Authorised and notified according to Article 10 of the 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

Österreichisches Institut für Bautechnik
Schenkenstrasse 4 | 1010 Vienna | Austria
T +43 1 533 65 50 | F +43 1 533 64 23
mail@oib.or.at | www.oib.or.at

Member of EOTA

European technical approval ETA-13/0796

English translation, the original version is in German

Handelsbezeichnung *Trade name*	**Simpson Strong-Tie® selbstbohrende Schrauben ESCR und SSTA** *Simpson Strong-Tie® self-tapping screws ESCR and SSTA*
Zulassungsinhaber *Holder of approval*	**SIMPSON STRONG-TIE® GmbH Hubert-Vergölst-Straße 6-14 61231 Bad Nauheim Deutschland**
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* bis zum *to*	**28.06.2013** **04.11.2017**
Herstellwerk *Manufacturing plant*	**Simpson Strong-Tie Manufacturing Facilities**
Diese Europäische technische Zulassung umfasst *This European technical approval contains*	**34 Seiten einschließlich 11 Anhängen** *34 Pages including 11 Annexes*

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 products[1] – Construction Products Directive (CPD) –, amended by the Council Directive 93/68/EEC of 22 July 1993[2], and Regulation (EC) 1882/2003 of the European Parliament and of the Council of 29 September 2003[3];
2. *der Vereinbarung gemäß Art. 15a B-VG über die Zusammenarbeit im Bauwesen, LGBl. Für Niederösterreich Nr. 8207-0, in Verbindung mit der NÖ Bauordnung 1996, LGBl. Nr. 8200-21;*

   the agreement according to Article 15a federal constitutional law on the co-operation in the construction sector, LGBl. for Lower Austria № 8207-0, in conjunction with the Lower Austrian Building Act 1996, LGBl. № 8200-21;
3. Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex of Commission Decision 94/23/EC[4];

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.

5 Reproduction of this European technical approval including transmission by electronic means shall be in full. However, partial reproduction may be made with the written consent of Österreichisches 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 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 Union № L 284, 31.10.2003, page 1
[4] 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

Simpson Strong-Tie® screws ESCR and SSTA are self-tapping screws divided into a drill tip, optionally a compressor and/or cutting groove, thread, shank, and head of the screw. The screws are made from special carbon steel and hardened. They are anti-friction coated and are electrogalvanised and passivated (yellow or blue) or provided with a zinc-nickel coating. Possible outer thread diameters as well as overall lengths for the Simpson Strong-Tie® screws ESCR and SSTA are given in Table 1. Further dimensions are shown from Annex 1 to Annex 6. The washers are made from carbon steel. The dimensions of the washers are given in Annex 6.

Table 1: Possible outer thread diameter and overall length of screws

Type of screw	Outer thread diameter		Overall length	
	min.	max.	min.	max.
	mm	mm	mm	mm
ESCR S	4	6	20	300
ESCR	6	10	20	500
ESCR C	4	10	20	500
ESCR FTC	6	12	20	1 000
ESCR FTP	6	12	20	1 000
ESCR FT	6	12	20	1 000
SSTA	6	12	20	500

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,

- Fibreboards according to EN 622-2, EN 622-3 and EN 13986,
- Cement-bonded particle boards according to European technical approvals or national provisions that apply on the installation site.

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. The scope of the screws regarding resistance to corrosion shall be defined according to national provisions that apply at the installation site considering environmental conditions.

1.3 Assumed working life

The provisions made in the European technical approval (ETA) are based on an assumed intended working life for Simpson Strong-Tie® screws ESCR and SSTA 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 Simpson Strong-Tie® screws ESCR and SSTA 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 2: Characteristics of the product and methods of verification and assessment

№	Product characteristic	Method of verification and assessment	Expression of performance
(1)	(2)	(3)	(4)
Essential Requirement 1: Mechanical resistance and stability			
1	Dimensions	2.1.1	Annex 1 to Annex 6
2	Characteristic yield moment	2.1.1	Annex 7
3	Characteristic withdrawal parameter	2.1.1	Annex 7
4	Characteristic head pull-trough parameter	2.1.1	Annex 7
5	Characteristic tensile strength	2.1.1	Annex 7
6	Characteristic yield strength	2.1.1	Annex 7
7	Characteristic torsional strength	2.1.1	Annex 7
8	Insertion moment	2.1.1	Annex 7
9	Spacing, end and edge distances of the screws and minimum thickness of the wood based material	2.1.1	Annex 8
10	Slip modulus for mainly axially loaded screws	2.1.1	Annex 7, where relevant
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			
13	Identical to ER 1	—	—
(1)	(2)	(3)	(4)
Essential Requirement 5: Protection against noise			
—	Not relevant	—	—
Essential Requirement 6: Energy economy and heat retention			
—	Not relevant	—	—
General aspects relating to fitness for use[1]			
14	Durability against corrosion	2.1.4	2.1.4 Service classes 1 and 2
15	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

Simpson Strong-Tie® screws ESCR and SSTA correspond to the information and drawings given in Annex 1 to Annex 6. The following performance characteristics data of the product are given in Annex 7 and Annex 8:

- Characteristic yield moment
- Characteristic withdrawal parameter
- Characteristic head pull-through 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, where relevant

The material characteristics, dimensions, and tolerances of the product not indicated in Annexes 1 to 6 are given in the technical documentation[5] of the European technical approval.

2.1.2 Safety in case of fire

Simpson Strong-Tie® screws ESCR and SSTA 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.
- There is no risk that chrome VI will be released by consideration of all possible release scenarios.

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 and 2 according to EN 1995-1-1.

The screws and washers are made from carbon steel are electrogalvanised and yellow or blue passivated or coated wit a zinc-nickel coating. The minimum thickness of the zinc coating of the screws is 5 µm. The minimum thickness of the zinc-nickel coating is 4 µm.

[5] 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.

Durability of Simpson Strong-Tie® screws ESCR and SSTA is in accordance with EN 1995-1-1 or national provisions that apply on the installation site, see also the conditions of Clause 4.

Serviceability of Simpson Strong-Tie® screws ESCR and SSTA is given in EN 1995-1-1 and under the conditions of Clause 4.

2.2 Methods of verification

2.2.1 General

The assessment of fitness of Simpson Strong-Tie® screws ESCR and SSTA 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 and for safety in use in the sense of the Essential Requirements 1, 2, 3 and 4 of Council Directive 89/106/EEC as well as for durability and serviceability 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 Simpson Strong-Tie® screws ESCR and SSTA 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.

By the accompanying documentation Simpson Strong-Tie® screws ESCR and SSTA shall be clearly identifiable at delivery.

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 plan[6];

(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.

[6] 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 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.

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 Simpson Strong-Tie® screws ESCR and SSTA 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 Simpson Strong-Tie® screws ESCR and SSTA 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 holder of approval
- 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 of corrosion protection

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

4.1 Manufacturing

Simpson Strong-Tie® screws ESCR and SSTA 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 Simpson Strong-Tie® screws ESCR and SSTA. 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 Simpson Strong-Tie® screws ESCR and SSTA is carried under the responsibility of an engineer experienced in such products.
- Design of the works shall account for the protection of Simpson Strong-Tie® screws ESCR and SSTA to maintain service classes 1 and 2 according to EN 1995-1-1 or national provisions that apply on the installation site.
- Simpson Strong-Tie® screws ESCR and SSTA are installed correctly.

Design of the products can be according to EN 1995-1-1 taking into account of Clause 2.1 of the European technical approval. Standards and regulations in force at the place of use shall be considered.

4.2.2 Installation

Installation of Simpson Strong-Tie® screws ESCR and SSTA 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.

To ensure a proper installation for screws with lengths of more than 800 mm a guiding hole is recommended.

The structural members which are connected with Simpson Strong-Tie® screws ESCR and SSTA shall

- be in accordance with Clause 1.2;
- ensure minimum spacing and edge distances in accordance with EN 1995-1-1 and Annex 8.

5 Recommendations for the manufacturer

5.1 General

The manufacturer shall ensure that the requirements in accordance with the Clauses 1, 2 and 4 as well as with the Annexes of the European technical approval are made known to those who are concerned with planning and execution of the works.

5.2 Recommendations on packaging, transport and storage

Simpson Strong-Tie® screws ESCR and SSTA 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 Simpson Strong-Tie® screws ESCR and SSTA requires immediate actions regarding the mechanical resistance and stability of the works.

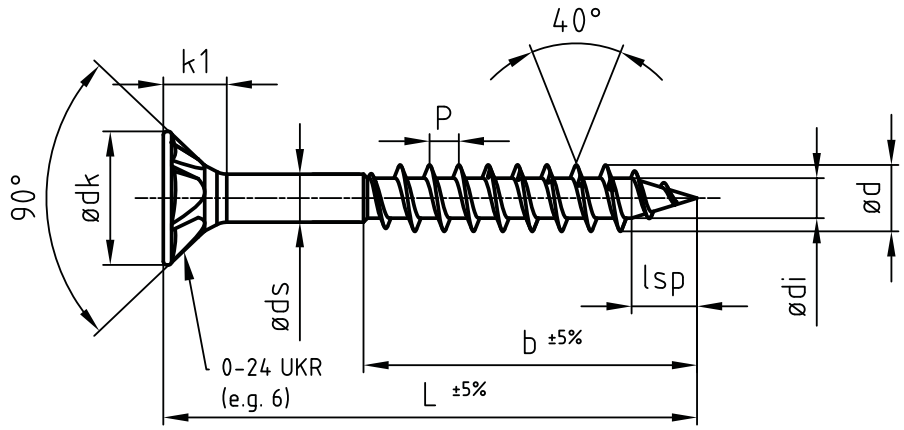
On behalf of Österreichisches Institut für Bautechnik

The original document is signed by:

Rainer Mikulits

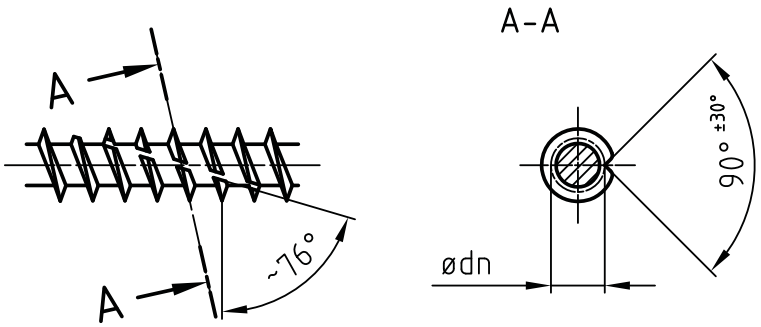
Managing Director

UKR ... cutter ribs



Dim	ødk	k1	ødn	P	ød	ødi	lsp	ødn
4.0	8.0 ±0.70	3.0 ±0.30	2.8 ±0.14	1.8 ±0.18	4.0 ±0.20	2.45 ±0.13	4.6 ±1.5	3.1 ±0.32
4.5	9.0 ±0.70	3.5 ±0.35	3.2 ±0.16	2.0 ±0.20	4.5 ±0.22	2.70 ±0.14	5.0 ±1.6	3.5 ±0.35

optional with cutting groove



length L and length of thread b			
Dim. 4.0		Dim. 4.5	
L	b	L	b
25	20	25	19
30	17	30	19

length of thread b = b_{min}
b_{max} (full thread) = L-k1

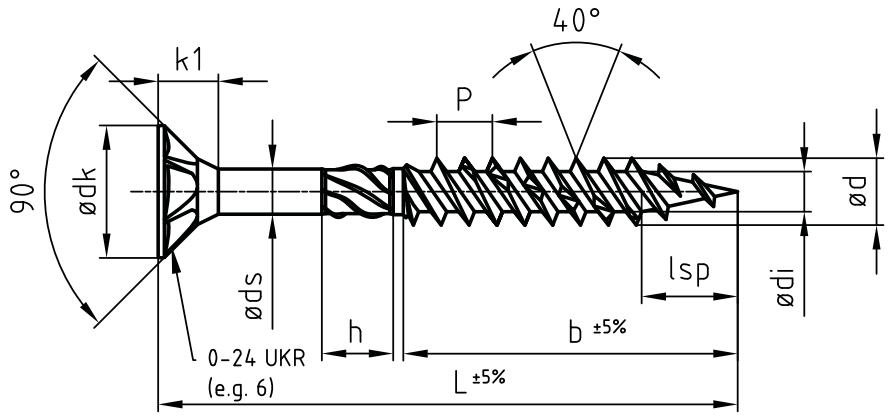
Simpson Strong-Tie® screws ESCR and SSTA

ESCR S

Annex 1

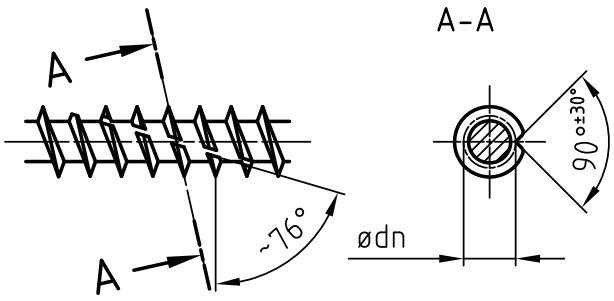
of European technical approval
ETA-13/0796

UKR ... cutter ribs



Dim	ødk	k1	ødi	P	ød	ødi	lsp	ødn	ødR	h
4.0	8.0 ±0.70	3.0 ±0.30	2.8 ±0.14	3.4 ±0.34	4.0 ±0.20	2.40 ±0.12	4.6 ±1.5	3.1 ±0.32	3.2 ±0.3	6.2 ±1.0
4.5	9.0 ±0.70	3.5 ±0.35	3.2 ±0.16	3.8 ±0.38	4.5 ±0.22	2.70 ±0.14	5.0 ±1.6	3.5 ±0.35	3.6 ±0.3	8.2 ±1.0
5.0	10.0 ±0.80	4.5 ±0.45	3.5 ±0.17	4.2 ±0.42	5.0 ±0.25	3.10 ±0.16	6.0 ±1.7	3.9 ±0.39	4.1 ±0.4	8.2 ±1.0
6.0	12.0 ±0.90	5.5 ±0.55	4.3 ±0.21	5.0 ±0.50	6.0 ±0.30	3.80 ±0.19	7.3 ±1.9	4.7 ±0.53	5.0 ±0.5	10.2 ±1.0

detail: cutting groove (optional without cutting groove)

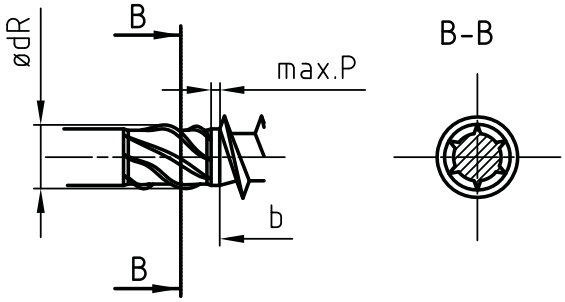


length L and length of thread b							
Dim. 4.0		Dim. 4.5		Dim. 5.0		Dim. 6.0	
L	b	L	b	L	b	L	b
35	20	40	24	40	22	50	29
40	25	45	24	50	27	60	34
45	25	50	29	60	32	70	39
50	30	60	34	70	37	80	48
60	35	70	39	80	47	90	48
70	35	80	44	90	47	100	54
				100	55	110-300	64
				110-120	65		

length of thread b = b_{min}
b_{max} (full thread) = L-k1

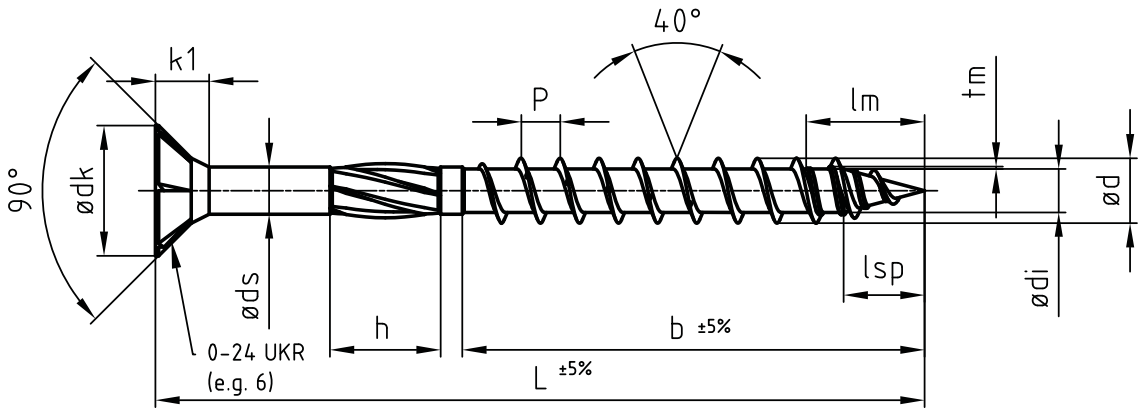
detail: friction part

optional without friction part



Simpson Strong-Tie® screws ESCR and SSTA	Annex 2 of European technical approval ETA-13/0796
ESCR S	

UKR ... cutter ribs



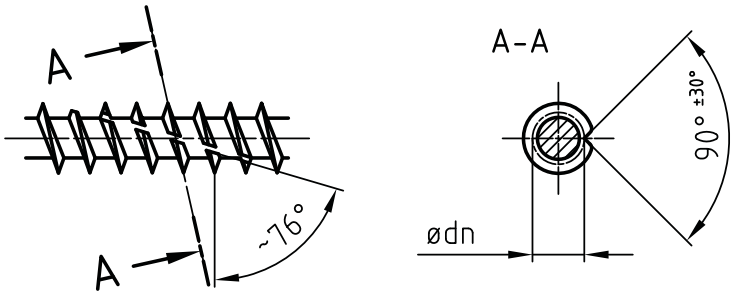
Dim	ødk	k1	ødS	P	ød	ødi	lsp	ødn	ødR	h	tm	a	a1
4.0	8.0 ±0.70	3.0 ±0.30	2.8 ±0.14	2.2 ±0.22	4.0 ±0.20	2.55 ±0.13	4.6 ±1.5	3.1 ±0.32	3.2 ±0.3	6.2 ±1.0	0.20 ±0.05	5.4 ±2.0	8.5 ±2.0
4.5	9.0 ±0.70	3.5 ±0.35	3.2 ±0.16	2.4 ±0.24	4.5 ±0.22	2.75 ±0.14	5.0 ±1.6	3.5 ±0.35	3.6 ±0.3	8.2 ±1.0	0.30 ±0.05	6.0 ±2.0	9.0 ±2.0
5.0 x)	10.0 ±0.80	4.5 ±0.45	3.5 ±0.17	2.7 ±0.27	5.0 ±0.25	3.25 ±0.17	6.0 ±1.7	3.9 ±0.39	4.1 ±0.4	8.2 ±1.0	0.35 ±0.07	7.0 ±2.0	10.5 ±2.0
6.0 xx)	12.0 ±0.90	5.5 ±0.55	4.3 ±0.21	3.4 ±0.34	6.0 ±0.30	3.95 ±0.20	7.3 ±1.9	4.7 ±0.53	5.0 ±0.5	10.2 ±1.0	0.30 ±0.07	8.5 ±2.0	12.5 ±2.0
8.0	15.0 ±1.20	7.0 ±0.70	5.9 ±0.29	5.6 ±0.56	8.0 ±0.40	5.30 ±0.26	8.2 ±2.1	7.1 ±0.73	6.8 ±0.6	10.2 ±1.0	0.60 ±0.12	11.0 ±2.0	16.5 ±2.0
10.0	18.5 ±1.50	9.0 ±0.90	7.1 ±0.35	6.6 ±0.66	10.0 ±0.50	6.20 ±0.31	10.1 ±2.3	8.4 ±0.87	8.3 ±0.8	10.2 ±1.0	0.60 ±0.12	13.0 ±2.0	19.5 ±2.0

x) Dim 5 optional with pitch P=3,4 $^{\pm 0.34}$

xx) Dim 6 optional with pitch P=4,6 $^{\pm 0.46}$

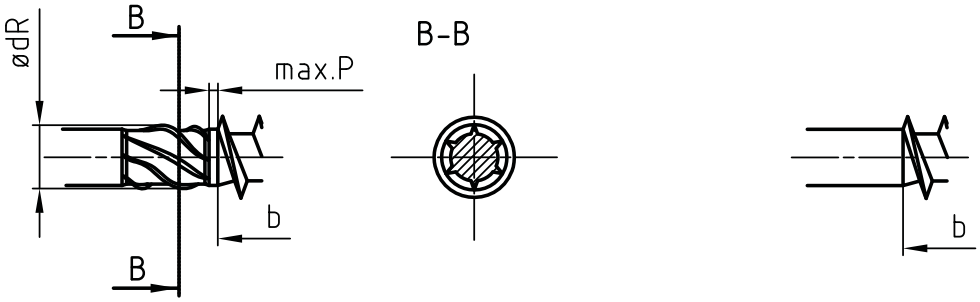
lm=lsp+1,0P

detail: cutting groove (optional without cutting groove)



detail: friction part

optional without friction part



Simpson Strong-Tie® screws ESCR and SSTA

SIMPSON Strong-Tie®

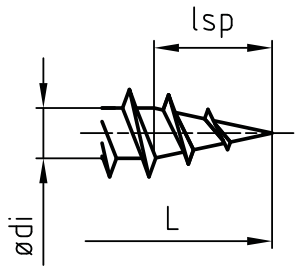
ESCR C

Annex 3

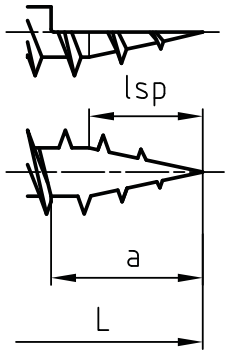
of European technical approval ETA-13/0796

alternative points:

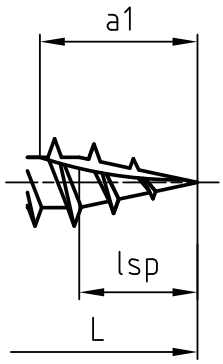
regular point



half cut



scraping (3/4 Point)



length L and length of thread b											
Dim. 4.0		Dim. 4.5		Dim. 5.0		Dim. 6.0		Dim. 8.0		Dim. 10.0	
L	b	L	b	L	b	L	b	L	b	L	b
30	24	40	24	40	30	60	36	80	54	80	60
35	24	45	24	50	30	70	36	100	54	100	60
40	30	50	29	60	30	80	48	120	54	120	60
50	30	60	29	70	37	90	48	140	84	140	60
60	35	70	39	80	37	100	48	160	84	160-500	100
70	35	80	39	90-120	55	110-300	64	180-500	100		
80	35										

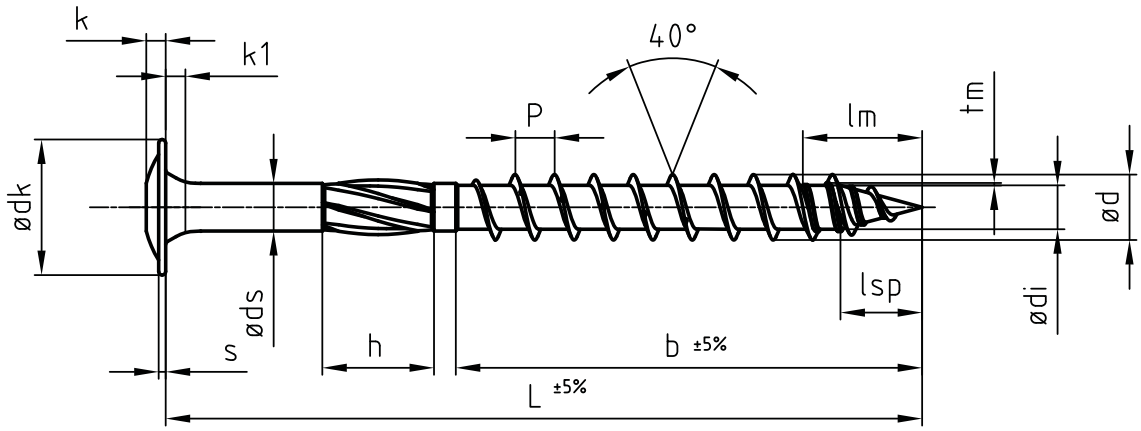
length of thread $b = b_{min}$
b_{max} (full thread) = L-k1

Simpson Strong-Tie® screws ESCR and SSTA

ESCR C

Annex 3

of European technical approval
ETA-13/0796

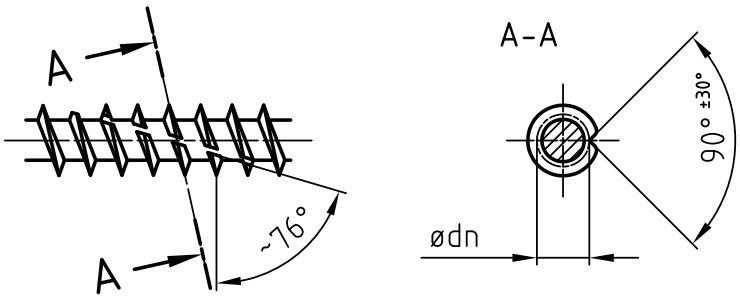


Dim	ødk	k	k1	s	ødS	ød	ødi	P	ødR	ødn	lsp	h	tm
6.0 x)	14.0 ±0.80	3.0 ±1.0	1.4 ±0.8	1.5 ±0.8	4.3±0.21	6.0 ±0.30	3.95 ±0.20	3.4 ±0.34	5.0 ±0.5	4.7 ±0.53	7.3 ±1.9	10.2 ±1.0	0.30 ±0.07
8.0	20.0 ±1.50	3.5 ±1.0	1.9 ±1.0	2.0±0.9	5.9±0.29	8.0 ±0.40	5.30 ±0.26	5.6 ±0.56	6.8±0.6	7.1 ±0.73	8.2 ±2.1	10.2 ±1.0	0.60 ±0.12
10.0	25.0 ±2.00	4.5 ±1.2	2.6 ±1.5	2.0±0.9	7.1 ±0.35	10.0±0.50	6.20 ±0.31	6.6 ±0.66	8.3±0.8	8.4 ±0.87	10.1 ±2.3	10.2 ±1.0	0.60 ±0.12

x) Dim 6 optional with pitch P=4,6 $^{\pm 0.46}$

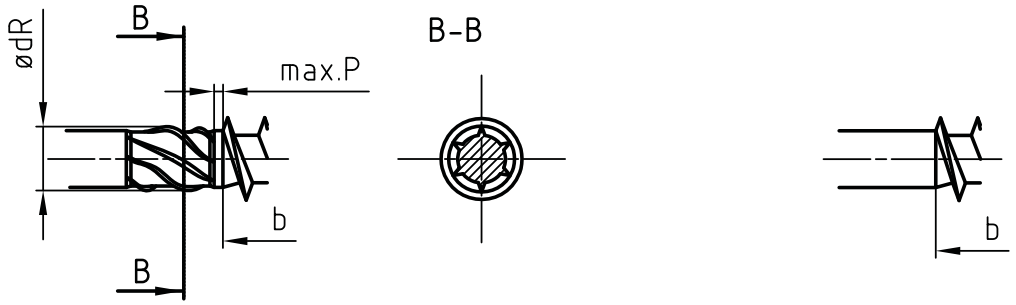
lm=lsp+1,0P

detail: cutting groove (optional without cutting groove)



detail: friction part

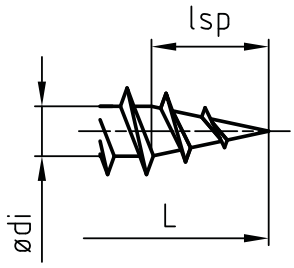
optional without friction part



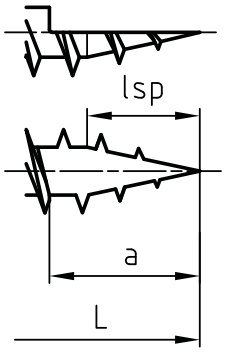
Simpson Strong-Tie® screws ESCR and SSTA	Annex 4 of European technical approval ETA-13/0796
ESCR	

alternative points:

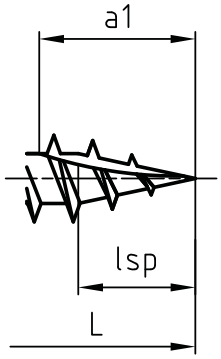
regular point



half cut



scraping (3/4 point)



Dim	a	a1
6.0	8.5 ±2.0	12.5 ±2.0
8.0	11.0 ±2.0	16.5 ±2.0
10.0	13.0 ±2.0	19.5 ±2.0

length L and length of thread b					
Dim. 6.0		Dim. 8.0		Dim. 10.0	
L	b	L	b	L	b
60	36	80	54	80	60
70	36	100	54	100	60
80	48	120	54	120	60
90	48	140	84	140	60
100	48	160	84	160-500	100
110-300	64	180-500	100		

length of thread $b = b_{min}$
b_{max} (full thread) = L-k1

Simpson Strong-Tie® screws ESCR and SSTA

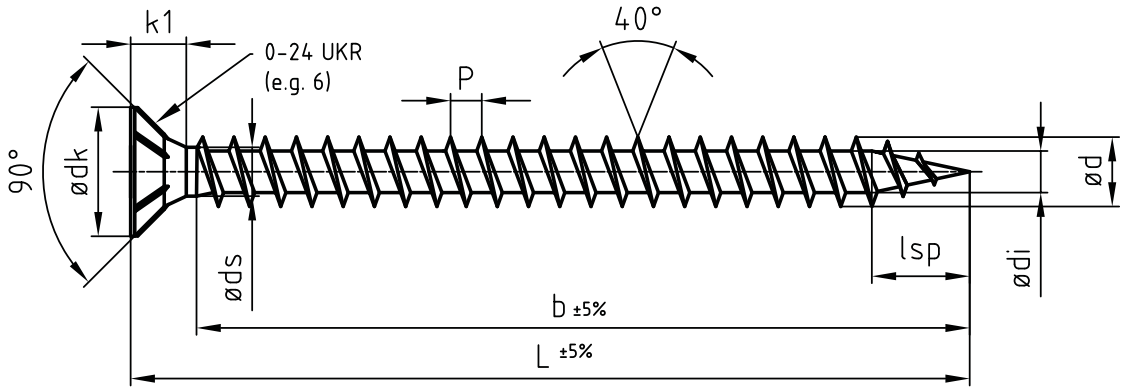
ESCR

Annex 4

of European technical approval
ETA-13/0796

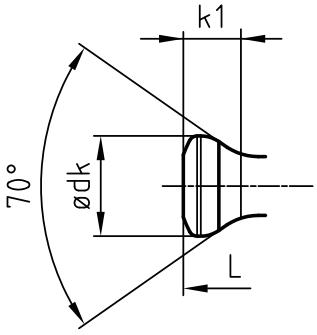
UKR ... cutter ribs

countersunk head "FTC"

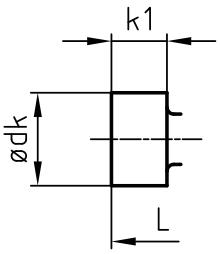


alternative heads:

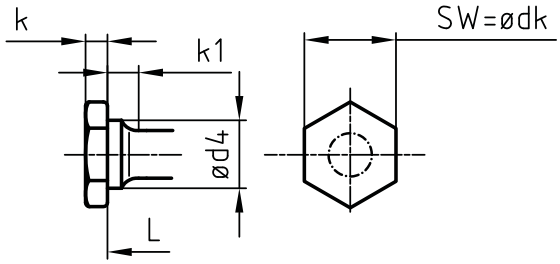
pear head "FTP"



cylindrical head "FT"

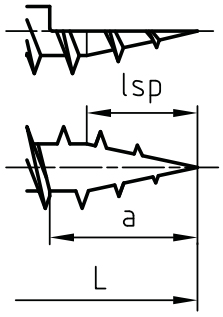


combi hexagon head "SSTA"

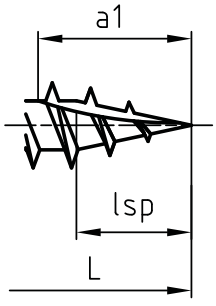


alternative points:

half cut



scraping (3/4 point)



Simpson Strong-Tie® screws ESCR and SSTA	Annex 5 of European technical approval ETA-13/0796
ESCR FTC, ESCR FTP, ESCR FT and SSTA	

Dim	countersunk head		pear head		cylindrical head		combi hexagon head			
	ødk	k1	ødk	k1	ødk	k1	SW=ødk	k	k1	ød4
6.0	12.0 ±0.90	5.5 ±0.55	10.3 ±0.51	7.0 ±1.0	8.15 ±0.40	4.7 ±0.8	9.0 -0.45	3.0 ±1.3	4.7 ±1.0	6.0 ±0.60
8.0	15.0 ±1.20	7.0 ±0.70	11.5 ±0.65	7.5 ±1.2	10.2 ±0.51	7.5 ±1.0	12.0 -0.60	4.5 ±1.3	6.3 ±1.0	8.0 ±0.80
10.0	18.5 ±1.50	9.0 ±0.90	12.0 ±0.75	9.5 ±1.5	13.4 ±0.67	8.0 ±1.0	15.0 -0.75	5.0 ±1.3	8.0 ±1.5	10.0 ±1.00
12.0	18.5 ±1.50	9.0 ±0.90	16.0 ±0.90	13.0±2.0	14.2 ±0.71	10.0 ±1.5	17.0 -0.85	5.5 ±1.3	10.0 ±2.0	12.0 ±1.20

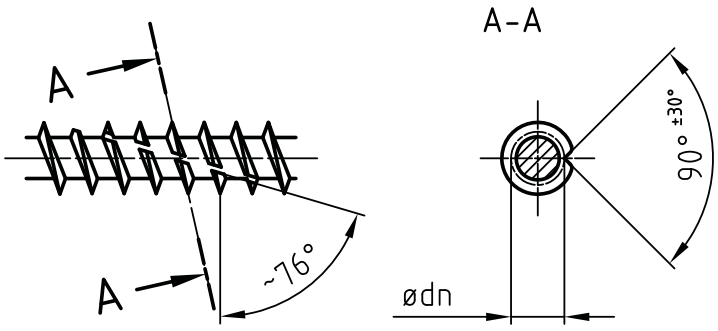
Dim	øds	ød	ødi	P	lsp	ødn	ødV	a	a1
6.0	4.3 ±0.21	6.0 ±0.30	3.80 ±0.19	2.6 ±0.26	7.3 ±1.9	4.7 ±0.53	4.4 ±0.43	8.5 ±2.0	12.5 ±2.0
8.0	5.9 ±0.29	8.0 ±0.40	5.20 ±0.26	3.8 ±0.38	8.2 ±2.1	7.1 ±0.73	6.0 ±0.59	11.0 ±2.0	16.5 ±2.0
10.0	7.1 ±0.35	10.0 ±0.50	6.10 ±0.31	4.5 ±0.45	10.1 ±2.3	8.4 ±0.87	7.1 ±0.72	13.0 ±2.0	19.5 ±2.0
12.0	8.2 ±0.41	12.0 ±0.60	6.80 ±0.34	6.2 ±0.62	11.2 ±2.6	8.9 ±0.89	7.9 ±0.80	15.0 ±2.0	22.5 ±2.0

lV = 4P

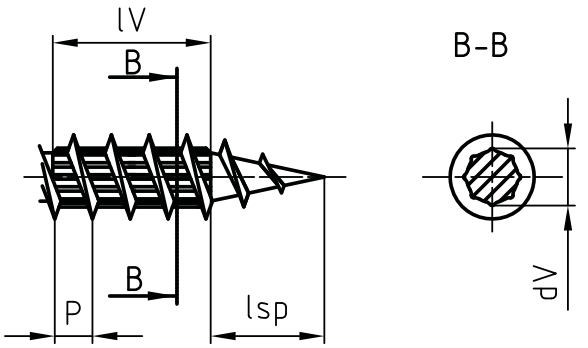
length L and length of thread b							
Dim. 6.0		Dim. 8.0		Dim. 10.0		Dim. 12.0	
L	b	L	b	L	b	L	b
30-400	L-8	50-400	L-10	50-400	L-12	60-400	L-20
		401-1000	L-23	401-1000	L-24	401-1000	L-25

length of thread b:
b_{nenn} is defined at the product
b_{max} = L-k1

optional with cutting groove



optional with compressor



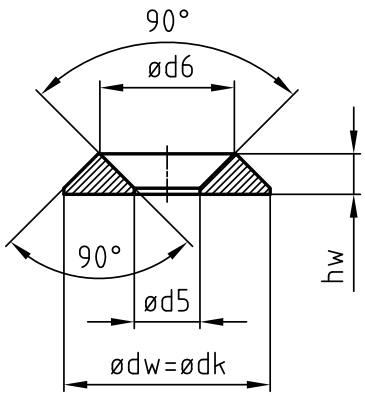
Simpson Strong-Tie® screws ESCR and SSTA

ESCR FTC, ESCR FTP, ESCR FT and SSTA

Annex 5

of European technical approval
ETA-13/0796

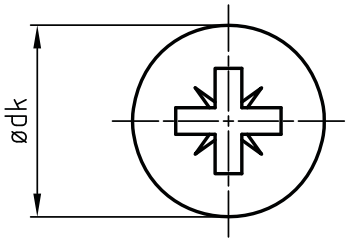
countersunk washer (this washer is only for countersunk-screws)



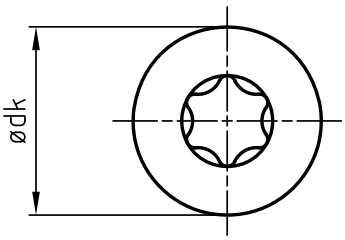
Dim	ødw=ødk	ød6	ød5	hw
6.0	22.0 ±2.0	14.5 ±1.5	8.5 ±1.0	4.5 ±1.0
8.0	28.0 ±2.0	19.0 ±1.9	10.0 ±2.0	6.0 ±1.0
10.0	35.0 ±3.0	22.5 ±2.2	12.0 ±2.0	7.0 ±1.0
12.0	42.0 ±3.0	25.0 ±2.5	14.0 ±2.0	7.5 ±1.0

for informal:

KS- Drive

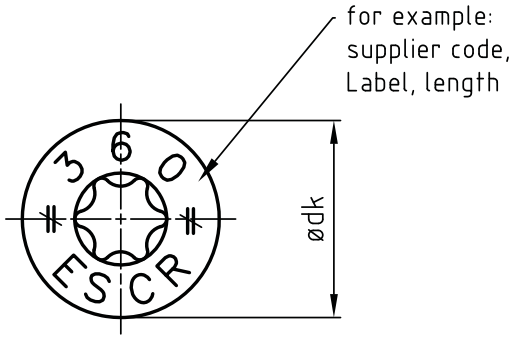


T-Drive



Dim	KS	T
4.0	KS 2	T10 / T15 / T20
4.5	KS 2	T15 / T20 / T25
5.0	KS 2	T20 / T25 / T30
6.0	KS 3	T20 / T25 / T30
7.0	KS 3	T25 / T30
8.0	KS 4	T30 / T40
10.0	KS 4	T40 / T50
12.0	KS 4	T40 / T50 / T55

head labeling optional
(for informal):



Simpson Strong-Tie® screws ESCR and SSTA	Annex 6 of European technical approval ETA-13/0796
Drive types and head labelling	

Table A7.1 Characteristic head pull-through capacities of Simpson Strong-Tie® screws ESCR S, ESCR C, ESCR FTC and SSTA in solid softwood or glued laminated timber

ESCR S, ESCR C, ESCR FTC and SSTA			Head diameter						
Product characteristic			8	9	10	12	15	17	18.5
Characteristic head pull-through parameter (ρ_k = 350 kg/m³)	$f_{head,k}$	N/mm²	17.1	17.6	14.6	14.6	12.4	12.2	12.2

Table A7.2 Characteristic head pull-through capacities of Simpson Strong-Tie® screws ESCR and washers in solid softwood or glued laminated timber

ESCR and washers			Head diameter / Washer diameter						
Product characteristic			14	20	22	25	28	35	42
Characteristic head pull-through parameter (ρ_k = 350 kg/m³)	$f_{head,k}$	N/mm²	16.7	17.6	20.4	15.2	14.5	10.0	6.5

Table A7.3 Characteristic load bearing capacities of Simpson Strong-Tie® screws ESCR S according to Annex 1

ESCR S (Annex 1)			Screw diameter	
Product characteristic			4	4.5
Max. length	l_{max}	mm	70	80
Characteristic tensile strength	$f_{tens,k}$	kN	5.0	5.8
Characteristic yield moment	$M_{y,k}$	Nm	3.2	4.9
Characteristic withdrawal parameter angle screw-axis to grain: 90° (ρ_k = 350 kg/m³)	$f_{ax,k,90°}$	N/mm²	14.8	13.8
Characteristic yield strength	$f_{y,k}$	N/mm²	900	
Characteristic torsional strength	$f_{tor,k}$	Nm	3.0	4.2
Insertion moment (ρ_k = 450 kg/m³)	$R_{tor,m}$	Nm	1.4	1.9

Table A7.4 Characteristic load bearing capacities of Simpson Strong-Tie® screws ESCR C and ESCR according to Annex 3 and Annex 4

ESCR C (Annex 3), ESCR (Annex 4)			Screw diameter					
Product characteristic			4	4.5	5	6	8	10
Max. length	l_{max}	mm	80	80	120	300	500	500
Characteristic tensile strength	$f_{tens,k}$	kN	5.0	5.8	8.8	12.8	22.7	33.2
Characteristic yield moment	$M_{y,k}$	Nm	3.2	4.9	6.5	10.1	22.6	33.0
Characteristic withdrawal parameter angle screw-axis to grain: 90° (ρ_k = 350 kg/m³)	$f_{ax,k,90°}$	N/mm²	14.8	13.8	13.6	13.0	10.7	9.5
Characteristic yield strength	$f_{y,k}$	N/mm²	900					
Characteristic torsional strength	$f_{tor,k}$	Nm	3.0	4.2	6.3	10.1	25.6	47.5
Insertion moment (ρ_k = 450kg/m³)	$R_{tor,m}$	Nm	1.2	1.6	2.1	2.5	8.3	14.2

Table A7.5 Characteristic load bearing capacities of Simpson Strong-Tie® screws ESCR S according to Annex 2

ESCR S (Annex 2)			Screw diameter			
Product characteristic			4	4.5	5	6
Max. length	l_{max}	mm	70	80	120	300
Characteristic tensile strength	$f_{tens.k}$	kN	5.0	7.0	8.8	13.1
Characteristic yield moment	$M_{y.k}$	Nm	3.1	4.2	5.9	10.7
Characteristic withdrawal parameter angle screw-axis to grain: 90° (ρ_k = 350 kg/m³)	$f_{ax.k.90°}$	N/mm²	14.3	13.3	13.6	13.0
Characteristic yield strength	$f_{y.k}$	N/mm²	900			
Characteristic torsional strength	$f_{tor.k}$	Nm	3.5	4.9	6.6	10.9
Insertion moment (ρ_k = 450 kg/m³)	$R_{tor.m}$	Nm	1.2	1.9	3.2	5.4

Simpson Strong-Tie® screws ESCR and SSTA	Annex 7
Product characteristics	of European technical approval ETA-13/0796

Table A7.6 Characteristic load bearing capacities of Simpson Strong-Tie® screws ESCR FTC without compressor and cutting groove, ESCR FTP and SSTA according to Annex 5

ESCR FTC without compressor and cutting groove, ESCR FTP and SSTA (Annex 5)			Screw diameter		
Product characteristic			6	8	10
Max. length	l_{max}	mm	220	400	400
Characteristic tensile strength	$f_{tens.k}$	kN	12.5	23.5	33.0
Characteristic yield moment	$M_{y.k}$	Nm	10.0	24.0	42.1
Characteristic withdrawal parameter angle screw-axis to grain: 90° (ρ_k = 350 kg/m³)	$f_{ax.k.90°}$	N/mm²	13.5	10.9	11.5
Characteristic yield strength	$f_{y.k}$	N/mm²	950		
Characteristic torsional strength	$f_{tor.k}$	Nm	10.4	26.5	47.0
Insertion moment (ρ_k = 450 kg/m³)	$R_{tor.m}$	Nm	6.9	15.6	23.0
Half cut	$R_{tor.m.\ HT}$	Nm	-	13.0	17.6
Slip modulus	K_{ser}	N/mm	see A.7.4		

Table A7.7 Characteristic load bearing capacities of Simpson Strong-Tie® screws ESCR FTC with compressor and cutting groove, ESCR FT and SSTA according to Annex 5

ESCR FTC with compressor and cutting groove, ESCR FT and SSTA (Annex 5)			Screw diameter		
Product characteristic			8	10	12
Max. length	l_{max}	mm	1000	1000	1000
Characteristic tensile strength	$f_{tens.k}$	kN	24.1	40.0	46.7
Characteristic yield moment	$M_{y.k}$	Nm	20.3	36.7	48.5
Characteristic withdrawal parameter angle screw-axis to grain: 90° (ρ_k = 350 kg/m³)	$f_{ax.k.90°}$	N/mm²	13.1	12.5	11.2
Characteristic yield strength	$f_{y.k}$	N/mm²	950		
Characteristic torsional strength	$f_{tor.k}$	Nm	25.8	55.0	77.1
Insertion moment (ρ_k = 450 kg/m³)	$R_{tor.m.HT}$	Nm	8.7	15.6	27.9
Slip modulus	K_{ser}	N/mm	see A.7.4		

A.7.1 General

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

A bending angle of 45° must be reached for all screws.

A.7.2 Characteristic withdrawal parameter

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

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

with

$$k_{ax} = 0{,}3 + \frac{0.7 \cdot \alpha}{45°}$$

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

A.7.3 Characteristic head pull-through capacity for wood based panels

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

- 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,
- Fibreboards according to EN 622-2, EN 622-3 and EN 13986,
- Cement-bonded particle boards according to EN 634-2 and EN 13986

with thicknesses of more than 20 mm is

$f_{head,k}$ = 10 N/mm²

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

$f_{head,k}$ = 8 N/mm²

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 A7.8 apply.

Table A7.8 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
Fibreboards	6
Cement-bonded particle boards	8

A.7.4 Slip modulus for mainly axially loaded screws

The axial slip modulus K_{ser} for the serviceability limit state used for connection of individual members in bending beams under flexible jointing shall be taken for screws drilled under an angle α=45° to the grain as

$$K_{ser} = \frac{234 \cdot (\rho \cdot d)^{0.2}}{\frac{1}{l_1^{0.4}} + \frac{1}{l_2^{0.4}}} \text{ in N/mm}$$

with

d = outer thread diameter of the screw in mm

$l_{1,2}$ = respective penetration length in the individual members in mm

A.7.5 Compressive loading for fully threaded screws

The design load carrying capacity for Simpson Strong-Tie® screws ESCR and SSTA with a full thread for an angle 30° ≤ α ≤ 90° between screw-axis and direction of wood-fibre for compressive loading is given as

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

with

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

$f_{ax,d,\alpha}$ = design value of the axial withdrawal capacity of the threaded part of the screw calculated from the characteristic values given in Table A7.3 to A7.7 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

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

$$\chi = 1 \text{ for } \bar{\lambda} \le 0.2 \text{ or } \chi = \frac{1}{\phi + \sqrt{\phi^2 - \bar{\lambda}^2}} \text{ for } \bar{\lambda} > 0.2$$

$$\phi = 0.5 \cdot \left[1 + 0.49 \cdot \left(\bar{\lambda} - 0.2 \right) + \bar{\lambda}^2 \right]$$

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

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

d_i = inner thread diameter of the screw

$f_{y,k}$ = characteristic yield strength of the screw according to Table A7.3 to A7.7

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

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

c_h = elastic foundation of the screw

$c_h = (0.19 + 0.012 \cdot d) \cdot \rho_k \cdot \left(\frac{90° + \alpha}{180°}\right)$ in N/mm²

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

α = angle between screw axis and grain direction, 30° ≤ α ≤ 90°

$E_s \cdot I_s = \frac{210000 \cdot \pi \cdot d_i^4}{64}$ = bending stiffness in N/mm²

A.7.6 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 shall be met independently of the angle between the screw axis and the grain direction.

The design resistance of a reinforced contact area is:

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

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 9

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

$$l_{ef,2} = \left\{ 2 \cdot l_{ef} + (n_0 - 1) \cdot a_1 \right\}$$ 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

Simpson Strong-Tie® screws ESCR and SSTA	Annex 7 of European technical approval ETA-13/0796
Product characteristics	

A.8.1 General

For screws with $d \geq 8$ mm the minimum width/thickness for structural members shall be in accordance with Table A8.1. Minimum thickness for structural members is $t = 24$ mm for screws with $d < 8$ mm.

Table A8.1 Minimum width/thickness for structural members

Screw diameter		8	10	12
Minimum thickness t for structural members	mm	30	40	80

A.8.2 Laterally and/or axially loaded screws

For Simpson Strong-Tie® screws ESCR and SSTA 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.

For screws in non-predrilled holes, the minimum distances for loaded and unloaded ends shall be 15 *d* for screws with outer thread diameter $d \geq 8$ mm and timber thickness $t < 5\ d$.

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.8.3 Only axially loaded screws

For Simpson Strong-Tie® screws ESCR and SSTA with $d \leq 8$ mm or provided with a half cut or drill point which are loaded only axially, the following minimum spacing, end and edge distances apply alternatively for a minimum timber thickness of $t = 12\ d$ 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: $a_{2,c} = 4\ d$

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.

Simpson Strong-Tie® screws ESCR and SSTA	Annex 8 of European technical approval ETA-13/0796
Spacing, end and edge distances of the screws and minimum thickness of the wood based material	

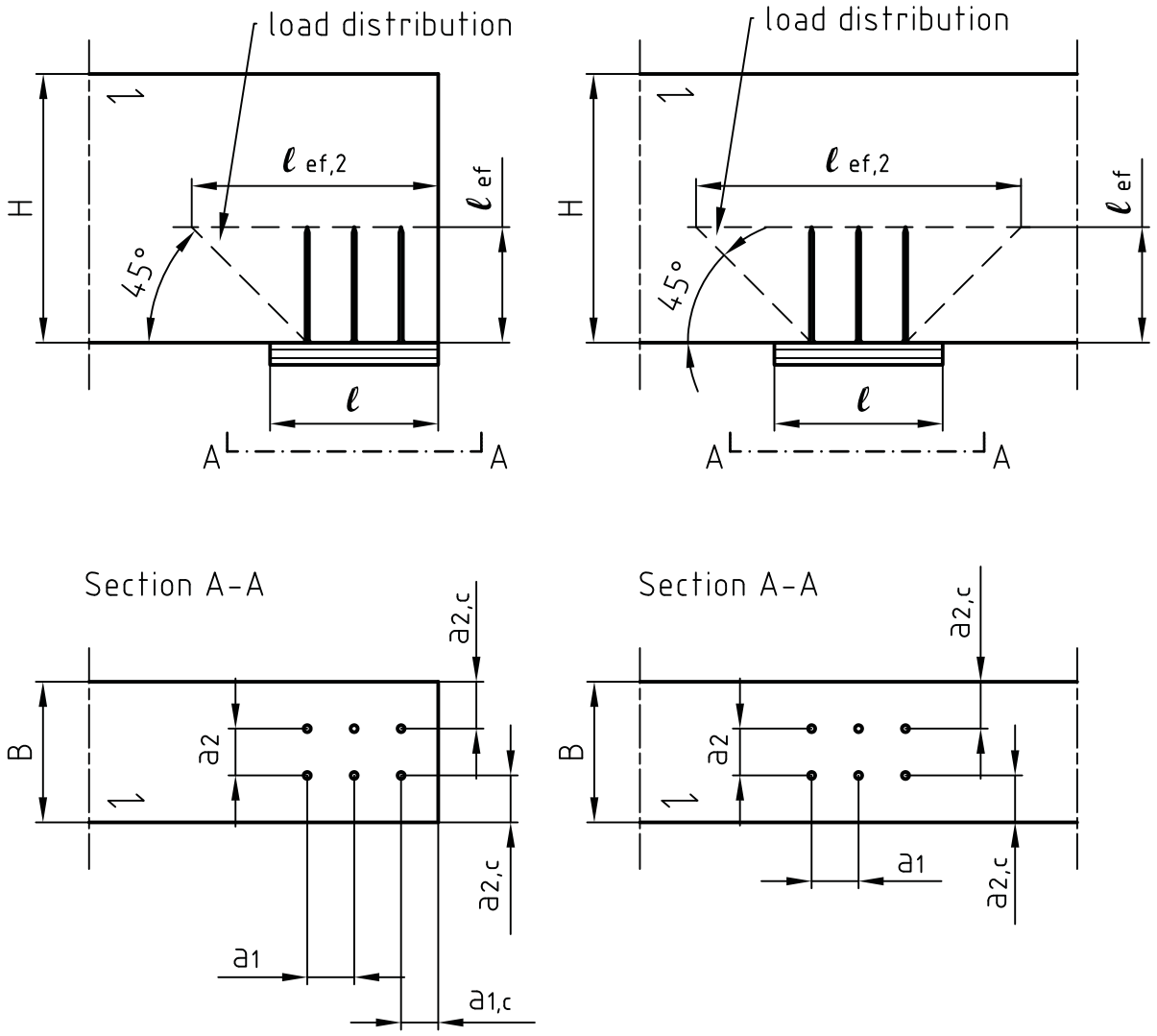


Figure: Reinforced end support (left) and reinforced intermediate support (right)

Simpson Strong-Tie® screws ESCR and SSTA	Annex 9 of European technical approval ETA-13/0796
Compression reinforcement	

A.10.1 Fastening of the thermal insulation material on top of rafters

Simpson Strong-Tie® screws ESCR and SSTA with an outer thread diameter of at least 6 mm and lengths between 120 mm and 600 mm may be used for fixing of thermal insulation material on rafters or on wood-based members in vertical facades.

The thickness of the **thermal insulation material** is in between 50 mm and 400 mm. The thermal insulation material shall be applicable as insulation on top of rafters according to national provisions that apply at the installation site.

The **battens** are made from solid timber strength class C24 according to EN 338 and EN 14081-1. The minimum thickness of the battens is t_{min} = 40 mm and the minimum width b of the battens is b_{min} = 60 mm. For screws with an outer thread diameter of 12 mm the minimum width b of the battens is b_{min} = 80 mm.

Instead of battens the following **wood-based panels** may be used to cover the thermal insulation material if they are suitable for that use:

− Plywood according to EN 636 and EN 13986,

− Oriented Strand Board, OSB according to EN 300 and EN 13986,

− Particleboard according to EN 312 and EN 13986

− Fibreboards according to EN 622-2, EN 622-3 and EN 13986.

ESCR FTP and ESCR FT according to Annex 5 are excluded from fixing wood-based panels on rafters with thermal insulation material as interlayer.

The minimum thickness of the wood-based panels shall be 22 mm.

The word batten includes the meaning of wood-based panels in the following.

The **substructure** is made from solid timber strength class C24 according to EN 338 and EN 14081-1, cross laminated timber according to European technical approvals or laminated veneer lumber according to EN 14374. The minimum width is b_{min} = 60 mm, for screws with an outer thread diameter of 12 mm the minimum width b_{min} = 80 mm.

The spacing between screws e_s shall be not more than 1.75 m.

Friction forces shall not be considered for the design of the characteristic axial capacity of the screws.

The anchorage of wind suction forces as well as the bending stresses of the battens or the boards, respectively, shall be considered for design. Screws perpendicular to the grain of the rafter (angle α = 90 °) may be arranged if necessary.

Design may follow EN 1995-1-1 if nothing different is specified below.

The **two** following **systems** are possible:

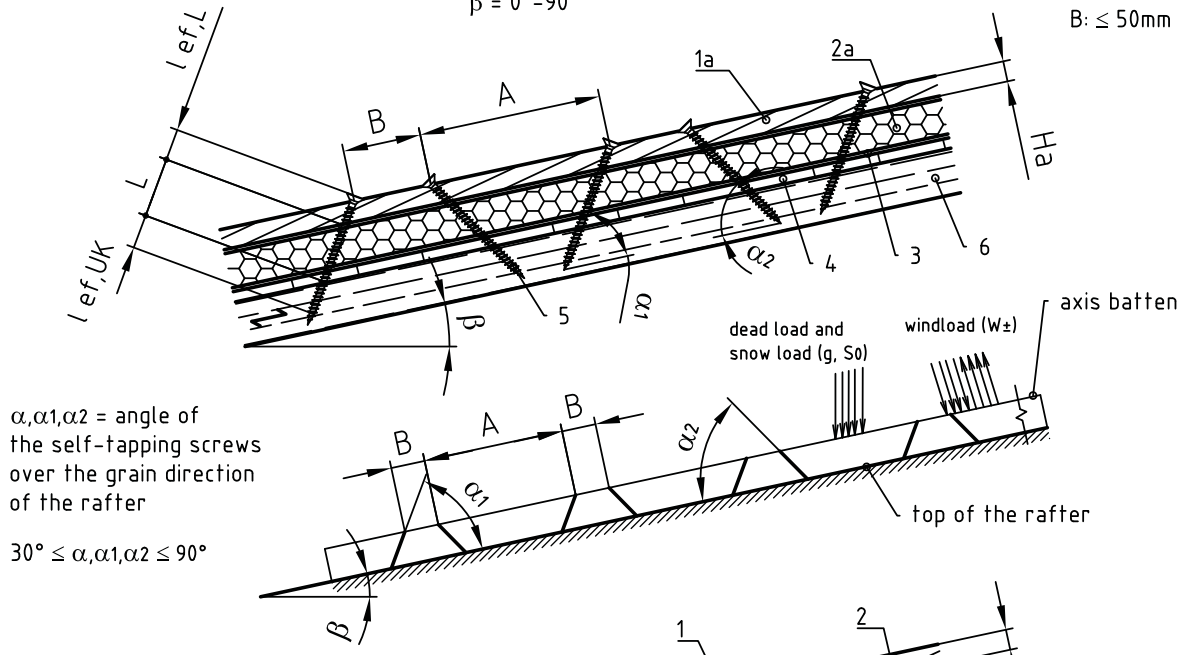
- System 1: Alternately inclined screws (only screws with full thread)
- System 2: Parallel inclined screws

Simpson Strong-Tie® screws ESCR and SSTA	Annex 10 of European technical approval ETA-13/0796
Fastening of thermal insulation material	

Version 1

roof, facade
β = 0°-90°

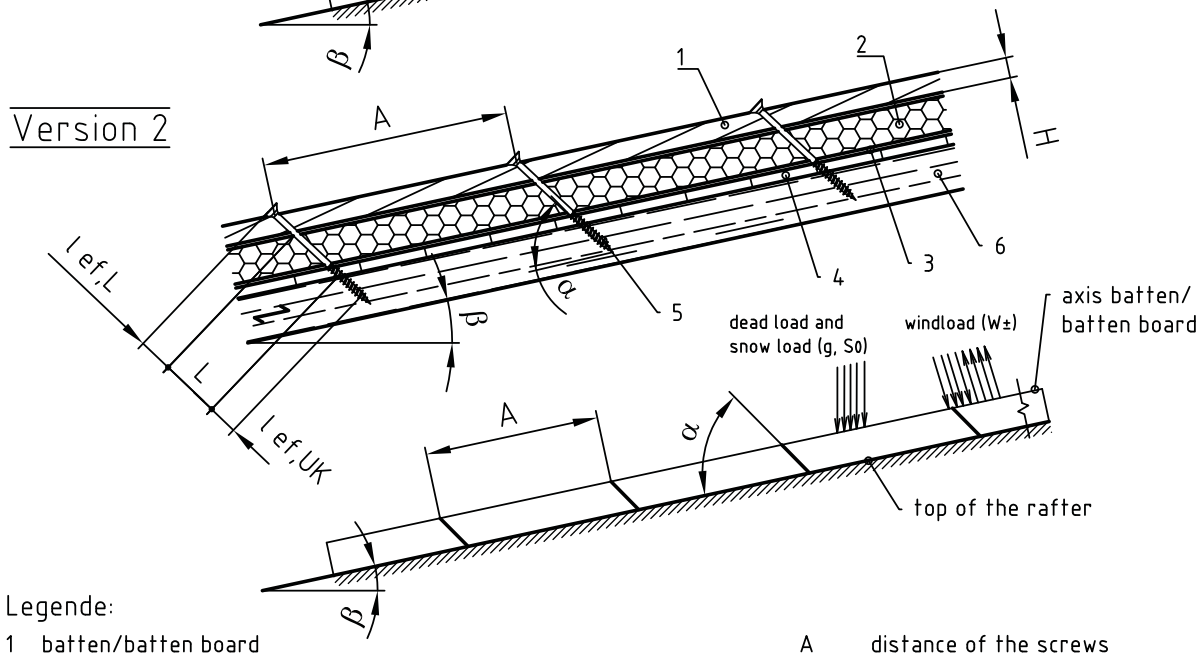
A: acc. to statics
B: ≤ 50mm



α,α1,α2 = angle of the self-tapping screws over the grain direction of the rafter

30° ≤ α,α1,α2 ≤ 90°

Version 2



Legende:

1 batten/batten board
1a batten
2 heat isulation (till 300mm), pressure resistant (min.0,05 N/mm²)
2a heat isulation (till 400mm), pressure resistant
3 vapour barrier
4 roof boards
5 self-tapping screws
6 rafter

A distance of the screws
H thickness batten/batten board
Ha thickness batten
l ef,L penetration lenght in the batten/batten board
l ef,UK penetration lenght in the rafter

Simpson Strong-Tie® screws ESCR and SSTA

Fastening of thermal insulation material

Annex 10

of European technical approval ETA-13/0796

A.10.2 Alternately inclined screws (only screws with full thread)

The screws are predominantly loaded in withdrawal or compression, respectively. Only systems with battens are allowed.

Design

For design of thermal insulation systems in terms of number and spacing of the screws the following characteristic values of tensile or compressive load bearing capacity may be taken into account:

$$R_{ax,k} = \min \begin{cases} f_{ax,k,\alpha} \cdot d \cdot l_{ef,L} \\ f_{ax,k,\alpha} \cdot d \cdot l_{ef,UK} \end{cases} \quad \text{in N}$$

where:

$f_{ax,k,\alpha}$ = characteristic value of the axial withdrawal parameter of the threaded part of the screw in the batten, $f_{ax,k,\alpha}$ does not apply for wood-based panels

α = angle between screw axis and grain direction of batten or substructure

d = outer thread diameter of the screw in mm

$l_{ef,L}$ = penetration length of the threaded part of the screw in the batten in mm; the screw head length *k* may be taken into account for tension load (not for compressive loading)

$l_{ef,UK}$ = penetration length of the threaded part of the screw in the substructure in mm; ≥ 60 mm

For compressive loading the design compressive load bearing capacity shall not exceed the buckling capacity of the screws $\chi \cdot N_{pl,d}$ according to A.7.5.

A.10.3 Parallel inclined screws

The screws are predominantly loaded in tension whereas corresponding thermal insulation material is loaded in compression. The minimum compression stress of the thermal insulation material at 10 % deformation, measured according to EN 826, shall be $\sigma_{(10\%)}$ = 0,05 N/mm². Hereby systems with battens or wood-based panels may be used.

Design

For design of thermal insulation systems in terms of number and spacing of the screws the following characteristic withdrawal parameter may be taken into account:

$$R_{ax,k} = \min\begin{cases} f_{ax,k,\alpha} \cdot d \cdot l_{ef,UK} \cdot k_1 \cdot k_2 \\ \max\begin{cases} f_{head,k} \cdot d_k^2 \\ f_{ax,k,\alpha} \cdot l_{ef,L} \cdot d \end{cases} \end{cases} \quad \text{in N}$$

where:

$f_{ax,k,\alpha}$ = characteristic value of the axial withdrawal parameter of the threaded part of the screw in the batten, $f_{ax,k,\alpha}$ does not apply for wood-based panels

$f_{head,k}$ = characteristic head pull-through parameter according to Tables A7.1 and A7.2

$$k_1 = \min\begin{cases} 1 \\ \dfrac{220}{d_{Dä.}} \end{cases}$$

$$k_2 = \min\begin{cases} 1 \\ \dfrac{\sigma_{10\%}}{0.12} \end{cases}$$

$d_{Dä.}$ = thickness of thermal insulation material in mm

$\sigma_{10\,\%}$ = compressive stress of thermal insulation material at 10 % strain in N/mm²

Simpson Strong-Tie® screws ESCR and SSTA	Annex 10 of European technical approval ETA-13/0796
Fastening of thermal insulation material	

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.

EN 300 (07.2006), Oriented Strand Boards (OSB) - Definitions, classification and specifications

EN 312 (09.2010), Particleboards - Specifications

EN 338 (10.2009), Structural timber - Strength classes

EN 622-2+AC (12.2005), Fibreboards – Specifications – Part 2: Requirements for hardboards

EN 622-3 (04.2004), Fibreboards – Specifications – Part 3: Requirements for medium boards

EN 634-2 (02.2007), Cement-bonded particleboards — Specifications — Part 2: Requirements for OPC bonded particleboards for use in dry, humid and external conditions

EN 636 (09.2012), Plywood – Specifications

EN 826 (03.1996), Thermal insulating products for building applications - Determination of compression behaviour

EN 1194 (04.1999), Timber structures - Glued laminated timber - Strength classes and determination of characteristic values

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 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

prEN 14080 (01.2011), 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 lumber - Requirements