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European technical approval

ETA-12/0063

English translation, the original version is in German

Handelsbezeichnung

Trade name

SFS selbstbohrende Schrauben WT

SFS self-tapping screws WT

Zulassungsinhaber

Holder of approval

SFS intec AG

**Rosenbergsaustasse 10
9435 Heerbrugg
Schweiz**

Zulassungsgegenstand und Verwendungszweck

Generic type and use of construction product

Selbstbohrende Schrauben zur Verwendung im Holzbau

Self-tapping screws for use in timber constructions

Geltungsdauer vom

Validity from

18.06.2012

bis zum

17.06.2017

to

Herstellwerk

Manufacturing plant

SFS intec AG

**Rosenbergsaustasse 10
9435 Heerbrugg
Schweiz**

Diese Europäische technische Zulassung umfasst

This European technical approval contains

18 Seiten einschließlich 5 Anhängen

18 Pages including 5 Annexes



European Organisation for Technical Approvals
Europäische Organisation für Technische Zulassungen
Organisation Européenne pour l'Agrément Technique

I LEGAL BASES AND GENERAL CONDITIONS

- 1 This European technical approval is issued by Österreichisches Institut für Bautechnik in accordance with:
 1. Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products¹ – Construction Products Directive (CPD) –, amended by the Council Directive 93/68/EEC of 22 July 1993²;
 2. *dem Vorarlberger Bauproduktengesetz, LGBl. Nr. 33/1994, in der Fassung LGBl. Nr. 65/2000;* the Vorarlberg Construction Products Law, LGBl. № 33/1994, amended by LGBl. № 65/2000;
 3. Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex of Commission Decision 94/23/EC³;
- 2 Österreichisches Institut für Bautechnik is authorised to check whether the provisions of this European technical approval are met. Checking may take place at 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 the 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- 4 This European technical approval may be withdrawn by Österreichisches Institut für Bautechnik, in particular pursuant to information by the Commission on the basis of Article 5 (1) of Council Directive 89/106/EEC.
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- 6 The European technical approval is issued by the Approval Body in its official language. This version corresponds to the version circulated within EOTA. Translations into other languages have to be designated as such.

¹ Official Journal of the European Communities № L 40, 11.02.1989, page 12

² Official Journal of the European Communities № L 220, 30.08.1993, page 1

³ Official Journal of the European Communities № L 17, 20.01.1994, page 34

II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of products and intended uses

1.1 Definition of the construction product

SFS fasteners "WT-S-6,5, WT-T-6,5, and WT-T-8,2" are self-tapping screws with different profiled sections, divided into drill tip, threaded length of the screw, non-threaded shaft, clamping thread, and head of the screw. They are made from special carbon or stainless steel. Screws made from carbon steel are coated with "Durocoat", screws made from stainless steel are waxed. The outer thread diameter is not less than 6,5 mm and not greater than 8,2 mm. The overall length of the screw is ranging from 65 mm to 330 mm. Further dimensions are shown in Annex 1.

1.2 Intended use

The screws are intended to be used for connecting wood-based members, where requirements for mechanical resistance and stability and safety in use in the sense of the Essential Requirements 1 and 4 of Council Directive 89/106/EEC shall be fulfilled.

The screws are used for connections in load bearing timber structures between wood-based members or between those members and steel members:

- Solid timber of softwood of strength class C14 to C40 according to EN 338 or EN 14081-1,
- Glued laminated timber of at least strength class GL24h according to EN 1194 or EN 14080,
- Laminated veneer lumber LVL according to EN 14374,
- Glued laminated solid timber according to prEN 14080 or national provisions that apply at the installation site,
- Cross laminated timber according to European technical approvals or national provisions that apply on the installation site.

The screws may be used for connecting the following wood-based panels to the timber members mentioned above:

- Plywood according to EN 636 and EN 13986,
- Oriented strand board, OSB according to EN 300 and EN 13986,
- Particle board according to EN 312 and EN 13986.

In addition, compression and tension reinforcement of the above mentioned wood-based members is allowed.

The product shall be subjected to static and quasi static actions only.

The product is intended to be used in service classes 1 and 2 according to EN 1995-1-1. Screws made of stainless steel may also be used in conditions defined by service class 3. The field of application of the screws shall be defined according to EN 1993-1-4 or national provisions that apply at the installation site.

1.3 Assumed working life

The provisions made in the European technical approval (ETA) are based on an assumed intended working life for the screws of 50 years, provided the requirements for packaging, transport, and storage as well as use, maintenance and repair given in Clauses 4 and 5 are fulfilled. The indications given on the working life for the SFS self-tapping screws cannot be interpreted as a guarantee given by the manufacturer or by the Approval Body, but are to be regarded only as a means for selecting the appropriate product in relation to the expected, economically reasonable working life of the construction works.

2 Characteristics of product and methods of verification

Table 1: Characteristics of the product and methods of verification and assessment

No	Product characteristic	Method of verification and assessment	Expression of performance
Essential Requirement 1: Mechanical resistance and stability			
1	Dimensions	2.1.1	Annex 1
2	Characteristic yield moment	2.1.1	Annex 2
3	Characteristic withdrawal parameter	2.1.1	Annex 2
4	Characteristic head pull-trough parameter	2.1.1	Annex 2
5	Characteristic tensile strength	2.1.1	Annex 2
6	Characteristic yield strength	2.1.1	Annex 2
7	Characteristic torsional strength	2.1.1	Annex 2
8	Insertion moment	2.1.1	Annex 2
9	Spacing, end and edge distances of the screws and minimum thickness of the wood based material	2.1.1	Annex 3
10	Slip modulus for mainly axially loaded screws	2.1.1	Annex 2
Essential Requirement 2: Safety in case of fire			
11	Reaction to fire	2.1.2	2.1.2, Euroclass A1
Essential Requirement 3: Hygiene, health and environment			
12	Content and/or release of dangerous substances	2.1.3	2.1.3
Essential Requirement 4: Safety in use			
—	Identical to ER 1	—	—
Essential Requirement 5: Protection against noise			
—	Not relevant	—	—
Essential Requirement 6: Energy economy and heat retention			
—	Not relevant	—	—
General aspects relating to fitness for use¹			
13	Durability against corrosion	2.1.4	2.1.4 Service classes 1, 2 and 3
14	Serviceability	2.1.4	2.1.4
¹ Aspects of durability and economy of the works which is not dealt with under Essential Requirements 1 to 6. Such aspects are also referred to as "serviceability".			

2.1 Characteristics of product

2.1.1 General

The SFS self-tapping screws correspond to the information and drawings given in Annex 1. The following performance characteristics data of the product are given in Annex 2 and 3:

- Characteristic yield moment
- Characteristic withdrawal parameter
- Characteristic tensile strength
- Characteristic yield strength
- Characteristic torsional strength
- Insertion moment
- Spacing, end and edge distances of the screws and minimum thickness of the wood based material
- Slip modulus for mainly axially loaded screws

The material characteristics, dimensions, and tolerances of the product not indicated in Annexes 1 are given in the technical documentation⁴ of the European technical approval.

2.1.2 Safety in case of fire

The SFS self-tapping screws are made from steel classified as Euroclass A1 in accordance with Commission Decision 96/603/EC, as amended by Commission Decision 2000/605/EC.

2.1.3 Hygiene, health and environment

According to CUAP 06.03/08 the performance of the product regarding release of dangerous substances can be summarized as follows:

- The product does not contain cadmium.
- The product does not contain chrome VI.

A declaration of conformity in this respect was made by the manufacturer.

In addition to the specific clauses relating to dangerous substances contained in the European technical approval, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Directive, these requirements need also to be complied with, when and where they apply.

2.1.4 Durability and serviceability

The product is intended to be used in service classes 1, 2, and 3 according to EN 1995-1-1.

The screws made of carbon steel are coated with "Durocoat". The minimum thickness of the coating is 5 µm.

Steel no. 1.4301, 1.4567, 1.4578 and 1.4539 according to EN 10088-1 is used for screws made from stainless steel.

Serviceability of the SFS self-tapping screws is given in EN 1995-1-1 and under the conditions of Clause 4.

⁴ The technical documentation of the European Technical Approval is deposited at Österreichisches Institut für Bautechnik and, in so far as is relevant to the tasks of the approved body involved in the attestation of conformity procedure, is handed over to the approved body.

2.2 Methods of verification

2.2.1 General

The assessment of fitness of the SFS self-tapping screws for the intended use in relation to the requirements for mechanical resistance and stability, for safety in case of fire, for hygiene, health and the environment, for safety in use, as well as for durability and serviceability in the sense of the Essential Requirements 1, 2, 3 and 4 of Council Directive 89/106/EEC has been made in accordance with *CUAP 06.03/08, Common Understanding of Assessment Procedure for European technical approval for Self-tapping Screws for Use in Timber Construction*.

2.2.2 Identification

The European technical approval for the SFS self-tapping screws is issued on the basis of agreed data, deposited with Österreichisches Institut für Bautechnik, which identifies the product that has been assessed and judged. Changes to materials, to the composition or to characteristics of the product, or to the production process, which could result in this deposited data being incorrect, should be immediately notified to Österreichisches Institut für Bautechnik before the changes are introduced. Österreichisches Institut für Bautechnik will decide whether or not such changes affect the European technical approval, and, if so, whether further assessment or alterations to the European technical approval are considered necessary.

3 Evaluation of conformity and CE marking

3.1 Attestation of conformity system

The system of conformity attestation assigned by the European Commission to this product shall be that laid down in the Council Directive 89/106/EEC of 21 December 1988, Annex III (2) (ii), first possibility, referred to as System 2+. This system provides for:

(a) Tasks for the manufacturer

- (1) Initial type-testing of the product;
- (2) Factory production control;
- (3) Further testing of samples taken at the factory by the manufacturer in accordance with a prescribed test plan⁵;

(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.

3.2 Responsibilities

3.2.1 Tasks for the manufacturer

3.2.1.1 Initial type-testing of the product

For initial type-testing, the results of the tests performed as part of the assessment for the European technical approval may be used unless there are changes in the manufacturing process or manufacturing plant. In the case of changes, the necessary initial type-testing shall be agreed between Österreichisches Institut für Bautechnik and the approved body involved.

⁵ The prescribed test plan has been deposited with Österreichisches Institut für Bautechnik and is handed over only to the approved body involved in the attestation of conformity procedure. The prescribed test plan is also referred to as control plan.

3.2.1.2 Factory production control

At the manufacturing plant the manufacturer has implemented and continuously maintains a factory production control system. All the elements, requirements and provisions adopted by the manufacturer are documented in a systematic manner in the form of written policies and procedures. The factory production control system ensures that the SFS self-tapping screws are in conformity with the European technical approval.

The manufacturer shall only use raw materials supplied with the relevant inspection documents as laid down in the prescribed test plan. Check of incoming materials shall include control of inspection documents (comparison with nominal values) presented by the manufacturer of the raw materials by verifying the dimensions and determining the material properties.

The frequencies of controls and tests conducted during manufacturing are defined by taking account of the manufacturing process of the product and are laid down in the prescribed test plan.

The results of factory production control are recorded and evaluated. The records include at least the following data:

- Designation of the product, basic materials and components
- Type of control or test
- Date of manufacture of the product and date of testing of the product or basic materials or components
- Results of controls and tests and, if appropriate, comparison with requirements
- Name and signature of person responsible for factory production control

The records shall be kept at least for five years time and shall be presented to the approved body involved in continuous surveillance. On request they shall be presented to Österreichisches Institut für Bautechnik.

3.2.1.3 Declaration of conformity

The manufacturer is responsible for preparing the declaration of conformity. When all the criteria of the conformity attestation including certification are met, the manufacturer shall issue a declaration of conformity.

3.2.2 Tasks for the approved body

3.2.2.1 Initial inspection of factory and of factory production control

The approved body shall ascertain that, in accordance with the prescribed test plan, the factory, in particular personnel and equipment, and the factory production control, are suitable to ensure a continuously and orderly manufacturing of the SFS self-tapping screws with the specifications given in Section II as well as in the Annexes of the European technical approval.

3.2.2.2 Continuous surveillance, assessment and approval of factory production control

The approved body shall visit the factory at least once a year for routine inspection. It shall be verified that the system of factory production control and the specified manufacturing process are maintained, taking account of the prescribed test plan. On demand the results of continuous surveillance shall be made available by the approved body to Österreichisches Institut für Bautechnik. When the provisions of the European technical approval and the prescribed test plan are no longer fulfilled, the certificate of conformity shall be withdrawn by the approved body.

3.3 CE marking

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

- Name or identification mark and address of the manufacturer
- The last two digits of the year in which the CE marking was affixed
- Number of the certificate of conformity
- Number of the European technical approval
- Identification of the product by trade name
- Size of the product
- Type and minimum thickness of the corrosion protection, if relevant
- Stainless steel including the material number, if relevant

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

4.1 Manufacturing

The SFS self-tapping screws are manufactured in accordance with the provisions of the European technical approval using the manufacturing process as identified in the inspection of the manufacturing plant by Österreichisches Institut für Bautechnik and laid down in the technical documentation.

4.2 Installation

4.2.1 Design

The European technical approval only applies to the manufacture and use of the SFS self-tapping screws. Verification of stability of the works including application of loads on the products is not subject to the European technical approval.

Fitness for the intended use of the products is given under the following conditions:

- Design of the SFS self-tapping screws is carried under the responsibility of an engineer or, as applicable at the place of use, by a master carpenter experienced in such products.
- Design of the works shall account for the protection of the connection with SFS self-tapping screws to maintain service classes 1, 2 or 3 according to EN 1995-1-1.
- The SFS self-tapping screws are installed correctly.

Design of the products can be according to EN 1995-1-1 taking into account the Annexes of the European technical approval. Standards and regulations in force at the place of use shall be considered.

4.2.2 Installation

The manufacturer shall prepare installation instructions in which the product-specific characteristics and the most important measures to be taken into consideration for installation are described. The installation instructions shall be available at every construction site and shall be deposited at Österreichisches Institut für Bautechnik.

Installation of SFS self-tapping screws shall be carried out by appropriately qualified personnel under the supervision of the person responsible for technical matters on site.

The screws are either driven into the wood-based member without pre-drilling or in predrilled holes with a diameter not exceeding the inner thread diameter. The screw holes in steel members shall be pre-drilled with an adequate diameter greater than the outer thread diameter.

The structural members which are connected with the SFS self-tapping screws shall be

- In accordance with Clause 1.2;
- Minimum spacing and edge distances are in accordance with EN 1995-1-1 and Annex 3.

5 Recommendations for the manufacturer

5.1 General

It is the responsibility of the ETA holder to ensure that all necessary information on design and installation is submitted to those responsible for design and execution of the works constructed with SFS self-tapping screws.

5.2 Recommendations on packaging, transport and storage

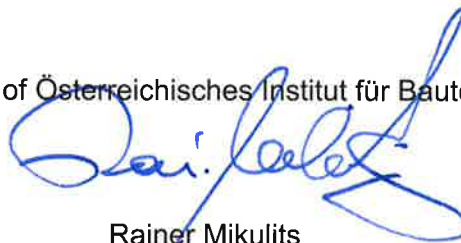
The SFS self-tapping screws shall be protected during transport and storage against any damage and detrimental moisture effects. Storage shall at all time be clear from the ground. Damaged products shall not be installed. The manufacturer's instruction for packaging, transport and storage shall be observed.

5.3 Recommendations on use, maintenance and repair

The assessment of the fitness for use is based on the assumption that maintenance is not required during the assumed intended working life.

Should repair prove necessary, an assessment shall be made in each case. Severe damage of a connection with the SFS self-tapping screws requires immediate actions regarding the mechanical resistance and stability of the works.

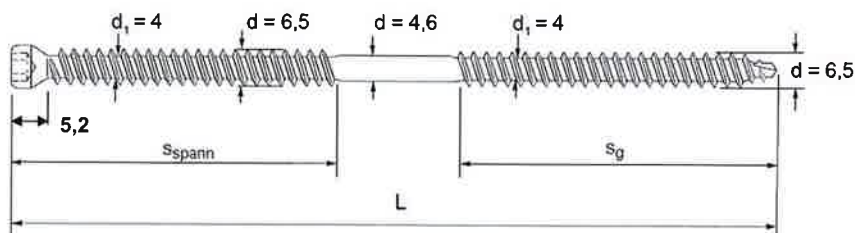
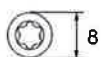
On behalf of Österreichisches Institut für Bautechnik



Rainer Mikulits
Managing Director

WT-S-6,5 x L

Material: stainless steel



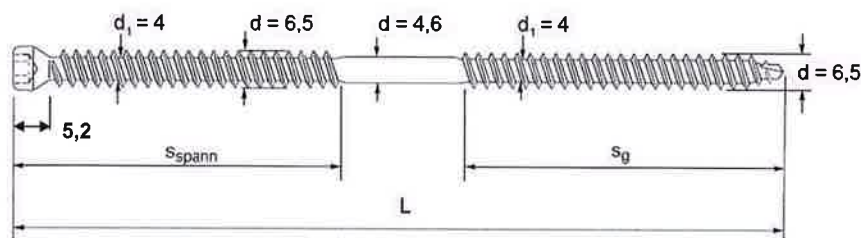
Additional lengths $65 < L < 130$ mm are possible.

Alternative threaded lengths are possible, the minimum thread length shall be $4 d$.

L	S _g	S _{spann}
mm	mm	mm
65	28	28
90	40	40
130	55	55

WT-T-6,5 x L

Material: special carbon steel



Additional lengths $65 < L < 220$ mm are possible.

Alternative threaded lengths are possible, the minimum thread length shall be $4 d$.

L	S _g	S _{spann}
mm	mm	mm
65	28	28
90	40	40
130	55	55
160	65	65
190	80	80
220	95	95

Dimensions in mm

SFS self-tapping screws

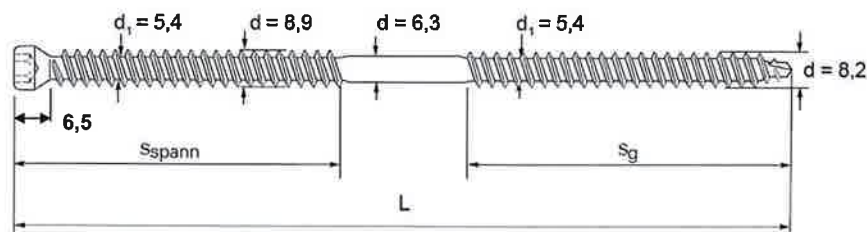
Dimensions

Annex 1

of European technical approval
ETA-12/0063

WT-T-8,2 x L

Material: special carbon steel



Additional lengths $160 < L < 330$ mm are possible.

Alternative threaded lengths are possible, the minimum thread length shall be $4 d$.

L	S _g	S _{spann}
mm	mm	mm
160	65	65
190	80	80
220	95	95
245	107	107
275	122	122
300	135	135
330	135	135

Dimensions in mm

Tolerances	
Length	$\pm 5 \%$
Diameter	$\pm 5 \%$

SFS self-tapping screws

Dimensions

Annex 1

of European technical approval
ETA-12/0063

Table A2.1 Characteristic load bearing capacities of SFS self-tapping screws

Product characteristic			WT-S-6,5 x L	WT-T-6,5 x L	WT-T-8,2 x L
Characteristic yield moment	$M_{y,k}$	Nm	7	12,7	19,5
Characteristic withdrawal parameter angle screw-axis to grain: 90° ($\rho=350\text{kg/m}^3$)	$f_{ax,k,90^\circ}$	N/mm ²	12,9	12,9	13,35
Characteristic tensile strength	$f_{tens,k}$	kN	9,1	14,4	28,6
Characteristic yield strength	$f_{y,k}$	N/mm ²	545	990	870
Characteristic torsional strength	$f_{tor,k}$	Nm	8,7	12,7	25,9
Insertion moment ($\rho=450\text{kg/m}^3$)	$R_{tor,k}$	Nm	5,6	5,6	15,25

A.2.1 General

The minimum penetration length of screws in the load-bearing wood-based members shall be 4 d.

For design according to EN 1995-1-1 the outer thread diameter d according to Annex 1 is used as nominal diameter d or rather effective diameter d_{ef} . Thereby, the SFS self-tapping screw WT-T-8,2 (regarding assignment of verification methods) may be categorized like a screw with an outer thread diameter of 8 mm.

A.2.2 Characteristic withdrawal parameter

For angles $0^\circ \leq \alpha \leq 45^\circ$ between screw-axis and direction of wood-fibre, $f_{ax,k,\alpha}$ is obtained by

$$f_{ax,k,\alpha} = k_{ax} \cdot f_{ax,k,90^\circ}$$

with

$$k_{ax} = 0,3 + \frac{0,7 \cdot \alpha}{45^\circ}$$

For angles $45^\circ \leq \alpha \leq 90^\circ$ between screw-axis and direction of wood-fibre, $f_{ax,k,\alpha}$ remains constant.

A.2.3 Characteristic head pull-through capacity

For screws with a head diameter of at least 1,8 times the shank or inner thread diameter the characteristic head pull-through parameter for solid wood (strength classes C24 up to C40 according to EN 14081-1) and glued laminated timber (strength class GL24 up to GL36 according to EN 14080) can be determined by calculation.

The characteristic value of the head pull-through parameter for a characteristic density of 380 kg/m³ of the timber and for wood based panels like

SFS self-tapping screws	Annex 2
Product characteristics	of European technical approval ETA-12/0063

- Plywood according to EN 636 and EN 13986,
- Oriented strand board, OSB according to EN 300 and EN 13986,
- Particle board according to EN 312 and EN 13986,

with thicknesses of more than 20 mm is

$$f_{\text{head,k}} = 10 \text{ N/mm}^2$$

For wood based panels with a thickness between 12 mm and 20 mm the characteristic value of the head pull-through parameter is

$$f_{\text{head,k}} = 8 \text{ N/mm}^2$$

For wood based panels with a thickness of less than 12 mm the characteristic head pull-through capacity shall be based on a characteristic value of the head pull-through parameter of 8 N/mm², and limited to 400 N complying with the minimum thicknesses of the wood based panels of 1,2 d, with d as outer thread diameter. In addition the minimum thicknesses of Table A2.2 apply.

Table A2.2 Minimum thicknesses of wood based panels

Wood based panel	Minimum thickness in mm
Plywood	6
Oriented strand board, OSB	8
Solid wood panels	12
Particleboard	8

A.2.4 Slip modulus for mainly axially loaded screws

The axial slip modulus K_{ser} for the serviceability limit state per side shall be taken independent of angle α to the grain as

$$K_{\text{ser}} = 25 \cdot l_{\text{ef}} \cdot d \quad \text{in N/mm}$$

with

d = outer thread diameter of the screw in mm

l_{ef} = penetration length of the threaded part of the screw in the timber member in mm

A.2.5 Compressive loading

The design load carrying capacity for SFS self-tapping screws for an angle $0^\circ \leq \alpha \leq 90^\circ$ between screw-axis and direction of wood-fibre for compressive loading is given as

$$F_{\text{c},\alpha,\text{Rd}} = \min\{F_{\text{ax},\alpha,d}; F_{\text{ki},d}\} \text{ in N}$$

SFS self-tapping screws	Annex 2
Product characteristics	of European technical approval ETA-12/0063

with

$$F_{ax,d} = f_{ax,d,\alpha} \cdot d \cdot l_{ef}$$

$f_{ax,d,\alpha}$ = design value of the axial withdrawal capacity of the threaded part of the screw calculated from the characteristic values given in Table A2.1 in N/mm²

d = outer thread diameter of the screw in mm

l_{ef} = penetration length of the threaded part of the screw in the timber member in mm

$$F_{ki,d} = F_{ki,k} / \gamma_M = \frac{\chi \cdot N_{pl,k}}{\gamma_M}$$

$$\chi = 1 \text{ for } \bar{\lambda} \leq 0,2 \text{ or } \chi = \frac{1}{\varphi + \sqrt{\varphi^2 - \bar{\lambda}^2}} \text{ for } \bar{\lambda} > 0,2$$

$$\varphi = 0,5 \cdot \left[1 + 0,49 \cdot (\bar{\lambda} - 0,2) + \bar{\lambda}^2 \right]$$

$$\bar{\lambda} = \sqrt{\frac{N_{pl,k}}{N_{ki,k}}}$$

$$N_{pl,k} = \pi \cdot \frac{d_1^2}{4} f_{y,k} \text{ in N}$$

d_1 = inner thread diameter of the screw

$f_{y,k}$ = characteristic yield strength of the screw according to Table A2.1

$N_{ki,k}$ = characteristic ideal elastic buckling load

$$N_{ki,k} = \sqrt{c_h \cdot E_s \cdot I_s} \text{ in N}$$

c_h = elastic foundation of the screw

$$c_h = (0,19 + 0,012 \cdot d_1) \cdot \rho_k \cdot \left(\frac{90^\circ + \alpha}{180^\circ} \right) \text{ in N/mm}^2$$

ρ_k = characteristic density of the wood-based member in kg/m³

α = angle between screw axis and grain direction

$$E_s \cdot I_s = \frac{210000 \cdot \pi \cdot d_1^4}{64} = \text{bending stiffness in N/mm}^2$$

SFS self-tapping screws

Annex 2

Product characteristics

of European technical approval
ETA-12/0063

A.2.6 Compression reinforcement

The compression force shall evenly be distributed to the screws used as compression reinforcement. The screws are driven into the timber member perpendicular to the contact surface under an angle between the screw axis and the grain direction of 45° to 90°. The screw heads must be flush with the timber surface.

Reinforcing screws for wood-based panels are not covered by this European technical approval.

For the design of reinforced contact areas the following conditions must be met independently of the angle between the screw axis and the grain direction.

The design resistance of a reinforced contact area is:

$$R_{90,d} = \min \left\{ \begin{array}{l} k_{c,90} \cdot B \cdot l_{ef,1} \cdot f_{c,90,d} + n \cdot \min \{ F_{ax,\alpha,d}; F_{ki,d} \} \\ B \cdot l_{ef,2} \cdot f_{c,90,d} \end{array} \right\}$$

Where:

$k_{c,90}$ = parameter according to EN 1995-1-1, 6.1.5

B = bearing width in mm

$l_{ef,1}$ = effective contact length according to EN 1995-1-1, 6.1.5 in mm

$f_{c,90,d}$ = design compressive strength perpendicular to the grain (EN 338/EN 14081-1) in N/mm²

$$n = n_0 \cdot n_{90}$$

n = number of reinforcing screws

n_0 = number of reinforcing screws arranged in a row parallel to the grain

n_{90} = number of reinforcing screws arranged in a row perpendicular to the grain

$l_{ef,2}$ = effective contact length in the plane of the screw tips in mm, see Annex 4

$$l_{ef,2} = \{ l_{ef} + (n_0 - 1) \cdot a_1 + \min(l_{ef}; a_{1,c}) \} \quad \text{end supports}$$

$$l_{ef,2} = \{ 2 \cdot l_{ef} + (n_0 - 1) \cdot a_1 \} \quad \text{intermediate supports}$$

l_{ef} = penetration length of the threaded part of the screw in the timber member in mm

$a_{1,c}$ = end distance of the centre of gravity of the threaded part in the timber member in mm

SFS self-tapping screws	Annex 2
Product characteristics	of European technical approval ETA-12/0063

A.3.1 General

Minimum thickness for structural members with non-predrilled holes is $t = 30$ mm for screws with $d = 6,5$ mm and $t = 40$ mm for screws with $d = 8,2$ mm.

A.3.2 Laterally and/or axially loaded screws

For SFS self-tapping screws in predrilled and non-predrilled holes, the minimum spacing, end and edge distances shall be specified according to EN 1995-1-1. Here, the outer thread diameter d shall be considered.

Minimum distances from the unloaded edge perpendicular to the grain may be reduced to $3 d$ also for timber thickness $t < 5 d$, if the spacing parallel to the grain and the end distance is at least $25 d$.

A.3.3 Only axially loaded screws

For SFS self-tapping screws loaded only axially, the following minimum spacing, end and edge distances apply alternatively for a minimum timber thickness of $t = 10 d$ in non-predrilled holes:

Spacing a_1 in a plane parallel to the grain:	$a_1 = 5 d$
Spacing a_2 perpendicular to a plane parallel to the grain:	$a_2 = 5 d$
End distance of the centre of gravity of the threaded part in the timber member:	$a_{1,c} = 5 d$
Edge distance of the centre of gravity of the threaded part in the timber member:	$a_{2,c} = 3 d$

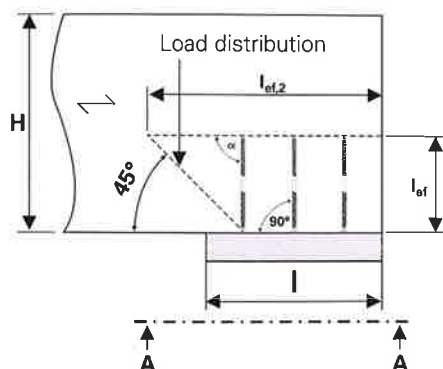
The distance $a_{2,c}$ can be reduced to 15 mm for WT-T-6,5 and WT-S-6,5. Spacing a_2 can be reduced till $2,5 d$ if the product of spacing a_1 times $a_2 = 25 d^2$ can be kept for every screw.

A.3.4 Crosswise installed pair of screws

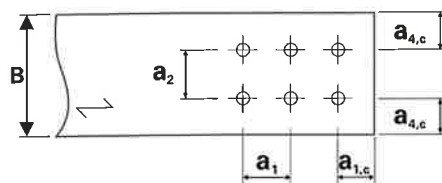
For crosswise installed pairs of screws the minimum spacing between these screws may be reduced by multiplication with $(1 - \alpha_k/180)$, with $0^\circ \leq \alpha_k \leq 90^\circ$, to a minimum of $1,5 d$. For the minimum spacing between parallel screws of adjacent crosswise installed pairs of screws a_1 and a_2 shall be considered.

SFS self-tapping screws	Annex 3 of European technical approval ETA-12/0063
Spacing, end and edge distances of the screws and minimum thickness of the wood based material	

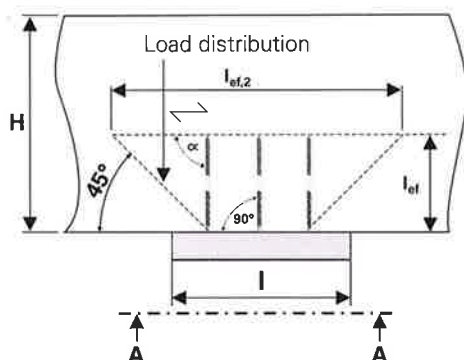
Reinforced End Bearing



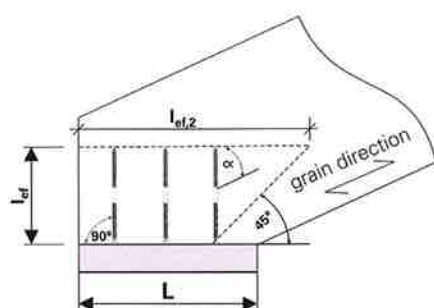
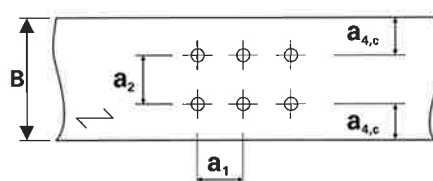
Section A-A



Reinforced Intermediate Bearing



Section A-A



H = depth of the member
 B = bearing width
 l_{ef} = fastener length in timber
 $l_{ef,2}$ = effective bearing length in the plane of fastener tips
 α = angle between the screw axis and the grain direction

SFS self-tapping screws

Compression reinforcement

Annex 4

of European technical approval
ETA-12/0063

Reference documents

CUAP 06.03/08 (12.2010), Common Understanding of Assessment Procedure for European technical approval for Self-tapping Screws for Use in Timber Construction.

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EN 312 (09.2010), Particleboards - Specifications

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EN 1993-1-4 (10.2006), Eurocode 3 - Design of steel structures - Part 1-4: General rules - Supplementary rules for stainless steels

EN 1995-1-1 (11.2004), EN 1995-1-1/AC (06.2006), EN 1995-1-1/A1 (06.2008), Eurocode 5 - Design of timber structures - Part 1-1: General - Common rules and rules for buildings

EN 10088-1 (06.2005), Stainless steels – Part 1: List of stainless steels

EN 13986 (10.2004), Wood-based panels for use in construction - Characteristics, evaluation of conformity and marking

EN 14080 (06.2005), Timber structures - Glued laminated timber - Requirements

FprEN 14080 (02.2012), Timber structures - Glued laminated timber and glued solid timber

EN 14081-1+A1 (02.2011), Timber structures - Strength graded structural timber with rectangular cross section - Part 1: General requirements

EN 14374 (11.2004), Timber structures - Structural laminated veneer timber - Requirements

SFS self-tapping screws	Annex 5 of European technical approval ETA-12/0063
Reference documents	