1,38	1,38	1,3		1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>	1,38 <sup>a)</sup>			
	0,40	-	-	-		-	-	-	-	-	-	-			
2	0,50	1,84	1,84	1,8	4	1,84	1,84	1,84	1,84	1,84	1,84	1,84			
j f	0,55	2,19	2,19	2,1	9	2,19	2,19	2,19	2,19	2,19	2,19	2,19			
N <sub>R,k</sub> [kN] for t <sub>N1</sub> [mm]	0,63	2,70	2,76	2,7		2,76	2,76	2,76	2,76	2,76	2,76	2,76			
L <sup>R,,</sup>	0,75	2,70	3,60	3,6		3,60	3,60	3,60	3,60	3,60	3,60	3,60			
	0,88	2,70	3,60	4,2		4,25	4,25	4,25	4,25	4,25	4,25	4,25			
	1,00	2,70	3,60	4,8		4,85	4,85	4,85	4,85	4,85	4,85	4,85			
ut of all	30,0	4,0	4,0	4,0		4,0	1,0	1,0	1,0	1,0	1,0	1,0			
em(	40,0 50,0	4,8	4,8	4,8		4,8	1,7	1,7	1,7	1,7	1,7	1,7			
laci ncti eler ss	50,0 60,0	5,6 6,4	5,6 6,4	5,6 6,4		5,6 6,4	2,4 3,1	2,4 3,1	2,4 3,1	2,4	2,4	2,4			
ead displace as a funce ndwich ele thickness	80,0 80,0	8,4 8,0	8,0	8,0		6,4 8,0	4,5	4,5	4,5	3,1 4,5	3,1 4,5	3,1 4,5			
as as indirection of the second of the secon	90,0	8,0 8,0	8,0	8,0		8,0 8,0	4,5	4,5	4,5	4,5	4,5	4,5			
t san	100,0	8,0	8,0	8,0		8,0	4,5	4,5	4,5	4,5	4,5	4,5			
max. head displacement u [mm] as a function of the sandwich element thickness	120,0	8,0	8,0	8,0		8,0	4,5	4,5	4,5	4,5	4,5	4,5			
	≥ 140,0	8,0	8,0	8,0		8,0	4,5	4,5	4,5	4,5	4,5	4,5			
	2 140,0   8,0   8,0   8,							· · · ·	· · · · ·	· · · · · · · · · · · · · · · · · · ·					

-

For  $t_{N2}$  of S320GD the values of  $V_{R,k}$  can be increased by 8,3 % Index  $^{a)}$ : For  $t_{N1}$  of S350GD the indicated values of  $V_{R,k}$  can be increased by 16,6 % -

Self-tapping	screw
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SFS TDB-T-T16-6,3 x L

with hexagon head and sealing washer  $\ge \emptyset$  16,0 mm

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English translation prepared by DIBt



ø10-	11	Ø16	_1	Materials							
Carlo	Ø16	SFS		Fastener:		s steel, EN -Nr. 1.4567					
	4,2-4,5	01	3,3	Washer:		s steel, EN -Nr. 1.4301	10088 with vulcani	zed EPDM-	seal		
3	2,54	3		Component I: S280GD, S320GD or S350GD - EN 10346							
I I	L T			Component I							
				Component							
2,54											
L				Drilling-capa	city:	Σt <sub>i</sub> ≤ 2,0 mn	n				
				Timber subst	tructures:						
-	Ø6,5			Following pe							
	1			$M_{v,Bk} = 9.74$	Nm						
10 -	ø3,9			M <sub>y,Rk</sub> = 9,74 f <sub>ax,k</sub> = 8,58 N	l/mm <sup>2</sup> for l <sub>ef</sub>	<u>&gt;</u> 35,0 mm					
<u> </u>	, , , I										
	[mm]	≥ 45	-	-	-	-	-		_		
M <sub>t,n</sub>	om =			-	-				1		
	0,40	-	-	-	-	-	-	-			
V <sub>R,k</sub> [kN] for t <sub>N2</sub> [mm]	0,50 0,55	1,00 1,20	-	-	-	-	-	1,00 1,20	Failure of component I (bearing stress		
Ξ.	0,55	1,20	-	-	-	-	-	1,20	Failure of component I cearing stres		
"N2 [	0,85	1,50	-	-	-	-	-	1,50	mp(		
> +	0,88	1,50			-	-	-	1,50	L R S S		
	1,00	1,50	-	-	-	-	-	1,50	-		
	0,40	-	-	-	-	-	-	-			
	0,50	1,33	-	-	-	-	-	1,33			
N <sub>B,k</sub> [kN] for t <sub>N1</sub> [mm]	0,55	1,67	-	-	-	-	-	1,67	Failure of component I (pull through)		
[m]	0,63	1,75	-	-	-	-	-	1,75	Failure of ponent I ( through)		
t <sub>N1</sub>	0,75	1,75	-	-	-	-	-	1,75	por		
Z	0,88	1,75	-	-	-	-	-	1,75			
	1,00	1,75	-	-	-	-	-	1,75	1		
<u>م</u> د	30,0	-	-	-	-	-	-	-			
t the	40,0	5,0	-	-	-	-	-	5,0			
n ol nen	50,0	6,5	-	-	-	-	-	6,5			
ad displac a functio lwich elen thickness	60,0	8,5	-	-	-	-	-	8,5			
kn e kn e	70,0	11,0	-	-	-	-	-	11,0			
max. head displacement u [mm] as a function of the sandwich element thickness	80,0	13,5	-	-	-	-	-	13,5	4		
. he n] a san	100,0	20,0	-	-	-	-	-	20,0	_		
ax "	120,0	20,0	-	-	-	-	-	20,0			
	<u>≥</u> 140,0	20,0	-	-	-	-	-	20,0	1		

- For  $t_{N1}$  of S350GD the indicated values of  $V_{B,k}$  can be increased by 8,3 % - For  $t_{N1}$  of S350GD the indicated values of  $N_{B,k}$  can be increased by 8,3 %

- The values above (indicated as a function of the screw-in depth  $I_{ef}$ ) apply to  $k_{mod} = 0.9$  and timber class C24 ( $\rho_a \ge 350 \text{ kg/m}^3$ )

- A failure of component II of timber shall be demonstrated by paragraph 4.4.2

Self-drilling screw Annex 26 SFS SXCW-S16-6,5 x L SFS SXCW-L12-S16-6,5 x L with hexagon head or  $irius^{\mbox{\ensuremath{\mathbb{B}}}}$  drive and sealing washer  $\geq \ensuremath{\mathcal{O}}$  16 mm

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ø10-	11	Ø19	1	Materials							
(Internet internet in	Ø19	SPS		Fastener:		s steel, EN -Nr. 1.4567					
8	4,2-4,5	01:	3,3	Washer:		s steel, EN -Nr. 1.4301	10088 with vulcani	zed EPDM-	seal		
3	2,54	3		Component I: S280GD, S320GD or S350GD - EN 10346							
1	L T		r	Component							
				Component	II. TIIIDer	- EN 14001					
2,54											
				Drilling-capa	<u>icity:</u>	Σt <sub>i</sub> ≤ 2,0 mn	n				
				Timber subs	tructures:						
	105										
	Ø6,5			Following pe							
				M <sub>y,Rk</sub> = 9,74 f <sub>ax,k</sub> = 8,58 №	Nm						
10	¢3,9			f <sub>ax,k</sub> = 8,58 N	v/mm² for l <sub>ef</sub>	<u>≥</u> 35,0 mm					
	[mm]	≥ 45	-	-	-	-	-				
		2 40			_				_		
M <sub>t,nom</sub> =		-	-	-	-	-	-	-			
	0,50	1,00	-	-	-	-	-	1,00			
V <sub>R.k</sub> [kN] for t <sub>N2</sub> [mm]	0,55	1,20	-	-	-	-	-	1,20	Failure of component I (bearing stress		
[N]	0,63	1,50	-	-	-	-	-	1,50	Failure of omponent aring stre		
t <sub>N2</sub>	0,75	1,50	-	-	-	-	-	1,50	Eail Smp		
>	0,88	1,50	-	-	-	-	-	1,50	ې م م		
	1,00	1,50	-	-	-	-	-	1,50			
	0,40	-	-	-	-	-	-	-			
<u> </u>	0,50	1,60	-	-	-	-	-	1,60	Failure of component I (pull through)		
N <sub>R,k</sub> [kN] for t <sub>N1</sub> [mm]	0,55	2,00	-	-	-	-	-	2,00	الله الله الله الله الله الله الله الله		
[wN	0,63	2,10	-	-	-	-	-	2,10	Failure of ponent I ( through)		
d <sub>R,k</sub> t <sub>N1</sub>	0,75	2,10	-	-	-	-	-	2,10	Tai Thr		
2	0,88	2,10	-	-	-	-	-	2,10	00		
	1,00	2,10	-	-	-	-	-	2,10	-		
⊐ ₀	30,0	-	-	-	-	-	-	-			
t th	40,0	5,0	-	-	-	-	-	5,0			
	50,0	6,5	-	-	-	-	-	6,5			
. head displaceme n] as a function of 1 sandwich element thickness	60,0	8,5	-	-	-	-	-	8,5	4		
ckn - ckn -	70,0	11,0	-	-	-	-	-	11,0			
ead is a idwi	80,0	13,5	-	-	-	-	-	13,5	4		
n] a san	100,0	20,0	-	-	-	-	-	20,0	4		
max. head displacement u [mm] as a function of the sandwich element thickness	120,0	20,0	-	-	-	-	-	20,0	4		
	<u>≥</u> 140,0	20,0	-	-	-	-	-	20,0			

- For  $t_{\text{N1}}$  of S350GD the indicated values of  $N_{\text{B},k}$  can be increased by 8,3 %

- The values above (indicated as a function of the screw-in depth  $I_{ef}$ ) apply to  $k_{mod} = 0.9$  and timber class C24 ( $\rho_a \ge 350 \text{ kg/m}^3$ )

- A failure of component II of timber shall be demonstrated by paragraph 4.4.2

Self-drilling screw	
SFS SXCW-S19-6,5 x L SFS SXCW-L12-S19-6,5 x L with hexagon head or <i>irius</i> <sup>®</sup> drive and sealing washer $\geq \emptyset$ 19 mm	Annex 27

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	1 2,54 L -Ø 3,9		 	<u>Materials</u> Fastener: Washer: Component I Component I <u>Drilling-capad</u> <u>Timber subst</u> Following per M <sub>y,Rk</sub> = 9,74 f <sub>ax,k</sub> = 8,58 N	Material- Stainless Material- with vulo : S280GD I: Timber - <u>Sity:</u> <u>ructures:</u> formance c	Σt <sub>i</sub> ≤ 2,00 mr letermined	1.4401 or 1 EN 10088 M seal – DIN EN 081		
t <sub>ii</sub> (m	t <sub>II</sub> [mm] = 1,50 2,00				3,00	4,00	5,00		
M <sub>t,nom</sub> =				_	-			]	
	0,40	-	-	-	-	-	-	-	
5	0,50	-	-	-	-	-	-	1,00 <sup>a)</sup>	- (ss
V <sub>R,k</sub> [kN] for t <sub>N2</sub> [mm]	0,55	-	-	-	-	-	-	1,20 <sup>a)</sup>	Failure of component I earing stress
<sub>R,k</sub> [kN] fo t <sub>N2</sub> [mm]	0,63	_	-	-	-	-	_	1,50 <sup>a)</sup>	Failure of omponent aring stre
/ <sub>R.k</sub> t <sub>NS</sub>	0,75	-	-	-	-	-	-	1,50 <sup>a)</sup>	Failure of component I (bearing stress)
	0,88	-	-	-	-	-	-	1,50 <sup>a)</sup>	၂ ၀ရိ
	1,00	-	-	-	-	-	-	1,50 <sup>a)</sup>	
	0,40	-	-	-	-	-	-	-	
F	0,50	-	-	-	-	-	-	1,46	
N <sub>R,k</sub> [kN] for t <sub>N1</sub> [mm]	0,55	-	-	-	-	-	-	1,84	Failure of component I (pull-through)
<u>لم</u> ا	0,63	-	-	-	-	-	-	2,70	three
И <sub>В,</sub> к t <sub>N1</sub>	0,75	-	-	-	-	-	-	3,40	Ŭ La U
~	0,88	-	-	-	-	-	-	4,10	<u>°</u>
	1,00	-	-	-	-	-	-	4,80	
⊐ o	30,0	-	-	-	-	-	-	-	
ent fth	40,0	-	-	-	-	-	-	5,0	
nax. head displacement u [mm] as a function of the sandwich element thickness	50,0	-	-	-	-	-	-	6,5	
olac ctio slen	60,0	-	-	-	-	-	-	8,5	
ad displac a function twich elen thickness	80,0	-	-	-	-	-	-	13,5	_
ad c s a f Jwic thic	90,0	-	-	-	-	-	-	16,8	
he. I] as anc	100,0	-	-	-	-	-	-	20,0	
max. [mm_s	120,0	-	-	-	-	-	-	20,0	1
	≥ 140,0	_	_	-	-	_	_	20,0	1

- The values above (indicated as a function of the screw-in depth  $l_{ef}$ ) apply to  $k_{mod} = 0.9$  and the timber class C24 ( $\rho_a \ge 350 \text{ kg/m}^3$ )

- A failure of component II of timber shall be demonstrated by paragraph 4.4.2

Self-drilling screw

## SFS SXW-S16-6,5 x L, SFS SXW-L12-S16-6,5 x L

with hexagon head or *irius*<sup>®</sup> drive and sealing washer  $\ge \emptyset$  16,0 mm

Annex 28

Electronic copy of the ETA by DIBt: ETA-13/0183



$\frac{10+11}{1}$ $\frac{14,2+4,5}{2,54}$ $\frac{1}{2,54}$ $\frac{1}{2,55}$ $\frac{1}{2,56}$ $\frac{1}{2,5$									
t. Im	ml _	1.50	2.00						
M <sub>t,no</sub>		1,50	2,00	2,50		4,00	5,00		_
ivit,no	0,40	-				-			
	0,50	-	-	-	-	-	-	1,55	- <u></u>
V <sub>R.k</sub> [kN] for t <sub>N2</sub> [mm]	0,55	-			-	-		1,55	Failure of component I (bearing stress)
	0,63			-	-	-		2,90	ure one g st
1, x, k []	0,75		_			-	_	3,50	Failure of omponent aring stre
	0,88		_				_	4,00	
	1,00	_	_		-	-	_	4,50	
	0,40	_			-	-	_	-	
i . T	0,50	_	-	-	-	-	_	1,68	
ੂ ਦੂ ਦ	0,55	-	_	-	-	-	_	1,88	ngh of L
<sub>R,k</sub> [kN] fo t <sub>N1</sub> [mm]	0,63	_	-	-	-	-	_	2,70	
N <sub>R,k</sub> [kN] for t <sub>N1</sub> [mm]	0,75	-	-	-	-	-	-	3,40	Failure of component l pull-through)
Z	0,88	-	-	-	-	-	-	4,10	٦ ک <u>ق</u>
	1,00	-	-	-	-	-	-	4,80	1
, ⊃ ,	30,0	-	-	-	-	-	-	-	
[ 누 딸 -	40,0	-	-	-	-	-	-	5,0	]
	, .				1	1	1		1
emen n of th nent	50,0	-	-	-	-	-	-	6,5	
lacemen ction of th slement sss		-	-		-	-	-	6,5 8,5	
displacemen function of th ch element kness	50,0							-	_
ad displacement u s a function of the dwich element thickness	50,0 60,0	-	-	-	-	-	-	8,5	
head displacemen as a function of th sandwich element thickness	50,0 60,0 80,0	-	-	-	-	-	-	8,5 13,5	- - - -
max. head displacement u [mm] as a function of the sandwich element thickness	50,0 60,0 80,0 90,0	-	-		- - -		- - -	8,5 13,5 16,8	

- A failure of component II of timber shall be demonstrated by paragraph 4.2.2

Self-tapping screw

SFS TDA-S-S16-6,5 x L

with hexagon head and sealing washer  $\ge \emptyset$  16,0 mm

8.06.02-229/11

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English translation prepared by DIBt



ø10-11	1	ø16		Materials								
Ø 16		SF5 T		Fastener:	Carbon galvaniz							
8 4		012	3,3	Washer:	Vasher: Stainless steel, DIN EN 10088 Material-Nr. 1.4301 with vulcanized EPDM seal							
II TI		Trip .		Component	I: S280GI	D to S350GD	– DIN EN 1	10326				
2,54				Component I: S280GD to S350GD – DIN EN 10326 Component II: Timber – DIN EN 14081								
					<u>Drilling-capacity:</u> $\Sigma t_i \le 2,00 \text{ mm}$							
				Timele en evile e								
	Ø6,5			Timber subs								
F				Following pe	rformance	determined						
7	Ø 4,3-4,4			M <sub>y,Rk</sub> = 15,40 f <sub>ax,k</sub> = 13,18								
t <sub>ii</sub> [m	ım] =	1,50	2,00	2,50	3,00	4,00	5,00					
	om =			-	_			1 .	_			
	0,40	-	-	-	-	-	-	-				
<u> </u>	0,50	-	-	-	-	-	-	1,00 <sup>a)</sup>	l – (ss			
V <sub>R,k</sub> [kN] for t <sub>N2</sub> [mm]	0,55	-	-	-	-	-	-	1,20 <sup>a)</sup>	Failure of component I (bearing stress)			
<sub>R,k</sub> [kN] fo t <sub>N2</sub> [mm]	0,63	_	_	-	-	_	-	1,50 <sup>a)</sup>	Failure of omponent aring stre			
∕ <sub>R,k</sub> t <sub>N2</sub>	0,75	-	-	-	-	-	-	1,50 <sup>a)</sup>	eari Bari			
	0,88	-	-	-	-	-	-	1,50 <sup>a)</sup>	ိမ္မိ			
	1,00	-	-	-	-	-	-	1,50 <sup>a)</sup>				
	0,40	-	-	-	-	-	-	-				
r	0,50	-	-	-	-	-	-	1,33 <sup>b)</sup>				
N <sub>R,k</sub> [kN] for t <sub>N1</sub> [mm]	0,55	-	-	-	-	-	-	1,67 <sup>b)</sup>	Failure of component I (pull-through)			
[k]	0,63	-	-	-	-	-	-	1,75 <sup>b)</sup>	the filter			
J <sub>R,k</sub> t <sub>N1</sub>	0,75	-	-	-	-	-	-	1,75 <sup>b)</sup>				
ラ	0,88	-	-	-	-	-	-	1,75 <sup>b)</sup>	09			
Z	0,00							b)				
Ž	1,00	-	-	-	-	-	-	1,75 <sup>b)</sup>				
		-	-	-	-	-	-	1,75 <sup>-57</sup> 2,0				
	1,00	-					-		-			
	1,00 30,0		-		-		- - - -	2,0				
	1,00 30,0 40,0	-	-	-	-	-	- - - - -	2,0 2,8				
	1,00 30,0 40,0 50,0	-	- - -	-		-	-	2,0 2,8 3,5				
	1,00 30,0 40,0 50,0 60,0		- - - -	-		-		2,0 2,8 3,5 4,3				
	1,00 30,0 40,0 50,0 60,0 80,0		- - - - -	- - - -	- - - -			2,0 2,8 3,5 4,3 5,7				
ement u n of the nent	1,00 30,0 40,0 50,0 60,0 80,0 90,0	- - - - -	- - - - -	- - - - -	- - - - -	- - - -	- - - - -	2,0 2,8 3,5 4,3 5,7 6,4				

- The values above (indicated values of  $N_{R,k}$  can be increased by 0,5 %) - The values above (indicated as a function of the screw-in depth  $I_{ef}$ ) apply to  $k_{mod} = 0.9$  and the timber class

C24 (ρ<sub>a</sub> ≥ 350 kg/m̀³)

- A failure of component II of timber shall be demonstrated by paragraph 4.4.2

Self-drilling screw

## SFS SDTW-S16-6,5 x L, SFS SDTW-L12-S16-6,5 x L

with hexagon head or  $irius^{\text{@}}$  drive and sealing washer  $\geq \emptyset$  16,0 mm

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English translation prepared by DIBt



ø10-1	1	ø19	1	Materials								
Ø 19 8 1 1 2,54		Ø12 3,3		Fastener:		Carbon Steel galvanized						
				Washer: Stainless steel, DIN EN 10088 Material-Nr. 1.4301 with vulcanized EPDM seal								
LI II	1			Component I: S280GD to S350GD – DIN EN 10326								
言				Component II: Timber – DIN EN 14081								
2,54	2,54			•••••								
					<u>Drilling-capacity:</u> $\Sigma t_i \le 2,00 \text{ mm}$							
				Timber subst	ructures.							
	Ø6,5					al a ka waa ka a ci						
3				Following pe	riormance	aetermined						
7 0	Ø 4,3-4,4											
t <sub>II</sub> [m	m] =	1,50	2,00	2,50	3,00	4,00	5,00					
	om =			-	-			1	_			
	0,40	-	-	-	-	-	-	-				
<u> </u>	0,50	-	-	-	2	-	-	1,00 <sup>a)</sup>	- (ss			
V <sub>R,k</sub> [kN] for t <sub>N2</sub> [mm]	0,55	-	-	-		-	-	1,20 <sup>a)</sup>	Failure of component I (bearing stress)			
<u> </u>	0,63	_	-	_	-	-	-	1,50 <sup>a)</sup>				
ν t <sub>N2</sub>	0,75	-	-	-	-	-	-	1,50 <sup>a)</sup>	Eari Som			
-	0,88	-	-	-	-	-	-	1,50 <sup>a)</sup>	, <sup>o</sup> ĝ			
	1,00	-	-	-	-	-	-	1,50 <sup>a)</sup>				
	0,40	-	-	-	-	-	-	-	-			
à	0,50	-	-	-	-	-	-	1,60 <sup>b)</sup>	~ 그 즢			
N <sub>R,k</sub> [kN] for t <sub>N1</sub> [mm]	0,55	-	-	-	-	-	-	2,00 <sup>b)</sup>	Failure of component l (pull-through)			
1x 1	0,63	-	-	-	-	-	-	2,10 <sup>b)</sup>	ti bi li			
Ч <sub>В,к</sub> t <sub>N</sub> .	0,75	-	-	-	-	-	-	2,10 <sup>b)</sup>				
_	0,88	-	-	-	-	-	-	2,10 <sup>b)</sup>				
	1,00	-	-	-	-	-	-	2,10 <sup>b)</sup>				
⊐ e	30,0	-	-	-	-	-	-	2,0	-			
rt fr	40,0	-	-	-	-	-	-	2,8				
head displacement u ] as a function of the andwich element thickness	50,0	-	-	-	-	-	-	3,5	4			
plac ictic eler ess	60,0	-	-	-	-	-	-	4,3	4			
ad displac a functiol twich elem thickness	80,0	-	-	-	-	-	-	5,7				
s ad dwi thi	90,0	-	-	-	-	-	-	6,4				
<ul> <li>head displaceme</li> <li>as a function of i sandwich element thickness</li> </ul>	100,0	-	-	-	-	-	-	7,1				
max. head displacement u [mm] as a function of the sandwich element thickness	120,0	-	-	-	-	-	-	8,6				
l m	≥ 140,0							10,0	i i			

- The values above (indicated as a function of the screw-in depth  $I_{ef}$ ) apply to  $k_{mod} = 0.9$  and the timber class

C24 ( $\rho_a \ge 350 \text{ kg/m}^3$ )

- A failure of component II of timber shall be demonstrated by paragraph 4.4.2

Self-drilling screw

## SFS SDTW-S19-6,5 x L, SFS SDTW-L12-S19-6,5 x L

with hexagon head or *irius*<sup>®</sup> drive and sealing washer  $\ge \emptyset$  19,0 mm

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English translation prepared by DIBt



	ø10-11	-	Materials							
		Ø17	Fastener:		Carbon Steel galvanized					
₹2,54	8.		Washer: Stainless steel, DIN EN 10088 Material-Nr. 1.4301							
H H										
			-				0020			
HH			Component			+001				
			<u>Drilling-capacity:</u> $\Sigma t_i \le 2,00 \text{ mm}$							
			Timber subst	ructures:						
\$0,5					datarmined					
			Pollowing per	normance	uetennined					
\$\$\$4,3-4,4										
ım] =	1,50	2,00	2,50	3,00	4,00	5,00				
om =			-	-			]	_		
0,40	-	-	-	-	-	-	-			
0,50	-	-	-	-	-	-	1,00 <sup>a)</sup>	l – (ss		
0,55	-	-	-	-	-	-	1,20 <sup>a)</sup>	Failure of component I (bearing stress)		
0,63	-	-	-	-	-	-	1,50 <sup>a)</sup>	Failure of omponent aring stre		
0,75	-	-	-	-	-	-	1,50 <sup>a)</sup>	Fai om		
0,88	-	-	-	-	-	-	1,50 <sup>a)</sup>	ြ ာ ရွိ		
1,00	-	-	-	-	-	-	1,50 <sup>a)</sup>			
0,40	-	-	-	-	-	-	-			
0,50	-	-	-	-	-	-	1,60 <sup>b)</sup>			
0,55	-	-	-	-	-	-	2,00 <sup>b)</sup>	ent ent		
0,63	-	-	-	-	-	-	2,10 <sup>b)</sup>	Failure of component I (pull-through)		
0,75	-	-	-	-	-	-	2,10 <sup>b)</sup>			
0,88	-	-	-	-	-	-	2,10 <sup>b)</sup>	0 <u>0</u>		
1,00	-	-	-	-	-	-				
30,0	-	-	-	-	-	-				
40,0	-	-	-	-	-	-		1		
50,0	-	-	-	-	-	-	3,5	1		
60,0	-	-	-	-	-	-	4,3	1		
80,0	-	-	-	-	-	-	5,7	1 –		
90,0	-	-	-	-	-	-	6,4	1		
		_	-	-	-	-	7,1	1		
100,0	-							-		
100,0 120,0	-	-	-	-	-	-	8,6			
			$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	3 $11$ $617$ Fastener: $2,54$ $617$ Washer: $2,54$ Component I $017$ $017$ $017$ $017$ $017$ $017$ $017$ $017$ $017$ $017$ $017$ $017$ $017$ $017$ $017$ $017$ $017$ $017$ $011$ $017$ $011$ $017$ $011$ $0111$ $0111$ $0111$ $0111$ $01111$ $0111$ $01111$ $01111$ $011111$ $0111111111111111111111111111111111111$		3 $11$ $617$ $2,54$ $617$ $a$	3 $11$ $42,54$ Fastener:       Carbon Steel galvanized $42,54$ $410$ $410$ $410$ $410$ $410$ $42,54$ $410$ $410$ $410$ $410$ $410$ $42,54$ $410$ $410$ $410$ $410$ $410$ $410$ $410$ $410$ $410$ $410$ $410$ $410$ $410$ $410$ $96,5$ $96,5$ $96,5$ $110$ $110$ $110$ $110$ $110$ $11000$ $11000$ $11000$	Image: state interview       Carbon Steel galvanized $4,2,54$ Image: state interview       Stainless steel, DIN EN 10088 Material-Nr. 1.4301 with vulcanized EPDM seal         Component I:       S280GD to S350GD – DIN EN 10326 Component II:       Stainless steel, DIN EN 10326 Component II: $0,6,5$ Drilling-capacity: $\Sigma t_i \le 2,00 \text{ mm}$ Timber substructures:       Following performance determined $0,4,3.4.4$ My,Rk = 15,40 Nmm faxk = 13,18 N/mm² for lef ≥ 35,0 mm $mn =$ - $0,40$ - $0,50$ - $0,65$ - $0,63$ - $0,75$ - $0,63$ - $0,63$ - $0,63$ - $0,63$ - $0,63$ - $0,75$ - $0,63$ - $0,63$ - $0,75$ - $0,75$ - $0,75$ - $0,75$ - $0,75$ - $0,75$ - $0,75$ - $0,75$ -		

- The values above (indicated as a function of the screw-in depth  $l_{ef}$ ) apply to  $k_{mod} = 0.9$  and the timber class

C24 ( $\rho_a \ge 350 \text{ kg/m}^3$ )

- A failure of component II of timber shall be demonstrated by paragraph 4.4.2

Self-drilling screw

SFS SWTZ3-S19-6,5 x L

with zamac head and sealing washer  $\ge \emptyset$  19,0 mm



Ø10+11 2 2,54	↓4,2÷4,5 ↓ L	Ø10÷11 2,54 06,5 06,5 06,5 06,5 08,5	4,2÷4,5	<u>Materials</u> Fastener: Washer: Component Component <u>Drilling-capa</u> <u>Timber subs</u> Following pe M <sub>y,Rk</sub> = 15,40 f <sub>ax,k</sub> = 8,575	Carbon with vul I: S280GI II: Timber <u>city:</u> <u>tructures:</u> rformance	zed /Ig3, DIN EN steel (case h canized EPD D to S350GD – DIN EN 14 see table determined	nardened ar M seal – DIN EN		ed)
t <sub>II</sub> [m	m] =	1,50	2,00	2,50	3,00	4,00	5,00		
M <sub>t,nc</sub>					-	- <b>I</b>		1	_
	0,40	-	-	-	-	-	-		
<u> </u>	0,50	-	-	1	÷	-	-	1,55	- (ss
V <sub>R.k</sub> [kN] for t <sub>N2</sub> [mm]	0,55	-	-	-	-	-		1,71	Failure of component I (bearing stress)
<u> </u>	0,63	-	_	<u> </u>	-	_	-	2,90	Failure of omponent aring stre
L RNS	0,75	-	-	-	-	-	-	3,50	Ea Som
	0,88	-	-	-	-	-	-	4,00	<u> </u>
	1,00	-	-	-	-	-	-	4,50	
	0,40	-	-	-	-	-	-	-	
ъ	0,50	-	-	-	-	-	-	1,34	L I I
N <sub>R,k</sub> [kN] for t <sub>N1</sub> [mm]	0,55	-	-	-	-	-	-	1,56	Failure of component l pull-through)
× =	0,63	-	-	-	-	-	-	1,91	
rt Z	0,75	-	-	-	-	-	-	2,45	
	0,88	-	-	-	-	-	-	3,02	-
	1,00	-	-		-	-	-	3,54	
he	30,0 40,0	-	-	-	-	-	-	2,0	-
of t		-	-		-	-	-	2,8	-
ace ion ss	60,0	-	-	-	-	-	-	3,5 4,3	4
ad displac s a functio dwich elen thickness	80,0	-	-		-	-	-	4,3	1 _
hick fi	90,0	-	-		-	-	-	6,4	-
. head displaceme n] as a function of sandwich element thickness	100,0							7,1	-
max. head displacement u [mm] as a function of the sandwich element thickness	120,0	-	-		-	-	-	8,6	1
Ë –	≥ 140,0	-	-	-	-	-	-	10,0	1
C24 (p <sub>a</sub> ≥ 3 - The pre-dr	350 kg/m <sup>3</sup> ) illing diamet	ter of compone	ent I and co	e screw-in dept omponent II is 4 nonstrated by pa	,0 mm		d the timber o		•

Self-tapping screw

### SFS TDA-T-A16/T16-6,5 x L

with hexagon head and sealing washer  $\ge \emptyset$  16,0 mm

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