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European Technical Assessment

ETA-11/0106
of 1 February 2019

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	REISSER screws
Product family to which the construction product belongs	Screws for use in timber constructions
Manufacturer	REISSER-Schraubentechnik GmbH Fritz-Müller-Straße 10 74653 Ingelfingen-Criesbach DEUTSCHLAND
Manufacturing plant	C1230, M1222, D1030, W1239, O1209, V1430, W1243, M1105, O1213, O1603, C1604, D1701, E1702, F1703, G1704, J0205
This European Technical Assessment contains	46 pages including 5 annexes which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	EAD 130118-00-0603
This version replaces	ETA-11/0106 issued on 20 June 2016

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Specific Part

1 Technical description of the product

REISSER R 2, RETINOX, DNS, DRIBO, SPARIBO, UHB, Vi-Port, HBS, TKS, STRONGI, fully threaded HBS screws, façade screws and REISSER terrace screws are screws made from special carbon or stainless steel. Screws made from carbon steel are hardened. They have a corrosion protection according to Annex A.2.6. The outer thread diameter is not less than 3.0 mm and not greater than 12.0 mm. The overall length of the screws is ranging from 16 mm to 500 mm. Further dimensions are shown in Annex 5. The washers are made from carbon steel. The dimensions of the washers are given in Annex 5.

2 Specification of the intended use in accordance with the applicable European Assessment Document

The performances given in Section 3 are only valid if the REISSER screws are used in compliance with the specifications and conditions given in Annex 1 to 4.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the REISSER screws of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Dimensions	See Annex 5
Characteristic yield moment	See Annex 2
Bending angle	See Annex 2
Characteristic withdrawal parameter	See Annex 2
Characteristic head pull-through parameter	See Annex 2
Characteristic tensile strength	See Annex 2
Characteristic yield strength	See Annex 2 and 3
Characteristic torsional strength	See Annex 2
Insertion moment	See Annex 2
Spacing, end and edge distances of the screws and minimum thickness of the wood based material	See Annex 2
Slip modulus for mainly axially loaded screws	See Annex 2

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1

3.3 Safety and accessibility in use (BWR 4)

Same as BWR 1

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

In accordance with EAD No. 130118-00-0603, the applicable European legal act is: 97/176/EC.
The system to be applied is: 3

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 1 February 2019 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Head of Department

beglaubigt:
Dewitt

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Annex 1   Specifications of intended use

A.1.1 Use of the REISSER- screws only for:

–   Static and quasi-static loads (not relevant to fatigue)

A.1.2 Base materials

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

–   Solid timber (softwood) according to EN 14081-1[1],
–   Glued laminated timber (softwood) according to EN 14080[2],
–   Laminated veneer lumber LVL of softwood according to EN 14374[3], arrangement of the screws only perpendicular to the plane of the veneers,
–   Glued solid timber (softwood) according to EN 14080 or national provisions that apply at the installation site,
–   Cross-laminated timber according to European Technical Assessments or national provisions that apply at the installation site,
–   Oriented Strand Board, OSB/3 or OSB/4 according to EN 300[4] and EN 13986[5] with a minimum thickness of 18 mm.

The screws may be used for connecting the following wood-based panels to the timber members mentioned above:
–   Plywood according to EN 636[6] and EN 13986,
–   Oriented Strand Board, OSB according to EN 300[7] and EN 13986,
–   Particleboard according to EN 312[8] and EN 13986,
–   Fibreboards according to EN 622-2[9], EN 622-3[10] and EN 13986,
–   Cement-bonded particle boards according to EN 634-2[11] and EN 13986,
–   Solid-wood panels according to EN 13353[12] and EN 13986.

Wood-based panels shall only be arranged on the side of the screw head, except OSB/3 and OSB/4 panels with a minimum thickness of 18 mm.

REISSER screws with an outer thread diameter of at least 6 mm may be used for the fixing of thermal insulation material on top of rafters or on wood-based members in vertical façades.

HBS screws with d = 8 mm and a full thread may be used for reinforcing of timber structures perpendicular to the grain.

[1]	EN 14081-1:2005+A1:2011	Timber structures – Strength graded structural timber with rectangular cross section – Part 1: General requirements
[2]	EN 14080:2013	Timber structures - Glued laminated timber and glued solid timber - Requirements
[3]	EN 14374:2004	Timber structures - Structural laminated veneer lumber - Requirements
[4]	EN 300:2006	Oriented strand boards (OSB) – Definition, classification and specifications
[5]	EN 13986:2004+A1:2015	Wood-based panels for use in construction - Characteristics, evaluation of conformity and marking
[6]	EN 636:2012+A1:2015	Plywood - Specifications
[7]	EN 300:2006	Oriented strand boards (OSB) – Definition, classification and specifications
[8]	EN 312:2010	Particleboards - Specifications
[9]	EN 622-2:2004	Fibreboards – Specifications – Part 2: Requirements for hardboards
[10]	EN 622-3:2004	Fibreboards - Specifications - Part 3: Requirements for medium boards
[11]	EN 634-2:2007	Cement-bonded particleboards – Specifications – Part 2: Requirements for OPC bonded particleboards for use in dry, humid and external conditions
[12]	EN 13353:2011	Solid wood panels (SWP) – Requirements

REISSER screws	Annex 1
Specifications of intended use	

A.1.3 Use Conditions (environmental conditions)

The corrosion protection of the REISSER screws is specified in Annex A.2.6. With regards to the use and the environmental conditions, the national provisions of the place of installation apply.

A.1.4 Installation provisions

EN 1995-1-1[13] in conjunction with the respective national annex applies for the installation.

The screws are either driven into the wood-based member made of softwood without pre-drilling or in pre-drilled 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.

A minimum of two screws shall be used for connections in load bearing timber structures. This does not apply for special situations specified in National Annexes to EN 1995-1-1.

If screws with an outer thread diameter $d \geq 8$ mm are driven into the wood-based member without pre-drilling, the structural solid or glued laminated timber, laminated veneer lumber and similar glued members shall be from spruce, pine or fir.

In the case of fastening battens on thermal insulation material on top of rafters the screws shall be driven in the rafter through the battens and the thermal insulation material without pre-drilling in one sequence.

Countersunk head screws may be used with washers according to Annex 5. After inserting the screw the washers shall touch the surface of the wood-based member completely. Screws made from carbon steel shall be used with washers made from carbon steel and screws made from stainless steel shall be used with washers made from stainless steel.

By fastening screws in wood-based members the head of the screws shall be flush with the surface of the wood-based member. For pan head, half-round head, head with washer face and hexagonal head the head part remains unconsidered.

REISSER screws	Annex 1
Installation provisions	

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ANNEX 2 – Characteristic values of the load-carrying capacities

Table A.2.1   Characteristic load-carrying capacities of REISSER screws

Outer thread diameter [mm]			3.0	3.5	4.0	4.5	5.0	5.5	6.0	7.0	8.0	10.0	12.0
Characteristic yield moment $M_{y,k}$ [Nm]	Carbon steel		1.6	2.3	3.3	4.5	5.9	7.6	9.5	17.0	20.0	30.0	60.0
	Stainless steel		0.9	1.4	1.9	2.6	3.4	4.4	5.5	-	12.0	21.0	-
Characteristic tensile strength $f_{tens,k}$ [kN]	Carbon steel	Other screws	2.8	3.8	5.0	6.4	7.9	9.5	11.3	18.0	15.1	23.6	40.0
		HBS Full thread									20.1		
	Stainless steel		1.8	2.4	3.1	4.0	4.9	5.9	7.1	-	12.6	19.6	-
Characteristic torsional moment $f_{tor,k}$ [Nm]	Carbon steel	Other screws	1.6	2.0	3.5	5.0	6.0	9.0	12.0	18.0	22.0	36.0	68.0
		HBS Full thread									30.0		
	Stainless steel		1.0	1.4	2.2	3.0	4.0	6.0	8.0	-	18.0	34.0	-

A.2.1 General

All REISSER screws achieve a bending angle α of at least $45/d^{0.7} + 20$, where d is the outer thread diameter of the screws.

The minimum penetration length of the threaded part of the screw in the wood-based members l_{ef} shall be

$$l_{ef} \geq \frac{4 \cdot d}{\sin \alpha}$$
(2.1)

where

α angle between screw axis and grain direction

d   outer thread diameter of the screw.

The outer thread diameter of screws inserted in cross-laminated timber shall be at least 6 mm. The inner thread diameter d_1 of the screws shall be greater than the maximal width of the gaps in the layer.

A.2.2 Laterally loaded screws

A.2.2.1   General

The outer thread diameter d shall be used as effective diameter of the screw according to EN 1995-1-1.
The embedding strength for the screws in wood-based members or in wood-based panels shall be taken from EN 1995-1-1 or from national provisions that apply at the installation site unless otherwise specified in the following.

REISSER screws	
Characteristic load-bearing capacity values	Annex 2

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A.2.2.2   Cross laminated timber

The embedding strength for screws arranged in the edge surfaces parallel to the plane of cross laminated timber may be assumed according to equation (2.2) independent of the angle between screw axis and grain direction, $0° ≤ α ≤ 90°$:

$$f_{h,k} = 20 \cdot d^{-0,5} \text{ in N/mm}^2 \tag{2.2}$$

unless otherwise specified in the technical specification of the cross laminated timber.

Where d is the outer thread diameter of the screws in mm.

Equation (2.2) is only valid for softwood layers. The provisions in the European Technical Assessment or in national provisions of the cross laminated timber apply.

The embedding strength for screws in the wide face of cross laminated timber should be assumed as for solid timber based on the characteristic density of the outer layer. Where applicable, the angle between force and grain direction of the outer layer shall be taken into account. The direction of the lateral force shall be perpendicular to the screw axis and parallel to the wide face of the cross laminated timber.

A.2.3 Axially loaded screws

A.2.3.1   Slip modulus for mainly axially loaded screws

The axial slip modulus K_{ser} of the threaded part of a screw for the serviceability limit state shall be taken independent of angle α to the grain as:

$$K_{ser} = 780 \cdot d^{0,2} \cdot l_{ef}^{0,4} \quad \text{[N/mm]} \tag{2.3}$$

Where

d outer thread diameter of the screw [mm]
l_{ef} penetration length of the of the threaded part of the screw in the wood-based member [mm].

A.2.3.2 Axial withdrawal capacity – Characteristic withdrawal parameter

The characteristic withdrawal parameter at an angle $α = 90°$ to the grain based on a characteristic density of the wood-based member of 350 kg/m³ is

$f_{ax,k}$ = 11.0 N/mm² for all screws with d = 10.0 mm, HBS-screws with d = 8.0 mm and UHB screws (d = 8 mm) and

$f_{ax,k}$ = 12.5 N/mm² for the remaining screws.

The characteristic withdrawal parameter is also valid for softwood layers of cross-laminated timber.

For LVL a maximum characteristic density of 500 kg/m³ shall be used in equation (8.40a) of EN 1995-1-1.

For OSB/3 and OSB/4 panels the characteristic withdrawal parameter at an angle of $α = 90°$ to the plane based on a characteristic density of the OSB panel of 600 kg/m³ is

$f_{ax,k}$ = 10.0 N/mm² for DRIBO and SPARIBO screws with 4 mm ≤ d ≤ 6 mm.

The minimum thickness of the OSB panel shall be 18 mm.

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Characteristic load-bearing capacity values	

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For screws penetrating more than one layer of cross laminated timber the different layers may be taken into account proportionally. In the lateral surfaces of the cross laminated timber the screws shall be fully inserted in one layer of cross-laminated timber. The axial withdrawal capacity for screws arranged parallel to the plane of cross laminated timber, independent of the angle between screw axis and grain direction, 30° ≤ a ≤ 90°, may be calculated from:

$$F_{ax,Rk} = 20 \cdot d^{0,8} \cdot l_{ef}^{0,9} \qquad \text{in N/mm}^2 \tag{2.4}$$

Where

d   outer thread diameter of the screw [mm]

l_{ef} penetration length of the screw in the cross laminated timber [mm].

A.2.3.3 Head pull-through capacity – Characteristic head pull-through parameter

The characteristic value of the head pull-through parameter for REISSER screws for a characteristic density of 350 kg/m³ of the timber and for wood-based panels like

- 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
- Cement-bonded particle boards according to EN 634-2 and EN 13986,
- Solid-wood panels according to EN 13353 and EN 13986

with a thickness of more than 20 mm is

$f_{head,k}$ = 9.4 N/mm².

For wood-based panels a maximum characteristic density of 380 kg/m³ and for LVL a maximum characteristic density of 500 kg/m³ shall be used in equation (8.40b) of EN 1995-1-1.

The head diameter shall be equal to or greater than $1.8 \cdot d_s$, where d_s is the smooth shank or the inner thread diameter. Otherwise the characteristic head pull-through capacity in equation (8.40b) is for all wood-based materials: $F_{ax,\alpha,RK}$ = 0.

For wood based panels with a thickness 12 mm ≤ t ≤ 20 mm the characteristic value of the head pull-through parameter for REISSER screws 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 for screws 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 thickness of the wood based panels of 1.2·d, with d as outer thread diameter and the values in Table A.2.2.

Table A.2.2 Minimum thickness of wood based panels

Wood based panel	Minimum thickness [mm]
Plywood	6
Fibreboards (hardboards and medium boards)	6
Oriented Strand Boards, OSB	8
Particleboards	8
Cement-bonded particle board	8
Solid wood Panels	12

Outer diameter of washer d_k > 32 mm shall not be considered.
In steel-to-timber connections the head pull-through capacity is not governing.

REISSER screws	Annex 2
Characteristic load-bearing capacity values	

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A.2.3.4 Compressive capacity of fully threaded HBS screws with d = 8 mm - Characteristic yield strength

The design axial capacity $F_{ax,Rd}$ of HBS screws with d = 8 mm and a full thread embedded in solid timber, glued solid timber or glued laminated timber made from softwood with an angle between screw axis and grain direction of $30° \leq \alpha \leq 90°$ is the minimum of the axial resistance against pushing-in and the buckling resistance of the screw.

$$F_{ax,Rd} = \min \left\{ f_{ax,d} \cdot d \cdot \ell_{ef}; \kappa_c \cdot N_{pl,d} \right\} \tag{2.5}$$

$f_{ax,d}$ design value of the axial withdrawal capacity of the threaded part of the screw [N/mm²]

d   outer thread diameter of the screw [mm]

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

$$\kappa_c = 1 \qquad\qquad \text{für } \overline{\lambda}_k \leq 0{,}2 \tag{2.6}$$

$$\kappa_c = \frac{1}{k + \sqrt{k^2 - \overline{\lambda}_k^2}} \qquad \text{für } \overline{\lambda}_k > 0{,}2 \tag{2.7}$$

$$k = 0{,}5 \cdot \left[1 + 0{,}49 \cdot \left(\overline{\lambda}_k - 0{,}2 \right) + \overline{\lambda}_k^2 \right] \tag{2.8}$$

and a relative slenderness ratio $\overline{\lambda}_k = \sqrt{\dfrac{N_{pl,k}}{N_{ki,k}}}$ (2.9)

where:

$N_{pl,k}$ characteristic plastic normal force related to the net cross-section

of the inner thread diameter: $N_{pl,k} = \pi \cdot \dfrac{d_1^2}{4} \cdot f_{y,k}$ (2.10)

$f_{y,k}$ characteristic yield strength, $f_{y,k}$ = 1000 N/mm² for fully threaded HBS screws with d = 8 mm

d_1 inner thread diameter of the screw   [mm]

$$N_{pl,d} = \frac{N_{pl,k}}{\gamma_{M1}} \tag{2.11}$$

γ_{M1} partial factor according to EN 1993-1-1 in conjunction with the particular national annex
characteristic ideal elastic buckling load:

$$N_{ki,k} = \sqrt{c_h \cdot E_S \cdot I_S} \quad \text{[N]} \tag{2.12}$$

elastic foundation of the screw:

$$c_h = (0{,}19 + 0{,}012 \cdot d) \cdot \rho_k \cdot \left(\frac{90° + \alpha}{180°} \right) \text{[N/mm²]} \tag{2.13}$$

ρ_k characteristic density of the wood-based member [kg/m³],

α angle between screw axis and grain direction, $30° \leq \alpha \leq 90°$

modulus of elasticity:

E_s = 210000 N/mm²

second moment of area:

$$I_s = \frac{\pi \cdot d_1^4}{64} \qquad \text{[mm}^4\text{]} \tag{2.14}$$

REISSER screws	
Characteristic load-bearing capacity values	Annex 2

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A.2.4 Spacing, end and edge distances of the screws and minimum thickness of the wood based material

A.2.4.1 Laterally and/or axially loaded screws

Screws in pre-drilled holes

For REISSER screws in pre-drilled holes the minimum spacings, end and edge distances are given in EN 1995-1-1, clause 8.3.1.2 and Table 8.2 as for nails in pre-drilled holes. Here, the outer thread diameter d shall be considered.

Minimum thickness for structural members made from solid timber, glued laminated timber, glued solid timber, laminated veneer lumber and cross laminated timber is t = 30 mm for screws with d ≤ 8 mm, t = 40 mm for screws with d = 10 mm and t = 80 mm for screws with d = 12 mm.

Screws in non pre-drilled holes

For REISSER screws minimum spacing and distances as well as the minimum member thickness are given in EN 1995-1-1, clause 8.3.1.2 as for nails in non-predrilled holes. Here, the outer thread diameter d shall be considered.

For Douglas fir members minimum spacing and distances parallel to the grain shall be increased by 50%.

Minimum distances from loaded or unloaded ends shall be at least 15·d for screws with outer thread diameter d > 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.

REISSER screws	Annex 2
Spacing, end and edge distances	

A.2.4.2 Only axially loaded screws

For SPARIBO screws with d = 6 mm and HBS screws with d = 8 mm and a full thread loaded only axially, the minimum spacings, end and edge distances according to table A.2.3 apply alternatively to paragraph A.2.4.1 for solid timber, glued laminated timber and similar glued products made from softwood.

Table A.2.3   Minimum Spacing, end and edge distances of the screws and minimum thickness and width of the timber

Screw type	SPARIBO	HBS
Outer thread diameter d [mm]	**6**	**8**
Minimum spacing a_1 in a plane parallel to grain	5 d	5 d
Minimum spacing a_2 perpendicular to a plane parallel to grain	4 d	2.5 d
Minimum end distance of the centre of gravity of the threaded part in the timber member $a_{1,c}$	10 d	10 d
Minimum edge distance of the centre of gravity of the threaded part in the timber member $a_{2,c}$	2.5 d	4 d
Minimum product of spacing a_1 and a_2	$a_1 \cdot a_2 = 25\ d^2$	$a_1 \cdot a_2 = 25\ d^2$
Crossed screw couples - Minimum spacing between the crossing screws[14]	$1.5 \cdot d$	$1.5 \cdot d$
Minimum timber thickness	10 d	10 d
Minimum timber width	5 d	$\max \begin{cases} 8 \cdot d \\ 60\,mm \end{cases}$

Are the spacing, end and edge distances less than the distances and thicknesses given in EN 1995-1-1 the verification of resistance according to EN 1995-1-1, clause 8.7.2 (1) the failure along the circumference of a group of screws has to be considered also for connections without steel plates.

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[14] Appropriate means have to ensure that the crossed screw threads do not touch each other when being inserted in the timber member.

REISSER screws	
Spacing, end and edge distances	Annex 2

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A.2.4.3 Cross laminated timber

The minimum requirements for spacing, end and edge distances of screws in the plane or edge surfaces of cross laminated timber are summarised in Table A.2.4. The definition of spacing, end and edge distance is shown in Figure A.2.1 and Figure A.2.2. The minimum spacing, end and edge distances in the edge surfaces are independent of the angle between screw axis and grain direction. They may be used based on the following conditions:

- Minimum thickness of cross laminated timber: $10 \cdot d$
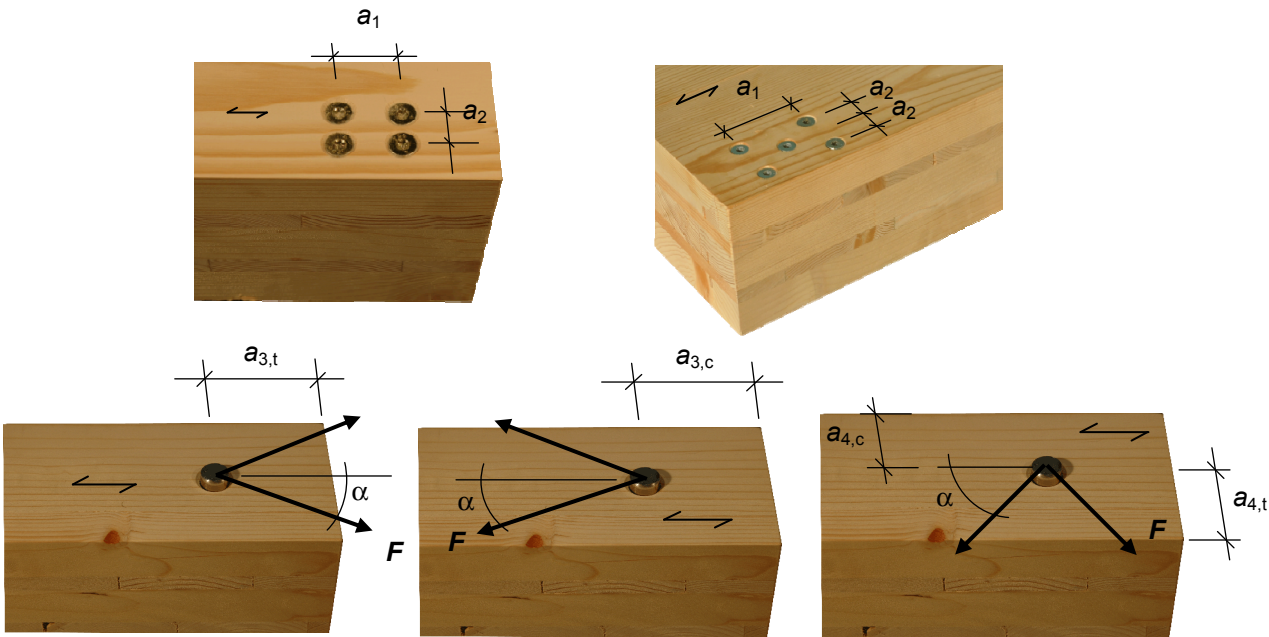- Minimum penetration depth in the edge surface: $10 \cdot d$

Figure A.2.1:   Definition of spacing, end and edge distances in the plane surface

Table A.2.4 Minimum spacing, end and edge distances of screws in the plane or edge surfaces of cross laminated timber

	a_1	$a_{3,t}$	$a_{3,c}$	a_2	$a_{4,t}$	$a_{4,c}$
Plane surface (see Figure A.2.1)	$4 \cdot d$	$6 \cdot d$	$6 \cdot d$	$2,5 \cdot d$	$6 \cdot d$	$2,5 \cdot d$
Edge surface (see Figure A.2.2)	$10 \cdot d$	$12 \cdot d$	$7 \cdot d$	$4 \cdot d$	$6 \cdot d$	$3 \cdot d$

REISSER screws	Annex 2
Spacing, end and edge distances	
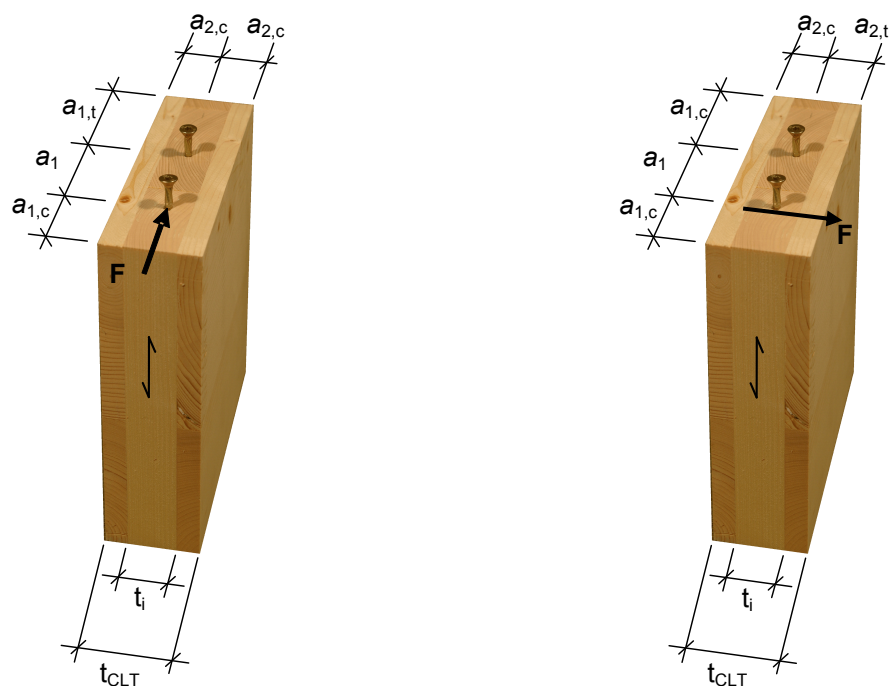
Figure A.2.2:   Definition of spacing, end and edge distances in the edge surface

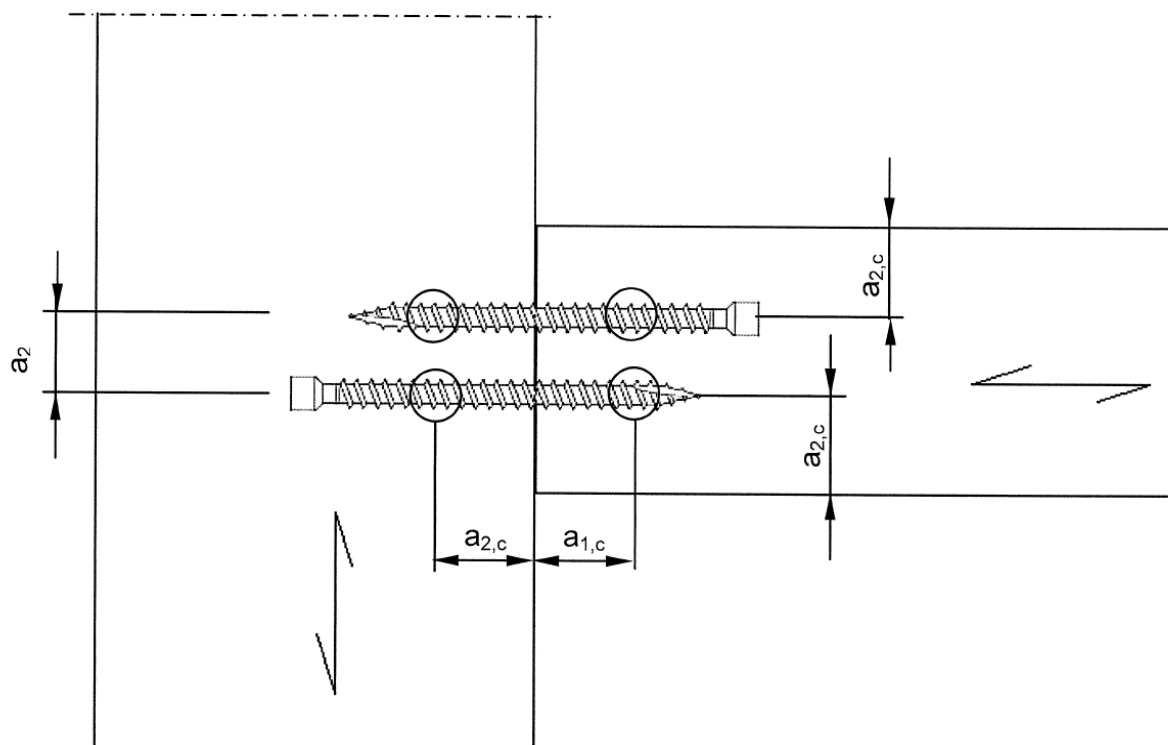| REISSER Schrauben	Anhang 2
Mindestabstände	

Examples of use for HBS screws with d = 8 mm and a full thread

Header-joist connection
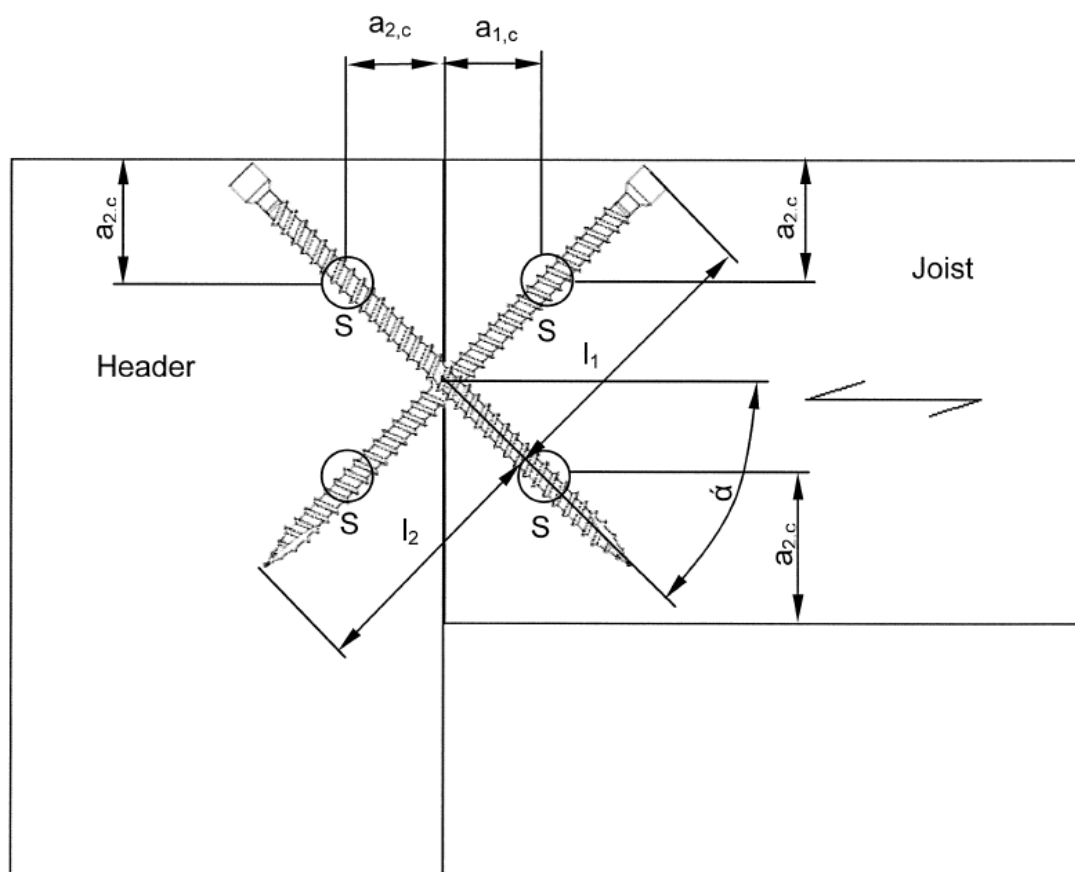
S   Centroid of the part of the screw in the timber

REISSER screws	
Use examples	Annex 2

REISSER screws	
Use examples	Annex 2

Parallel inclined screws to connect wood-based members

S   Centroid of the part of the screw in the timber
t   Thickness of the wood-based member
b   Width of the wood-based member
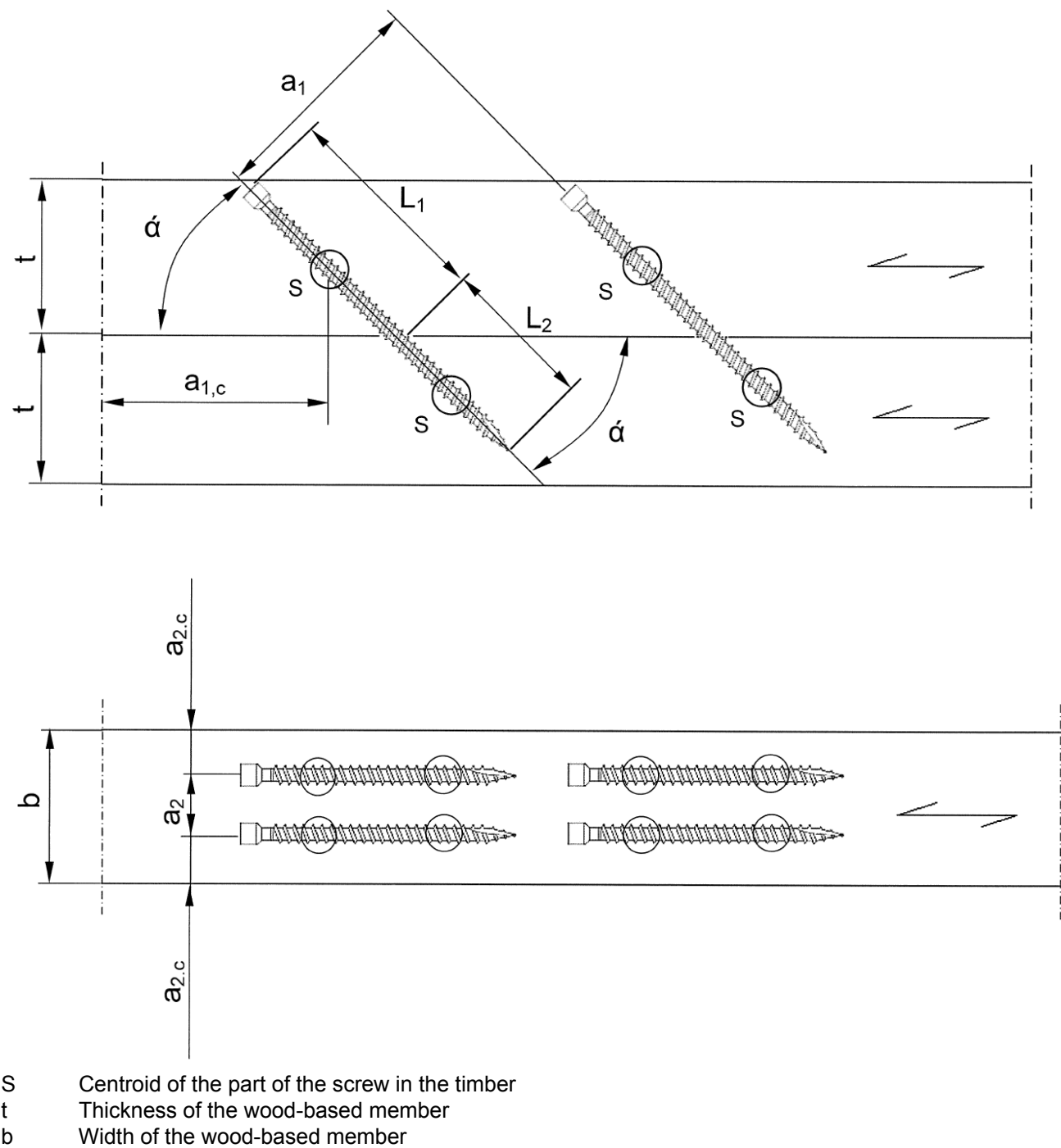
REISSER screws	
Use examples	Annex 2

A.2.5 Insertion moment

The ratio between the characteristic torsional strength $f_{tor,k}$ and the mean value of insertion moment $R_{tor,mean}$ fulfills the requirement for all screws.

A.2.6 Durability against corrosion

Screws made from carbon steel are electrogalvanised and yellow or blue chromated. The mean thickness of the zinc coating of the screws is 5 μm.

Steel no. 1.4567 (A2L), 1.4578 (A4L), 1.4539 or 1.4529 are used for screws made from stainless steel.

REISSER screws	Annex 2
Insertion moment and durability against corrosion	

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ANNEX 3 - Compression reinforcement perpendicular to the grain

A.3.1 General

Only HBS screws with d = 8 mm and a full thread shall be used for compression reinforcement perpendicular to the grain. The provisions are valid for reinforcing timber members made from solid timber, glued solid timber or glued laminated timber made from softwood.

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 shall be flush with the timber surface.

A.3.2 Design

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:

$$R_{90,d} = min \left\{ \begin{array}{l} k_{c,90} \cdot B \cdot \ell_{ef,1} \cdot f_{c,90,d} + n \cdot min \left\{ R_{ax,d} ; \kappa_c \cdot N_{pl,d} \right\} \\ B \cdot \ell_{ef,2} \cdot f_{c,90,d} \end{array} \right\} \qquad (3.1)$$

where:

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

B   bearing width [mm]

$\ell_{ef,1}$ effective contact length according to EN 1995-1-1, clause 6.1.5 [mm]

$f_{c,90,d}$ design compressive strength perpendicular to the grain [N/mm²]

n   number of reinforcing screws, $n = n_0 \cdot n_{90}$

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

$$R_{ax,d} = f_{ax,d} \cdot d \cdot \ell_{ef} \quad [N] \qquad (3.2)$$

$f_{ax,d}$ design value of the axial withdrawal capacity of the threaded part of the screw [N/mm²]

d   outer thread diameter of the screw [mm]

$$\kappa_c \cdot N_{pl,d} = \frac{\kappa_c \cdot N_{pl,k}}{\gamma_{M1}} \quad \text{with } \kappa_c \cdot N_{pl,k} \text{ according to Table A.3.1} \qquad [N] \qquad (3.3)$$

$\ell_{ef,2}$ effective contact length in the plane of the screw tips (see Figure A.3.1) [mm]

         $\ell_{ef,2} = \{\ell_{ef} + (n_0 - 1) \cdot a_1 + min(\ell_{ef} ; a_{1,c})\}$ for end supports (see Figure A.3.1 left)

         $\ell_{ef,2} = \{2 \cdot \ell_{ef} + (n_0 - 1) \cdot a_1\}$ for intermediate supports (see Figure A.3.1 right)

ℓ_{ef} threaded length of the screw in the timber member [mm]

γ_{M1} partial factor according to EN 1993-1-1[15] in conjunction with the particular national annex

---

[15]   EN 1993-1-1:2005   Eurocode 3: Design of steel structures. Part 1-1: General rules and rules for buildings

REISSER screws	Annex 3
Compression reinforcement perpendicular to the grain	

Table A.3.1: Characteristic load-carrying capacity $\kappa_c \cdot N_{pl,k}$ for fully threaded HBS screws in N

ρ_k [kg/m³]	d [mm]
	8.0
310	11800
350	12200
380	12500
410	12700
450	13000

The characteristic load-carrying capacity $\kappa_c \cdot N_{pl,k}$ are based on a characteristic yield strength of the HBS screws of $f_{y,k} = 1000$ N/mm².

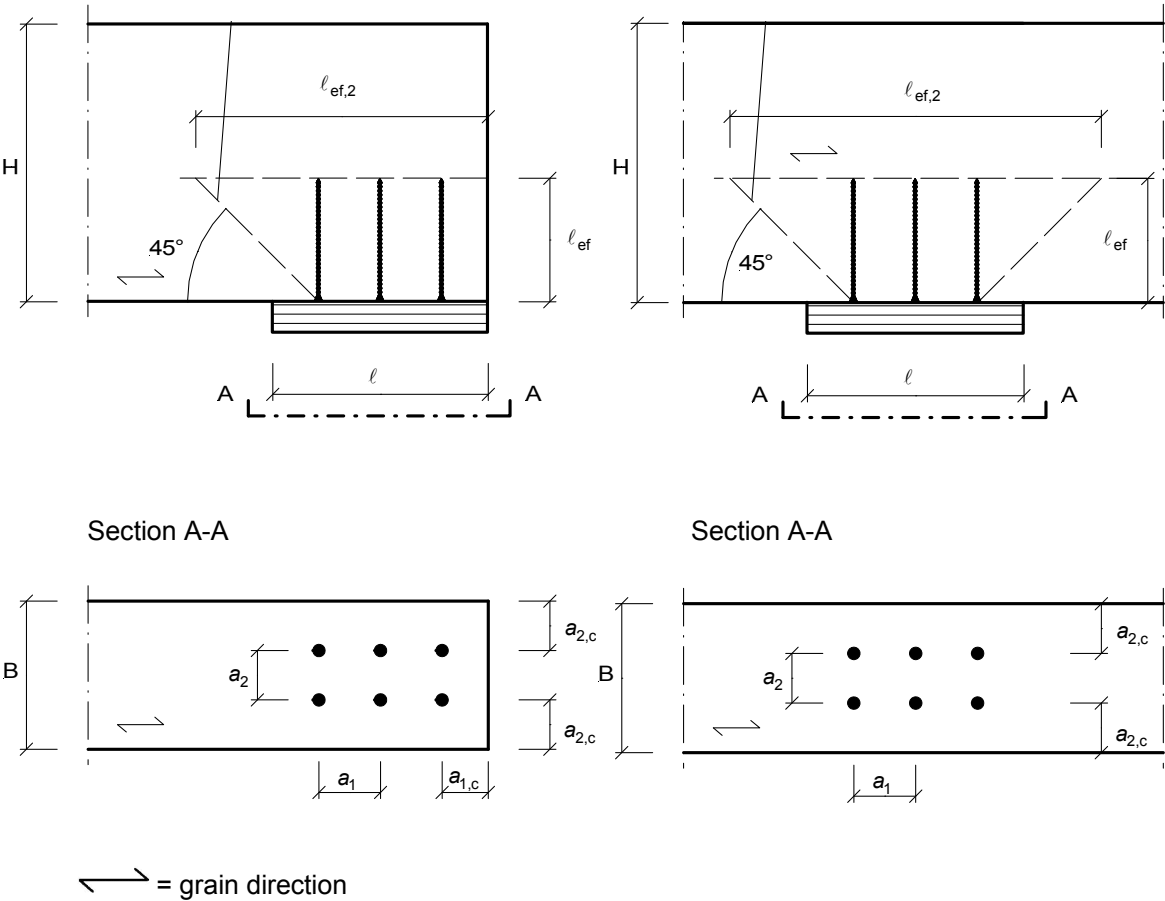Section A-A   Section A-A

= grain direction

Figure A.3.1: Reinforced end support (left) and reinforced intermediate support (right)

REISSER screws	
Compression reinforcement perpendicular to the grain	Annex 3

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ANNEX 4 - Fastening of thermal insulation material on top of rafters

A.4.1 General

REISSER screws with an outer thread diameter of at least 6 mm may be used for the fixing of thermal insulation material on top of rafters. The thickness of the thermal insulation material may be up to 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 have to be from solid timber according to EN 338/ EN 14081-1. The minimum thickness t and the minimum width b of the battens are given in Table A.4.1:

Table A.4.1 Minimum thickness and minimum width of the battens

Outer thread diameter [mm]	Minimum thickness t [mm]	Minimum width b [mm]
6 and 8	30	50
10	40	60
12	80	100

The minimum width of the rafters is 60 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, respectively, shall be considered for design. Screws perpendicular to the grain of the rafter (angle α = 90 °) may be arranged if necessary.

A.4.2   Parallel inclined screws and thermal insulation material in compression

A.4.2.1 Mechanical model

The system of rafter, thermal insulation material on top of rafter and counter battens parallel to the rafter may be considered as a beam on elastic foundation. The batten represents the beam, and the thermal insulation material on top of the rafter the elastic foundation. The minimum compressive stress of the thermal insulation material at 10 % deformation, measured according to EN 826[16], shall be $\sigma_{(10\%)}$ = 0.05 N/mm². The batten is loaded perpendicular to the axis by point loads F_b transferred by regularly spaced battens. Further point loads F_s are caused by the shear load of the roof due to dead and snow load, which are transferred from the screw heads into the counter battens.

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[16]   EN 826:2013   Thermal insulating products for building applications - Determination of compression behaviour

REISSER screws	Annex 4
Fastening of thermal insulation material on top of rafters	

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batten

thermal insulation
material

rafter

vapour barrier

roof boards

α

β

l_{ef}

Wind

W suction

W preassure

daed and
snow load

e

e

e

α

β

axis batten

top of the rafter

compressive force
transfer in the
heat insulation

screw axis tension force T_s

concentrated compressive force transfer
in the termal insulation material
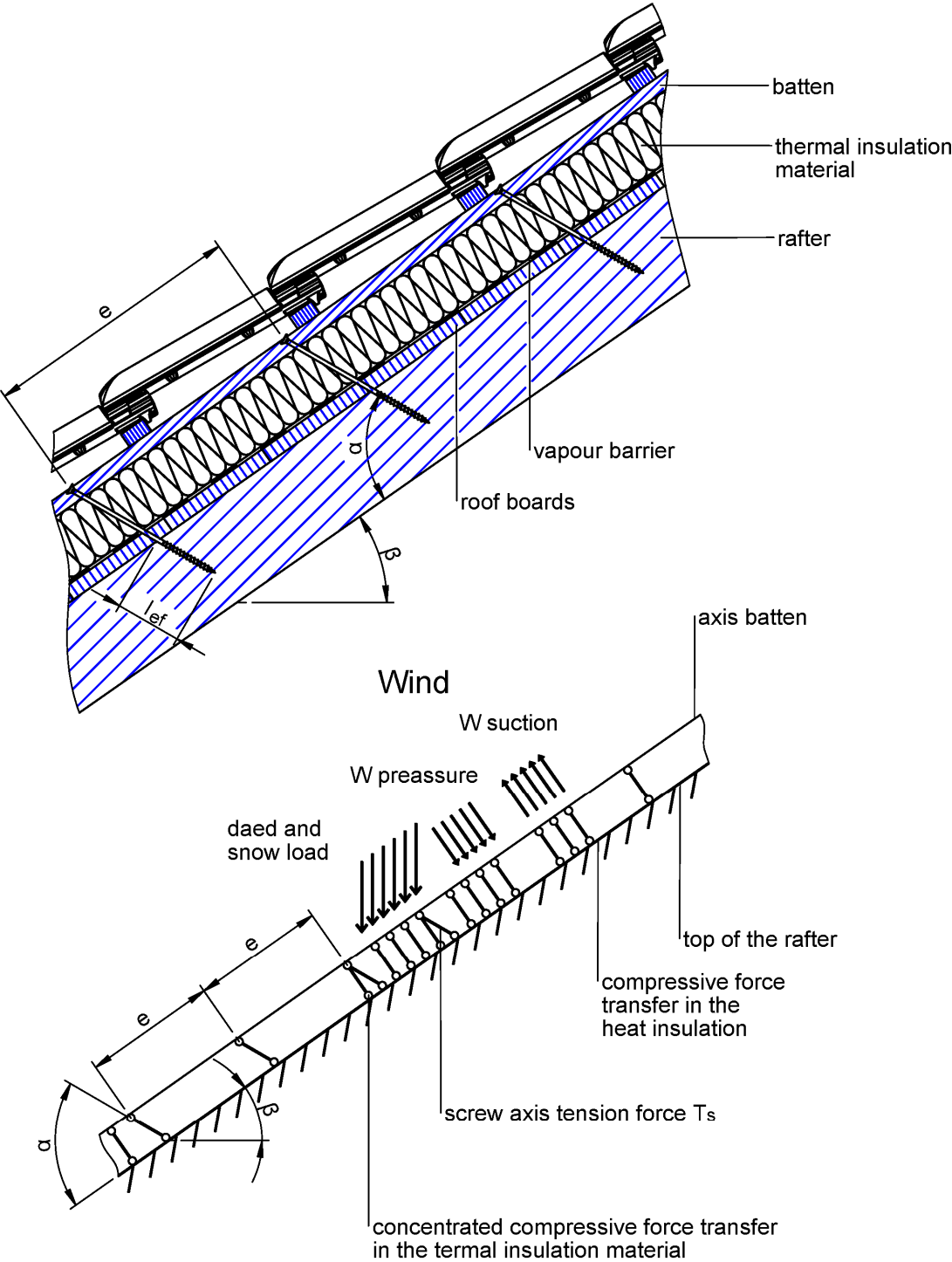
Figure A.4.1   Fastening of the thermal insulation material on top of rafters - structural system

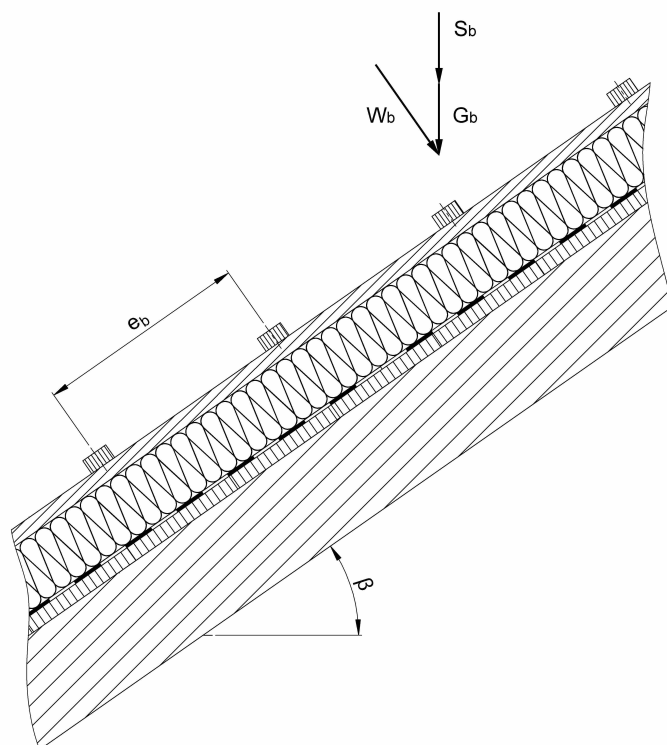| REISSER screws	Annex 4
Fastening of thermal insulation material on top of rafters	

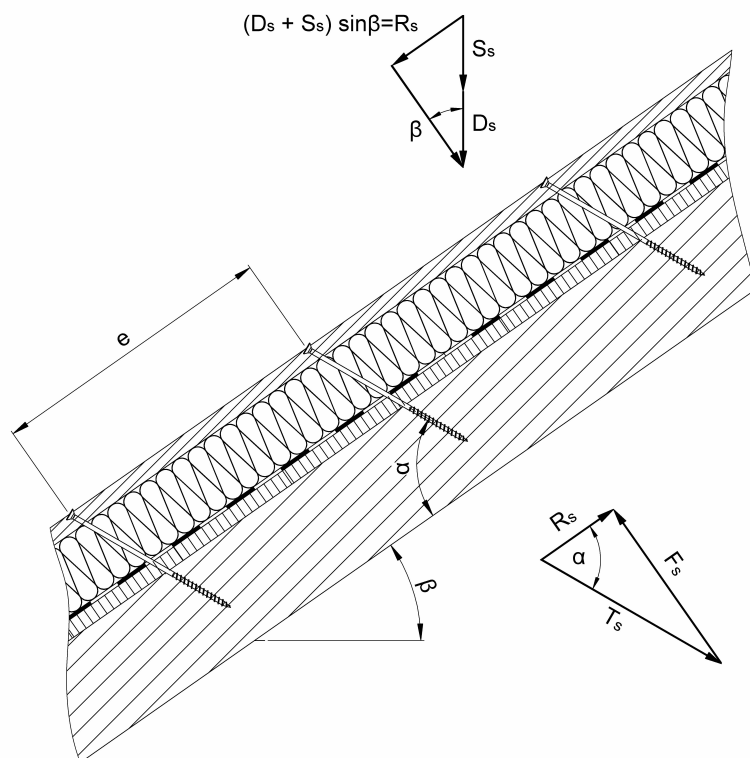Figure A.4.2 Point loads F_b perpendicular to the battens

Figure A.4.3   Point loads F_s perpendicular to the battens, load application in the area of the screw heads

REISSER screws	
Fastening of thermal insulation material on top of rafters	Annex 4

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A.4.2.2 Design of the battens

It's assumed that the spacing between the counter battens exceeds the characteristic length l_{char}.

The characteristic values of the bending stresses are calculated as:

$$M_k = \frac{(F_b + F_s) \cdot l_{char}}{4} \qquad (4.1)$$

where

l_{char} = characteristic length $l_{char} = \sqrt[4]{\dfrac{4 \cdot EI}{w_{ef} \cdot K}}$ $\qquad (4.2)$

EI = bending stiffness of the batten
K = modulus of subgrade reaction
w_{ef} = effective width of the thermal insulation material
$F_{b,k}$ = point loads perpendicular to the battens
$F_{s,k}$ = point loads perpendicular to the battens, load application in the area of the screw heads

The modulus of subgrade reaction K may be calculated from the modulus of elasticity E_{HI} and the thickness t_{HI} of the thermal insulation material if the effective width w_{ef} of the thermal insulation material under compression is known. Due to the load extension in the thermal insulation material the effective width w_{ef} is greater than the width of the batten or rafter, respectively. For further calculations, the effective width w_{ef} of the thermal insulation material may be determined according to:

$$w_{ef} = w + t_{HI}/2 \qquad (4.3)$$

where
w = minimum from width of the batten or rafter, respectively
t_{HI} = thickness of the thermal insulation material

$$K = \frac{E_{HI}}{t_{HI}} \qquad (4.4)$$

The following condition shall be satisfied:

$$\frac{\sigma_{m,d}}{f_{m,d}} = \frac{M_d}{W \cdot f_{m,d}} \leq 1 \qquad (4.5)$$

For the calculation of the section modulus W the net cross section shall be considered.

The characteristic values of the shear stresses shall be calculated according to:

$$V_k = \frac{(F_b + F_s)}{2} \qquad (4.6)$$

The following condition need to be satisfied:

$$\frac{\tau_d}{f_{v,d}} = \frac{1.5 \cdot V_d}{A \cdot f_{v,d}} \leq 1 \qquad (4.7)$$

For the calculation of the cross section area the net cross section shall be considered.

A.4.2.3 Design of the thermal insulation material

The characteristic value of the compressive stresses in the thermal insulation material shall be calculated according to:

$$\sigma_k = \frac{1.5 \cdot F_{b,k} + F_{s,k}}{2 \cdot l_{char} \cdot w} \tag{4.8}$$

The design value of the compressive stress shall not be greater than 110 % of the compressive strength at 10 % deformation calculated according to EN 826.

A.4.2.4 Design of the screws

The screws are loaded predominantly axial. The characteristic value of the axial tension force in the screw may be calculated from the shear loads of the roof R_s:

$$T_{S,k} = \frac{R_{S,k}}{\cos \alpha} \tag{4.9}$$

The load-carrying capacity of axially loaded screws is the minimum design value of the axial withdrawal capacity of the threaded part of the screw, the head pull-through capacity of the screw and the tensile capacity of the screw according to Annex 2.

In order to limit the deformation of the screw head for thermal insulation material with thickness over 220 mm or with compressive strength below 0.12 N/mm², respectively, the axial withdrawal capacity of the screws shall be reduced by the factors k_1 and k_2:

$$F_{ax,\alpha,Rd} = \min \left\{ \frac{f_{ax,d} \cdot d \cdot l_{ef} \cdot k_1 \cdot k_2}{1.2 \cdot \cos^2\alpha + \sin^2\alpha} \cdot \left(\frac{\rho_k}{350}\right)^{0.8}; f_{head,d} \cdot d_h^2 \cdot \left(\frac{\rho_k}{350}\right)^{0.8}; \frac{f_{tens,k}}{\gamma_{M2}} \right\} \tag{4.10}$$

where:

$f_{ax,d}$	design value of the axial withdrawal parameter of the threaded part of the screw [N/mm²]
d	outer thread diameter of the screw [mm]
l_{ef}	penetration length of the threaded part of the screw in the rafter [mm], $l_{ef} \geq 40$ mm
ρ_k	characteristic density of the wood-based member [kg/m³], for LVL the assumed characteristic density shall not exceed 500 kg/m³
α	angle α between screw axis and grain direction, $30° \leq \alpha \leq 90°$
$f_{head,d}$	design value of the head pull-through parameter of the screw [N/mm²]
d_h	head diameter [mm]
$f_{tens,k}$	characteristic tensile capacity of the screw according to Annex 2 [N]
γ_{M2}	partial factor according to EN 1993-1-1 in conjunction with the particular national annex
k_1	min {1; 220/t_{HI}}
k_2	min {1; $\sigma_{10\%}$/0.12}
t_{HI}	thickness of the thermal insulation material [mm]
$\sigma_{10\%}$	compressive stress of the thermal insulation material under 10 % deformation [N/mm²]

If equation (4.10) is fulfilled, the deflection of the battens does not need to be considered when designing the load-carrying capacity of the screws.

REISSER screws	
Fastening of the thermal insulation material on top of rafters	Annex 4

A.4.3 Alternatively inclined screws and thermal insulation material non in compression

A.4.3.1 Mechanical model

Depending on the screw spacing and the arrangement of tensile and compressive screws with different inclinations the battens are loaded by significant bending moments. The bending moments are derived based on the following assumptions:

- The tensile and compressive loads in the screws are determined based on equilibrium conditions from the actions parallel and perpendicular to the roof plane. These actions are constant line loads $q_\perp$ and $q_{||}$.

- The screws act as hinged columns supported 10 mm within the batten or rafter, respectively. The effective column length consequently equals the length of the screw between batten and rafter plus 20 mm.

- The batten is considered as a continuous beam with a constant span $\ell = A + B$. The compressive screws constitute the supports of the continuous beam while the tensile screws transfer concentrated loads perpendicular to the batten axis.

The screws are predominantly loaded in withdrawal or compression, respectively. The characteristic values of the screw's normal forces are determined based on the loads parallel and perpendicular to the roof plane:

Compressive screw:
$$N_{c,k} = (A + B) \cdot \left(-\frac{q_{||,k}}{\cos\alpha_1 + \sin\alpha_1 / \tan\alpha_2} - \frac{q_{\perp,k} \cdot \sin(90° - \alpha_2)}{\sin(\alpha_1 + \alpha_2)} \right) \qquad (4.11)$$

Tensile screw:
$$N_{t,k} = (A + B) \cdot \left(\frac{q_{||,k}}{\cos\alpha_2 + \sin\alpha_2 / \tan\alpha_1} - \frac{q_{\perp,k} \cdot \sin(90° - \alpha_1)}{\sin(\alpha_1 + \alpha_2)} \right) \qquad (4.12)$$

A, B   distances of the screws according to Figure A.4.5

$q_{||,k}$ characteristic value of the loads parallel to the roof plane

$q_{\perp,k}$ characteristic value of the loads perpendicular to the roof plane

α Angle a_1 and a_2 between screw axis and grain direction, $30° \leq \alpha_1 \leq 90°$, $30° \leq \alpha_2 \leq 90°$

Only screws with full thread shall be used.

The bending moments in the batten follow from the constant line load $q_\perp$ and the load components perpendicular to the batten from the tensile screws. The span of the continuous beam is (A + B). The characteristic value of the load component perpendicular to the batten from the tensile screw is:

$$F_{ZS,k} = (A + B) \cdot \left(\frac{q_{||,k}}{1 / \tan\alpha_1 + 1 / \tan\alpha_2} - \frac{q_{\perp,k} \cdot \sin(90° - \alpha_1) \cdot \sin\alpha_2}{\sin(\alpha_1 + \alpha_2)} \right) \qquad (4.13)$$

A positive value for $F_{ZS,k}$ means a load towards the rafter, a negative value a load away from the rafter. The system of the continuous beam is shown in Figure A.4.5.

The battens fixed on the rafter shall be supported perpendicular to the load-bearing plane.

REISSER screws	
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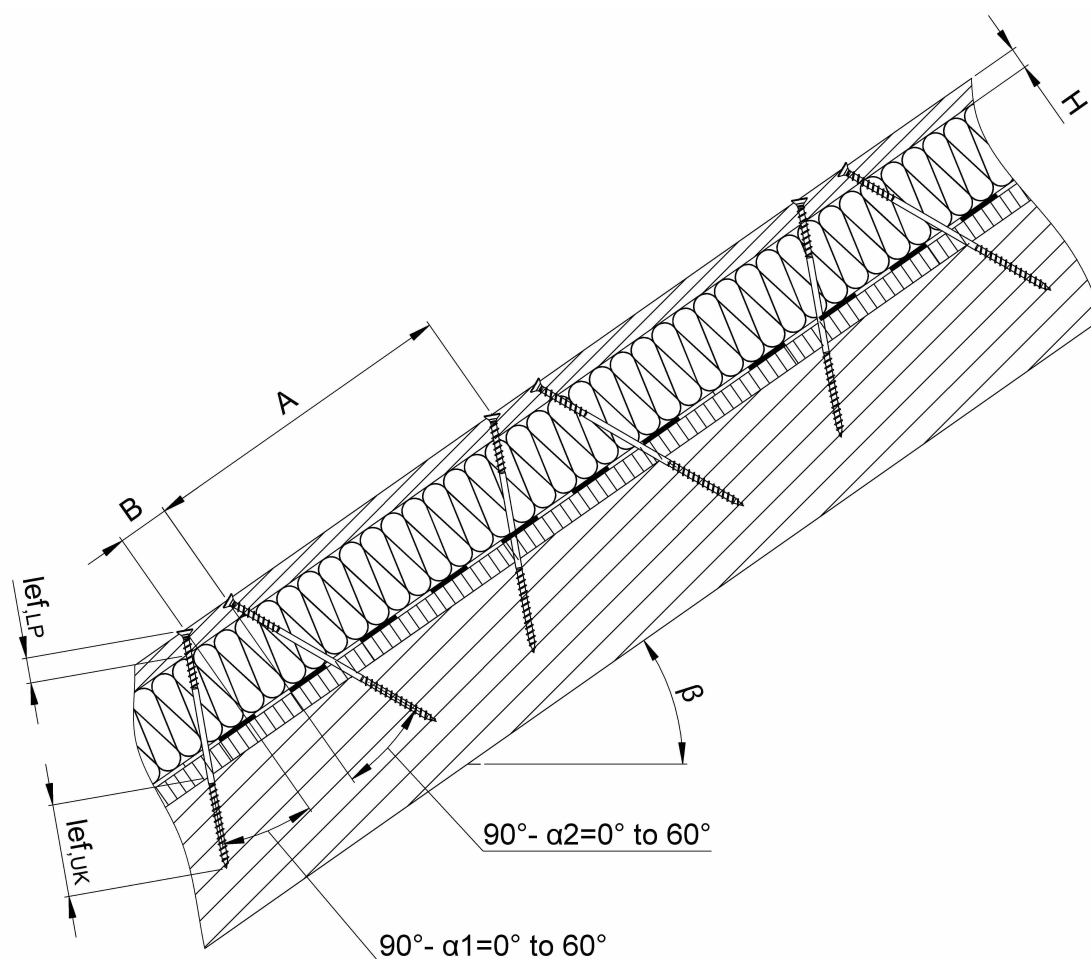Bautechnik**

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Figure A.4.4 Fastening of thermal insulation material on top of rafters - structural system for alternatively inclined screws
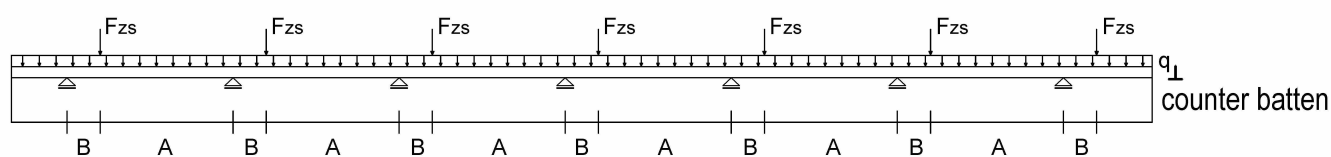

Figure A.4.5   Continuous batten under constant line loads from actions on the roof plane $q_\perp$ and concentrated loads from tensile screws F_{ZS}

REISSER screws	
Fastening of thermal insulation material on top of rafters	Annex 4

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A.4.3.2 Design of the screws

The design value of the load-carrying capacity of the screws shall be calculated according to equation (4.14) and (4.15).

Screws loaded in tension:

$$F_{ax,\alpha,Rd} = \min \left\{ \frac{f_{ax,d} \cdot d \cdot l_{ef,b}}{1.2 \cdot \cos^2\alpha_2 + \sin^2\alpha_2} \cdot \left(\frac{\rho_{b,k}}{350}\right)^{0.8} ; \frac{f_{ax,d} \cdot d \cdot l_{ef,r}}{1.2 \cdot \cos^2\alpha_2 + \sin^2\alpha} \cdot \left(\frac{\rho_{r,k}}{350}\right)^{0.8} ; \frac{f_{tens,k}}{\gamma_{M2}} \right\} \qquad (4.14)$$

Screws loaded in compression:

$$F_{ax,\alpha,Rd} = \min \left\{ \frac{f_{ax,d} \cdot d \cdot l_{ef,b}}{1.2 \cdot \cos^2\alpha_1 + \sin^2\alpha_1} \cdot \left(\frac{\rho_{b,k}}{350}\right)^{0.8} ; \frac{f_{ax,d} \cdot d \cdot l_{ef,r}}{1.2 \cdot \cos^2\alpha_1 + \sin^2\alpha_1} \cdot \left(\frac{\rho_{r,k}}{350}\right)^{0.8} ; \frac{\kappa_c \cdot N_{pl,k}}{\gamma_{M1}} \right\} \qquad (4.15)$$
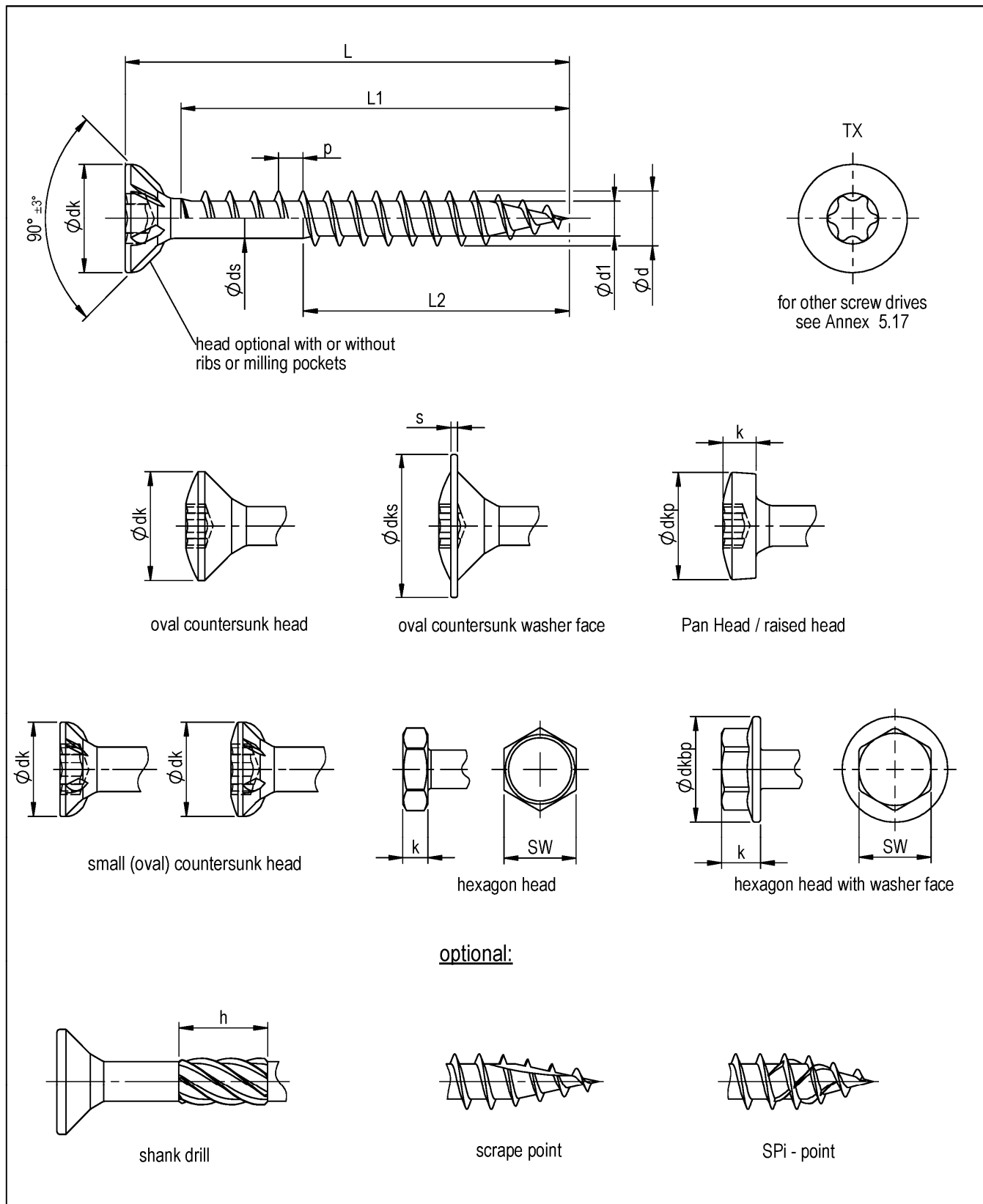
where:

$f_{ax,d}$	design value of the axial withdrawal parameter of the threaded part of the screw [N/mm²]
d	outer thread diameter of the screw [mm]
$l_{ef,b}$	penetration length of the threaded part of the screw in the batten [mm]
$l_{ef,r}$	penetration length of the threaded part of the screw in the rafter, $l_{ef} \geq 40$ mm
$\rho_{b,k}$	characteristic density of the batten [kg/m³], for LVL the assumed characteristic density shall not exceed 500 kg/m³
$\rho_{r,k}$	characteristic density of the rafter [kg/m³], for LVL the assumed characteristic density shall not exceed 500 kg/m³
α	angle α_1 or α_2 between screw axis and grain direction, $30° \leq \alpha_1 \leq 90°$, $30° \leq \alpha_2 \leq 90°$
$f_{tens,k}$	characteristic tensile capacity of the screw according to Annex 2 [N]
γ_{M1}, γ_{M2}	partial factor according to EN 1993-1-1 in conjunction with the particular national Annex
$\kappa_c \cdot N_{pl,k}$	Buckling capacity of the screw according to table A.4.2 [N]

REISSER screws	
Fastening of thermal insulation material on top of rafters	Annex 4

Table A.4.2   Characteristic buckling capacity of the screws $\kappa_c \cdot N_{pl,k}$ in N

Free screw length l between batten and rafter [mm]	UHB screws
	Outer thread diameter d [mm]
	8.0/ 10.0
	$\kappa_c \cdot N_{pl,k}$ [N]
≤ 100	13300
120	10400
140	8300
160	6800
180	5600
200	4700
220	4000
240	3500
260	3000
280	2700
300	2300
320	2100
340	1900
360	1700
380	1500
400	1400

REISSER screws	Annex 4
Fastening of thermal insulation material on top of rafters	

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TX

for other screw drives
see Annex 5.17

head optional with or without
ribs or milling pockets

oval countersunk head

oval countersunk washer face

Pan Head / raised head

small (oval) countersunk head

hexagon head

hexagon head with washer face

optional:

shank drill

scrape point

SPi - point

REISSER screws

REISSER R2, HBS, TKS and Vi-Port screws with single thread made of carbon steel,
RETINOX screws with single thread made of stainless steel,
Wooden facades-screws with single thread made of stainless steel

Annex 5.1

Z56546.18

8.06.03-336/17

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REISSER R2, RETINOX, HBS, TKS, Vi-Port and Wooden facade screws with single thread

	thread dimensions				h
Ø d -0,3	Ø d1 +0,3	Ø ds ±0,2	p ±10%		
$3,0^{+0,1}$	1,8	2,2	1,35		5,0
$3,5^{+0,1}$	2,1	2,6	1,6		6,0
$4,0^{+0,2}$	2,4	2,8	1,8		7,0
$4,5^{+0,1}$	2,6	3,1	2,0		8,0
$5,0^{+0,2}$	3,1	3,6	2,2		8,0
$6,0^{+0,2}$	3,6	4,1	2,6		10,0

head shapes

Ø d	(oval) countersunk head	small (oval) counterunk head	oval countersunk washer face		Panhead / raised head		hexagon head		hexagon head with washer face	
	dk ±0,5	dk ±0,3	dks ±0,3	s ±0,2	dkp -0,5	k ±0,2	SW	k	dkbp max.	k
3,0	6,0		7,1	0,6	6,0	2,3				
3,5	7,0	5,0	8,1	0,6	7,0	2,6				
4,0	8,0	6,0	9,2	0,9	8,0	3,0				
4,5	9,0	7,0	10,3	0,9	9,0	3,2				
5,0	10,0	8,0	11,0	1,1	10,0	3,7	8	3,5	11,4	3,5
6,0	12,0	11,0	13,8	1,1	12,0	4,5	10	4,0		

d	3,0		3,5		4,0		4,5		5,0		6,0	
L*	L1 ±2,0	L2 ±2,0	L1 ±2,0	L2 ±2,0	L1 ±2,0	L2 ±2,0	L1 ±2,0	L2 ±2,0	L1 ±2,0	L2 ±2,0	L1 ±2,0	L2 ±2,0
$16^{-0,90}$	12											
$20^{-1,05}$	16		16		16							
$25^{-1,05}$	21		21		21		21		21			
$30^{-1,05}$	26	min. 12 - max. 31	26	min. 14 - max. 31	26		26		26		26	
$35^{-1,25}$	31		31		31		31		31		31	
$40^{-1,25}$	36		36		36		36	min. 18 - max. 50	36		36	
$45^{-1,25}$	41		41		41	min. 16 - max. 50	41		41		41	
$50^{-1,25}$			46		46		46		46	min. 20 - max. 70	46	min. 24 - max. 80
$55^{-1,50}$			51		51		51		51		51	
$60^{-1,50}$			56		56		56		56		56	
$70^{-1,50}$							66		66		66	
$80^{-1,50}$									76		76	
$90^{-1,50}$												
$100^{-1,50}$												
$110^{-1,75}$												
$120\text{-}180^{-2,00}$												
$200\text{-}300^{-3,00}$												

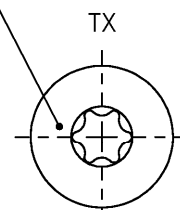***deviant lengths between Lmin < L < Lmax possible**

REISSER screws

REISSER R2, HBS, TKS and Vi-Port screws with single thread made of carbon steel,
RETINOX screws with single thread made of stainless steel,
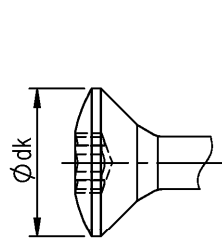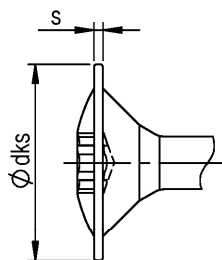Wooden facades-screws with single thread made of stainless steel
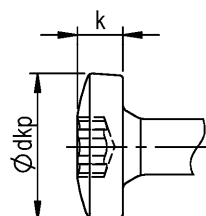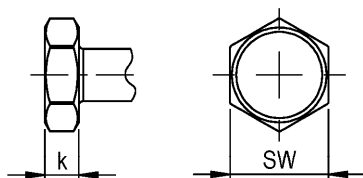
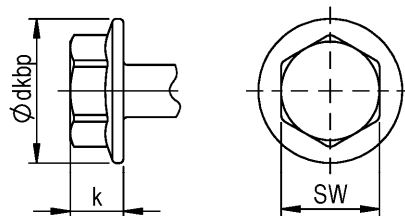Annex 5.2

oval countersunk head

oval countersunk washer face
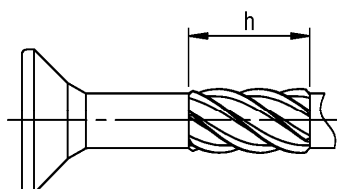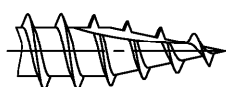
Pan Head / raised head

hexagon head

hexagon head with washer face

optional:

shank drill

scrape point

SPi - point

REISSER screws

DNS screws with double thread made of carbon steel
HBS, TKS and Vi-Port screws with double thread made of carbon steel

Annex 5.3

Z56546.18   8.06.03-336/17

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DNS, HBS, TKS und Vi-Port screws with double thread

thread dimensions				h
Ø d -0,3	Ø d1 +0,3	Ø ds ±0,2	p ± 5%	
3,0 +0,1	1,8 -0,1	2,2	3,1	5,0
3,5 +0,1	2,1 -0,1	2,6	3,7	6,0
4,0 +0,1	2,4 -0,1	2,8	4,1	7,0
4,5 +0,1	2,6 -0,1	3,1	4,5	8,0
5,0 +0,2	3,0 -0,1	3,5	5,5	8,0
6,0 +0,2	3,6 -0,1	4,1	6,6	10,0

head shapes

Ø d	(oval) countersunk head	oval counterunk washer face		Panhead / raised head		hexagon head		hexagon head with washer face	
	dk ±0,5	dks ±0,3	s ±0,2	dkp -0,5	k ±0,2	SW	k	dkbp max.	k
3,0	6,0	7,1	0,6	6,0	2,3				
3,5	7,0	8,1	0,6	7,0	2,6				
4,0	8,0	9,2	0,9	8,0	3,0				
4,5	9,0	10,3	0,9	9,0	3,2				
5,0	10,0	11,0	1,1	10,0	3,7	8	3,5	11,4	3,5
6,0	12,0	13,8	1,1	12,0	4,5	10	4,0		

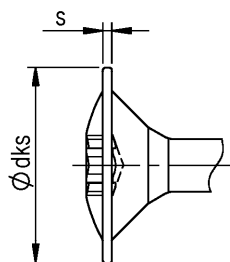| d	3,0		3,5		4,0		4,5		5,0		6,0	
L*	L1 ±2,0	L2 ±2,0	L1 ±2,0	L2 ±2,0	L1 ±2,0	L2 ±2,0	L1 ±2,0	L2 ±2,0	L1 ±2,0	L2 ±2,0	L1 ±2,0	L2 ±2,0
16 -0,90	12											
20 -1,05	16		16		16							
25 -1,05	21		21		21		21		21			
30 -1,05	26	min. 12 - max. 31	26	min. 14 - max. 31	26	min. 16 - max. 50	26	min. 18 - max. 50	26	min. 20 - max. 70	26	min. 24 - max. 80
35 -1,25	31		31		31		31		31		31	
40 -1,25	36		36		36		36		36		36	
45 -1,25	41		41		41		41		41		41	
50 -1,25			46		46		46		46		46	
55 -1,50					51		51		51		51	
60 -1,50					56		56		56		56	
70 -1,50							66		66		66	
80 -1,50									76		76	
90 -1,50												
100 -1,50												
110 -1,75												
120-180 -2,00												
200-300 -3,00												

*deviant lengths between Lmin < L < Lmax possible

REISSER screws

DNS screws with double thread made of carbon steel
HBS, TKS and Vi-Port screws with double thread made of carbon steel

Annex 5.4

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DIBt

optional: lenght of screw and
manufacturer mark on the head

TX

for other screw drives
see Annex 5.17

$90° \pm 3°$

$\varnothing \, dk$

p

$\varnothing \, ds$

L

$L1$

$L2$

$\varnothing \, d1$

$\varnothing \, d$

head optional with or without
ribs or milling pockets

$\varnothing \, dk$

oval countersunk head

s

$\varnothing \, dks$

oval countersunk washer face

k

$\varnothing \, dkp$

Pan Head / raised head

$\varnothing \, dk$

$\varnothing \, dk$

small (oval) countersunk head

k

SW

hexagon head

$\varnothing \, dkbp$

k

SW

hexagon head with washer face

optional:

h

shank drill

REISSER screws

DRIBO screws with single thread made of carbon steel or stainless steel
TKS screws with single thread made of stainless steel

Annex 5.5

Z56546.18

8.06.03-336/17

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DIBt

DRIBO and TKS screws with single thread

thread dimensions				h
Ø d $_{-0,3}$	Ø d1 $^{+0,3}$	Ø ds ±0,2	p ±10%	
3,0 $^{+0,1}$	1,8 $_{-0,1}$	2,2	1,35	5,0
3,5 $^{+0,1}$	2,0 $_{-0,1}$	2,6	1,6	6,0
4,0 $^{+0,1}$	2,4 $_{-0,1}$	2,8	1,8	7,0
4,5 $^{+0,1}$	2,6 $_{-0,1}$	3,2	2,0	8,0
5,0 $^{+0,2}$	3,2 $_{-0,2}$	3,5	2,2	8,0
6,0 $^{+0,2}$	3,6 $_{-0,1}$	4,4	2,6	10,0

head shapes

Ø d	(oval) countersunk head	oval countersunk washer face		panhead / raised head		small (oval) countersunk head	hexagon head		hexagon head with washer face	
	dk ±0,5	dks ±0,3	s ±0,2	dkp $_{-0,5}$	k ±0,2	dk ±0,3	SW	k	dkbp max.	k
3,0	6,0	7,1	0,6	6,0	2,3					
3,5	7,0	8,1	0,6	7,0	2,6	5,0				
4,0	8,0	9,2	0,9	8,0	3,0	6,0				
4,5	9,0	10,3	0,9	9,0	3,2	7,0				
5,0	10,0	11,0	1,1	10,0	3,7	8,0	8	3,5	11,4	3,5
6,0	12,0	13,8	1,1	12,0	4,5	11,0	12	4,5	13,6	4,5

d	3,0		3,5		4,0		4,5		5,0		6,0	
L*	L1 ±2,0	L2 ±2,0	L1 ±2,0	L2 ±2,0	L1 ±2,0	L2 ±2,0	L1 ±2,0	L2 ±2,0	L1 ±2,0	L2 ±2,0	L1 ±2,0	L2 ±2,0
16 $^{-0,90}$	12											
20 $^{-1,05}$	16		16		16							
25 $^{-1,05}$	21		21		21		21		21			
30 $^{-1,05}$	26		26		26		26		26		26	
35 $^{-1,25}$	31		31		31		31		31		31	
40 $^{-1,25}$	36	min. 12 - max. 31	36	min. 14 - max. 42	36	min. 16 - max. 50	36	min. 18 - max. 50	36	min. 20 - max. 70	36	min. 24 - max. 80
45 $^{-1,25}$	41		41		41		41		41		41	
50 $^{-1,25}$			46		46		46		46		46	
55 $^{-1,50}$			51		51		51		51		51	
60 $^{-1,50}$			56		56		56		56		56	
70 $^{-1,50}$			66				66		66		66	
80 $^{-1,50}$									76		76	
90 $^{-1,50}$												
100 $^{-1,50}$												
110 $^{-1,75}$												
120-180 $^{-2,00}$												
200-300 $^{-3,00}$												

*deviant lengths between Lmin < L < Lmax possible

REISSER screws

DRIBO screws with single thread made of carbon steel or stainless steel
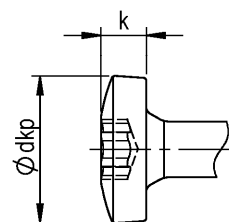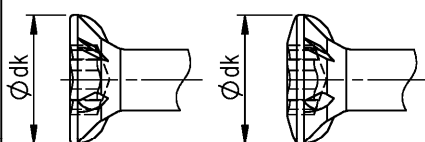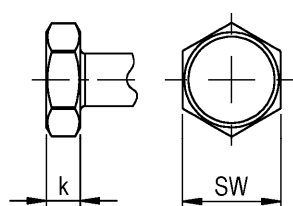TKS screws with single thread made of stainless steel

Annex 5.6
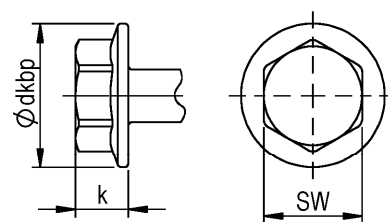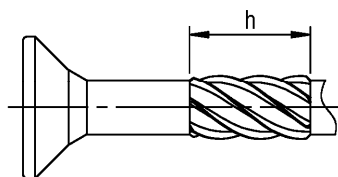
oval countersunk head

oval countersunk washer face

Pan Head / raised head

shank drill

small (oval) countersunk head

optional: lenght of screw and manufacturer mark on the head

TX

for other screw drives see Annex 5.17

head optional with or without ribs or milling pockets

REISSER screws

SPARIBO screws with tapping point made of carbon steel or stainless steel
TKS screws with tapping point made of carbon steel or stainless steel

Annex 5.7

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ETA-11/0106 of 1 February 2019**

English translation prepared by DIBt

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SPARIBO and tapping point screws

thread dimensions				h	F ca.	dp
Ø d -0,3	Ø d1 +0,3	Ø ds ±0,2	p ±10%			
3,5 +0,1	2,0 -0,1	2,6	1,6	6,0	2,8	2,2
4,0 +0,1	2,4 (2,6) -0,1	2,9	1,8	7,0	3,0	2,9
4,5 +0,1	2,6 (3,0) -0,1	3,3	2,0	8,0	3,7	3,2
5,0 (5,3) +0,2	3,0 (3,7) -0,1	3,5 (4,0)	2,2	8,0	4,5	3,9
6,0 (6,5) +0,2	3,6 (4,6) -0,1	4,4 (5,0)	2,6 (2,2)	10,0	4,5	4,9

*(values in brackets only for screws made of stainless steel)

head shapes

Ø d	(oval) countersunk head	oval countersunk washer face		panhead / raised head		small (oval) countersunk head
	dk ±0,5	dks ±0,3	s ±0,2	dkp -0,5	k ±0,2	dk ±0,3
3,5	7,0	8,1	0,6	7,0	2,6	5,0
4,0	8,0	9,2	0,9	8,0	3,0	6,0
4,5	9,0	10,3	0,9	9,0	3,2	7,0
5,0	10,0	11,0	1,1	10,0	3,7	8,0
6,0	12,0	13,8	1,1	12,0	4,5	11,0

d	3,0		3,5		4,0		4,5		5,0		6,0	
L*	L1 ±2,0	L2 ±2,0	L1 ±2,0	L2 ±2,0	L1 ±2,0	L2 ±2,0	L1 ±2,0	L2 ±2,0	L1 ±2,0	L2 ±2,0	L1 ±2,0	L2 ±2,0
16 -0,90	12											
20 -1,05	16		16		16							
25 -1,05	21		21		21		21		21			
30 -1,05	26	min. 12 - max. 31	26	min. 14 - max. 42	26	min. 16 - max. 50	26	min. 18 - max. 50	26	min. 20 - max. 70	26	min. 24 - max. 80
35 -1,25	31		31		31		31		31		31	
40 -1,25	36		36		36		36		36		36	
45 -1,25	41		41		41		41		41		41	
50 -1,25			46		46		46		46		46	
55 -1,50					51		51		51		51	
60 -1,50					56		56		56		56	
70 -1,50							66		66		66	
80 -1,50									76		76	
90 -1,50												
100 -1,50												
110 -1,75												
120-180 -2,00												
200-300 -3,00												

*deviant lengths between Lmin < L < Lmax possible

REISSER screws

SPARIBO screws with tapping point made of carbon steel or stainless steel
TKS screws with tapping point made of carbon steel or stainless steel
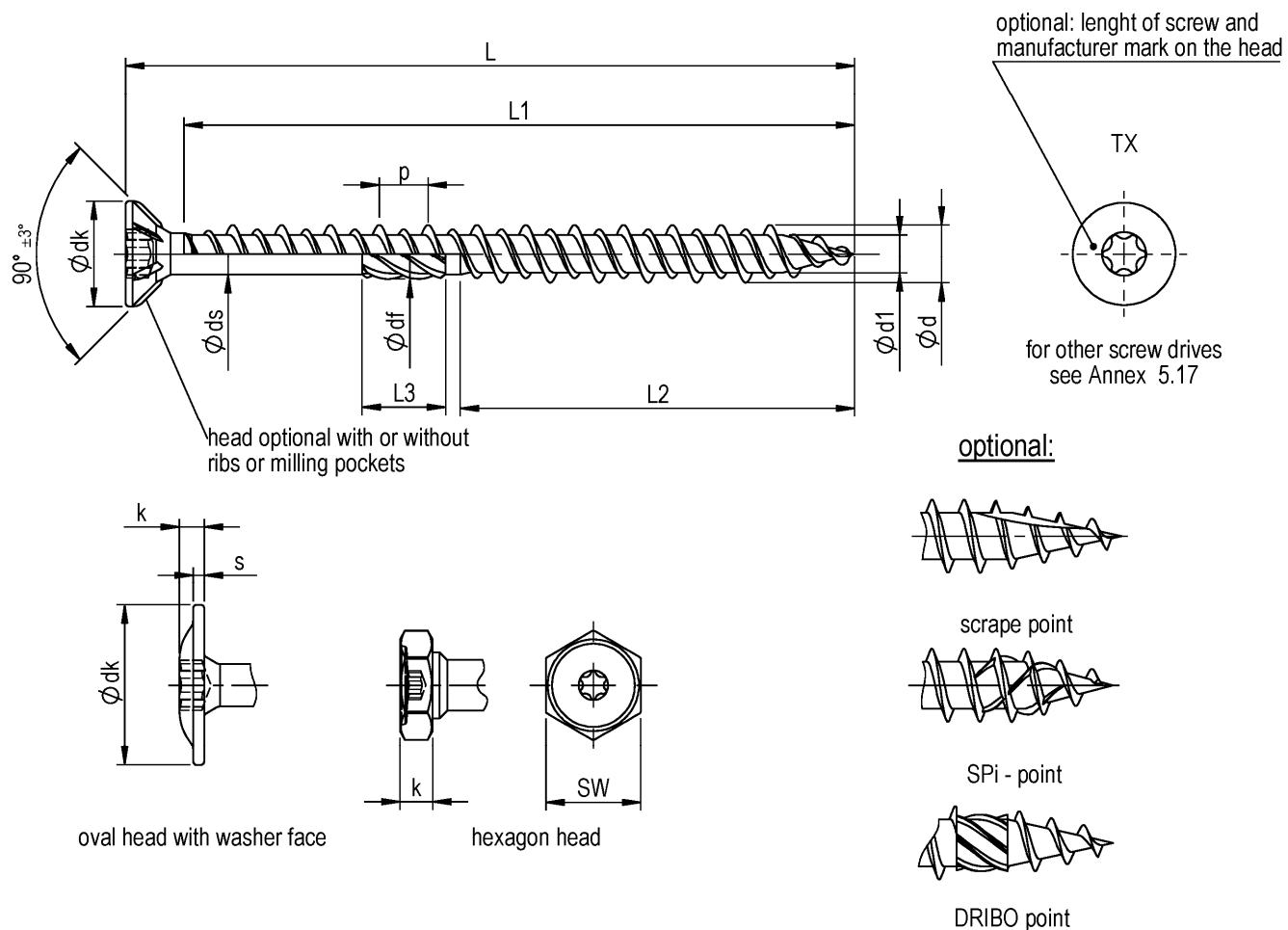
Annex 5.8

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DIBt

optional: lenght of screw and
manufacturer mark on the head

TX

for other screw drives
see Annex 5.17

head optional with or without
ribs or milling pockets

oval head with washer face

hexagon head

optional:

shank drill

scrape point

SPi - point

HBS, TKS and Vi-Port screws with coarse thread						head shapes					
thread dimensions				shank drill		countersunk head	oval haed with washer face			hexagon head	
Ø d -0,3	Ø d1 ±0,3	Ø ds ±0,2	p ±10%	Ø df ±0,3	L2 ± 2	Ø dk ± 0,6	Ø dk ± 1,0	k ±0,3	s ±0,3	SW	k ±1,0
8,0 +0,2	5,2	5,8	5,5	7,0	12,0	14,5	20	4,0	1,6	12	4,5
10,0 +0,2	6,25	7,0	6,6	8,25	12,0	17,8	24	4,8	2,0	15	5,5
12,0 +0,2	7,12	8,2	6,8	9,5	12,0	20,0	30	5,5	2,4	17	6,5

nominal length L	Ø 8,0	Ø 10,0	Ø 12,0
	L1	L1	L1
70 - 120 -1,75	60 ± 1,5		
121 - 500 -2,5	80 ± 1,5		

REISSER screws

HBS, TKS and Vi-Port screws coarse thread made of carbon steel

Annex 5.9

optional: lenght of screw and manufacturer mark on the head

TX

for other screw drives see Annex 5.17

head optional with or without ribs or milling pockets

optional:

oval head with washer face

hexagon head

scrape point

SPi - point

DRIBO point

HBS, TKS screws with HiLo-thread						head shapes					
thread dimensions				shank drill		countersunk head	oval head with washer face			hexagon head	
Ø d $_{-0,3}$	Ø d1 ±0,3	Ø ds ±0,2	p ±10%	Ø df ±0,3	L3 ± 2	Ø dk ± 0,6	Ø dk ± 1,0	k ±0,3	s ±0,3	SW	k ±1,0
8,0 $^{+0,2}$	5,0	5,7	6,7	6,5	12,0	14,5	20	4,0	1,6	12	4,5
10,0 $^{+0,2}$	6,4	7,1	7,7	7,80	12,0	17,8	24	4,8	2,0	15	5,5

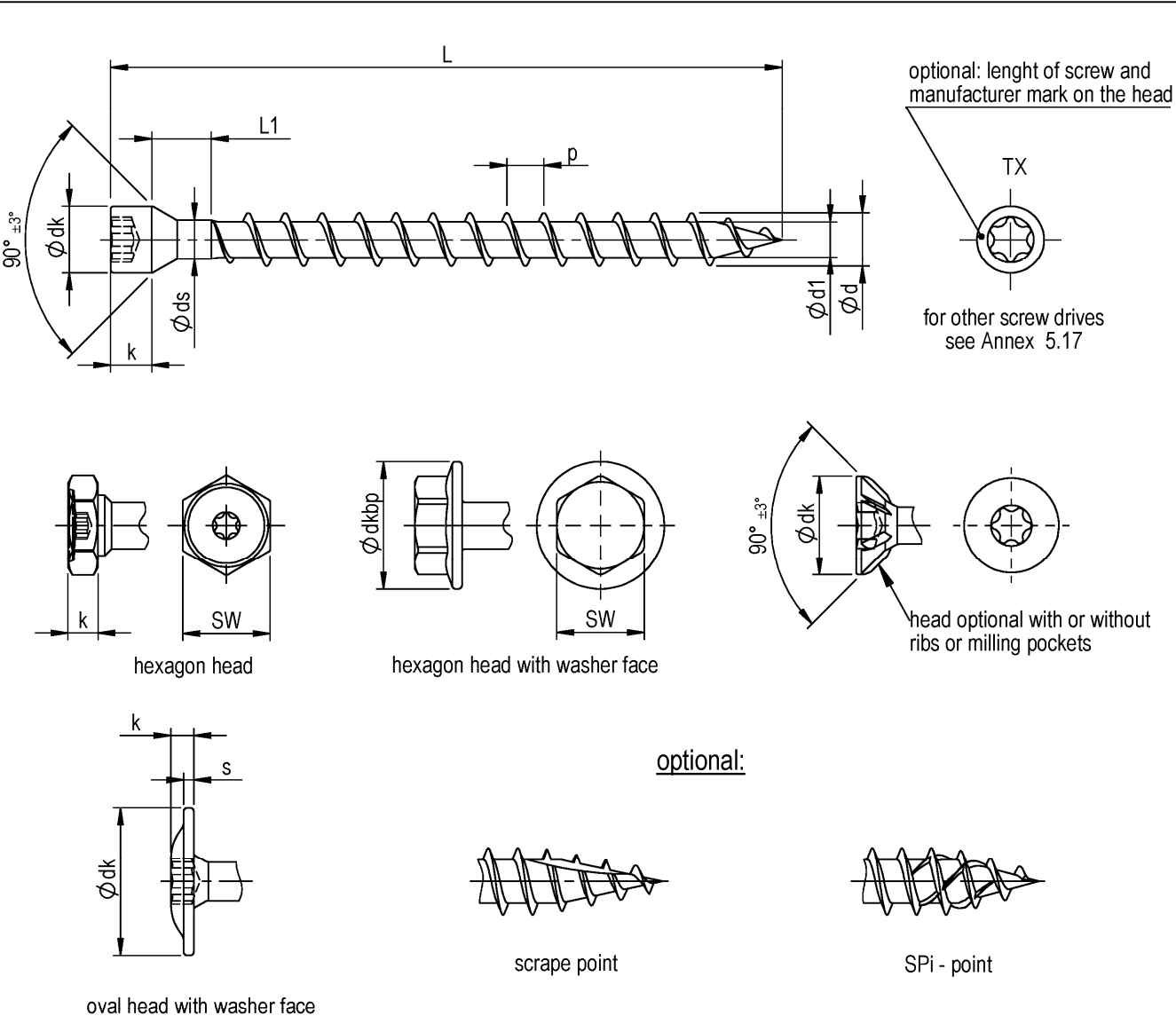| nominal	Ø 8,0		Ø 10,0	
length L $_{-2,0}$	L1	L2	L1	L2
40	35			
50	45		45	
60	55		55	
80	75	60	75	60
100		60		60
120 - 200		80		80
(201 - 500)*		80		80

*only screws made of carbon steel

REISSER screws

HBS and TKS screws with HiLo-thread made of carbon steel or stainless steel

Annex 5.10

optional: lenght of screw and
manufacturer mark on the head

TX

for other screw drives
see Annex 5.17

hexagon head

hexagon head with washer face

head optional with or without
ribs or milling pockets

oval head with washer face

optional:

scrape point

SPi - point

nominal length L max.	L1 ±2,0
500	12

fully threaded HBS screws				head shapes							
thread dimensions				cylindrical head		countersunk head	oval head with washer face			hexagon head (with washer face)		
Ø d -0,3	Ø d1 ±0,3	Ø ds ±0,2	p ±10%	Ø dk -0,5	k ±0,3	Ø dk ± 0,6	Ø dk ± 1,0	k ±0,3	s ±0,3	SW	k ±1,0	dkbp
8,0 +0,2	5,2	5,8	5,5	10,0	7,0	14,5	20	4,0	1,6	12	4,5	13,6

REISSER screws

Fully threaded HBS screws made of carbon steel

Annex 5.11

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DIBt

L

70 ±2,5

59 ±2

optional: lenght of screw and
manufacturer mark on the head

5,4 ±0,2

t= 2,0 - 3,0 mm

8,2 ±0,2

5,6 ±0,05

$\emptyset$ 10 ±0,4

TX

7,5 ±0,5

$\emptyset$ 10 ±0,3

$\emptyset$ 6,3 ±0,3

$\emptyset$ 7,05 ±0,1

3,5 ±0,5

6,5 ±3

$\emptyset$ 5,3 ±0,3

$\emptyset$ 8 ±0,3

for other screw drives
see Annex 5.17

nominal diameter 8,0 mm

L	L min
160	158
180	178
200	197
220	217
230	227
240	237
250	247
260	257
270	267
280	277
300	297
320	317
330	327
340	337
350	347
360	357
380	377
400	397
420	417
440	437
460	457
480	477
500	497

optional:

SPi - point

scrape point

tapping point

REISSER screws

UHB and Vi-Port screws with thread under head d = 8.0 mm made of carbon steel

Annex 5.12

optional: lenght of screw and manufacturer mark on the head

TX

for other screw drives
see Annex 5.17
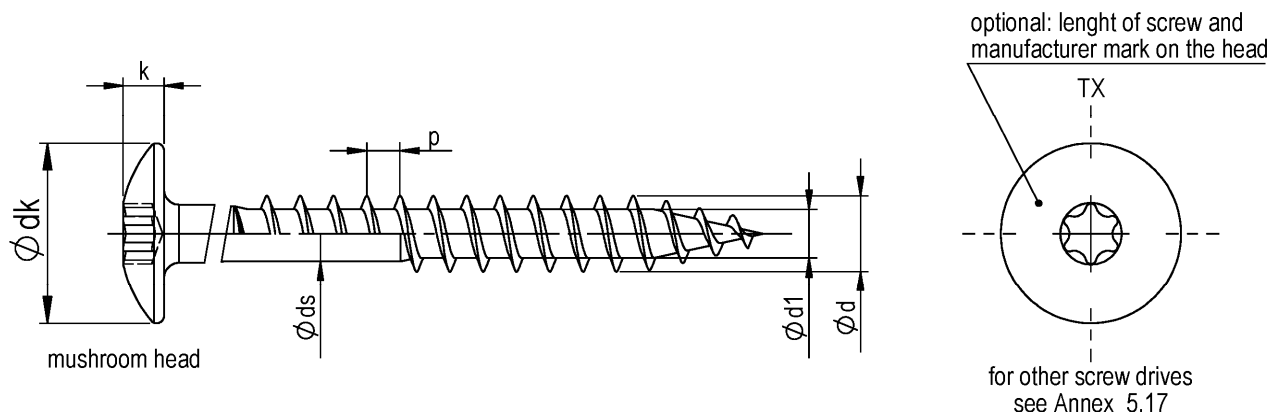
mushroom head

optional:
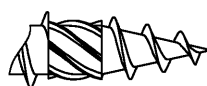
scrape point   SPi - point   DRIBO point   tapping point

facade screw with mushroom head and chipboard thread (acc. to annex 5.1)

thread dimensions				head dimensions	
Ø d -0,3	Ø d1 +0,3	Ø ds ±0,3	p ±10%	Ø dk ±0,3	k ±0,2
4,0 +0,2	2,5	3,2	1,8	10,0	2,4
5,0 +0,2	3,1	3,6	2,2	12,0	2,6
5,5 +0,1	3,5	4,1	2,4	12,0	2,6

facade screw with mushroom head and DRIBO thread (acc. to annex 5.5)

thread dimensions				head dimensions	
3	Ø d1 +0,3	Ø ds ±0,2	p ±10%	Ø dk ±0,3	k ±0,2
4,5 +0,2	2,6	3,2	2,0	10,0	2,4
5,0 +0,2	3,2	3,5	2,2	12,0	2,6
5,5 +0,1	3,5	4,1	2,4	12,0	2,6

facade screw with musroom head and SPARIBO thread (acc. to annex 5.7)

thread dimensions				head dimensions	
Ø d -0,3	Ø d1 +0,3	Ø ds ±0,2	p ±10%	Ø dk ±0,3	k ±0,2
4,5 +0,2	2,6	3,2	2,0	10,0	2,4
5,0 +0,2	3,0	3,8	2,2	12,0	2,6
6,0 +0,2	3,6	4,4	2,6	12,0	2,6

nominal length and length of thread according to mentioned annexes (5.1; 5.5; 5.7)

REISSER screws

Facade screws with mushroom head made of carbon steel or stainless steel

Annex 5.13

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DIBt

head optional with or without
ribs or milling pockets

TX

for other screw drives
see Annex 5.17

small oval countersunk head

cylindrical head
with washer face

cylindrical head

optional:

thread under head

optional:

scrape point

SPi - point

DRIBO point

tapping point
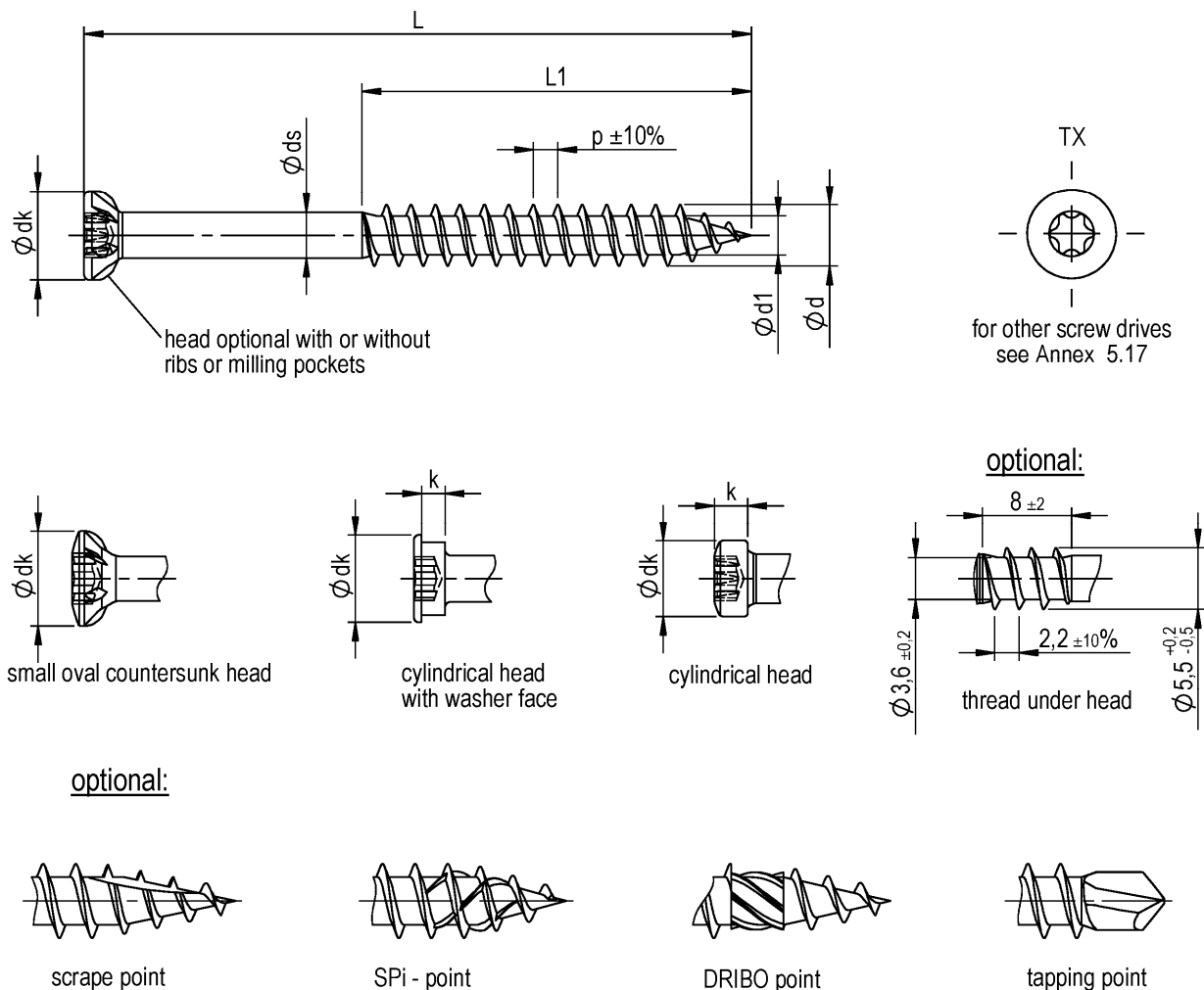
terrace screw (thread acc. to annex 5.5)							
thread dimensions				small oval countersunk head / cylindrical head with washer face		cylindrical head	
Ø d -0,5	Ø d1 ±0,2	Ø ds ±0,2	p ±10%	Ø dk ±0,3	k ±0,2	Ø dk ±0,3	k ±0,3
5,5 +0,2	3,6	4	2,2	7,7	2,8	6,8	3,0

L -1,5	L1 -1,5
40	25
45	25
50	35 (30)
60	35 (33)
70	35 (40)
80	35 (43)
90	50

thread length in brackets only
for screws with thread under head

REISSER screws

REISSER terrace screws made of carbon steel or stainless steel

Annex 5.14

optional: lenght of screw and manufacturer mark on the head

TX

for other screw drives see Annex 5.17
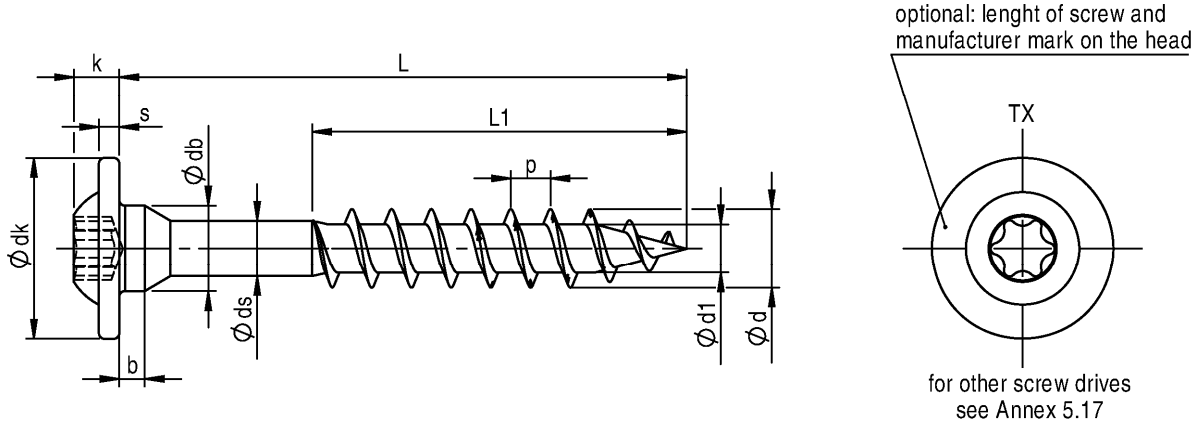
optional:
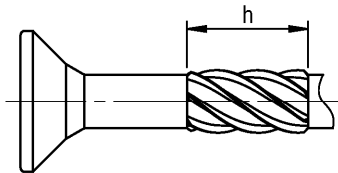
shank drill
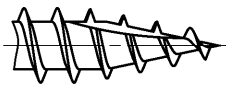
scrape - point

L	tol.	L1 ±1,0
40	-1,5	
50	-1,5	
60	-1,5	
70	-1,5	
80	-1,5	
90	-1,75	
100	-1,75	
110	-1,75	
120	-1,75	
130	-2,0	
140	-2,0	
150	-2,0	min. 32 - max. 150
160	-2,0	
180	-2,0	
200	-2,3	
220	-2,3	
240	-2,3	
250	-2,5	
260	-2,5	
280	-2,5	
300	-2,5	
320	-2,5	
340	-2,5	
380	-2,5	
400	-2,5	

Reisser STRONGI wood screws								
ød ±0,3	ød1 ±0,3	p ±10%	øds ±0,1	ødk ±1,0	k ±0,2	s ±0,2	ødb ±0,2	b ±0,4
7,0	4,4	3,5	4,95	16,0	4,0	1,8	7,6	2,3
8,0	4,8	3,5	5,65	17,0	4,2	1,8	9,2	2,4

REISSER screws

REISSER STRONGI wood screws made from carbon steel

Annex 5.15
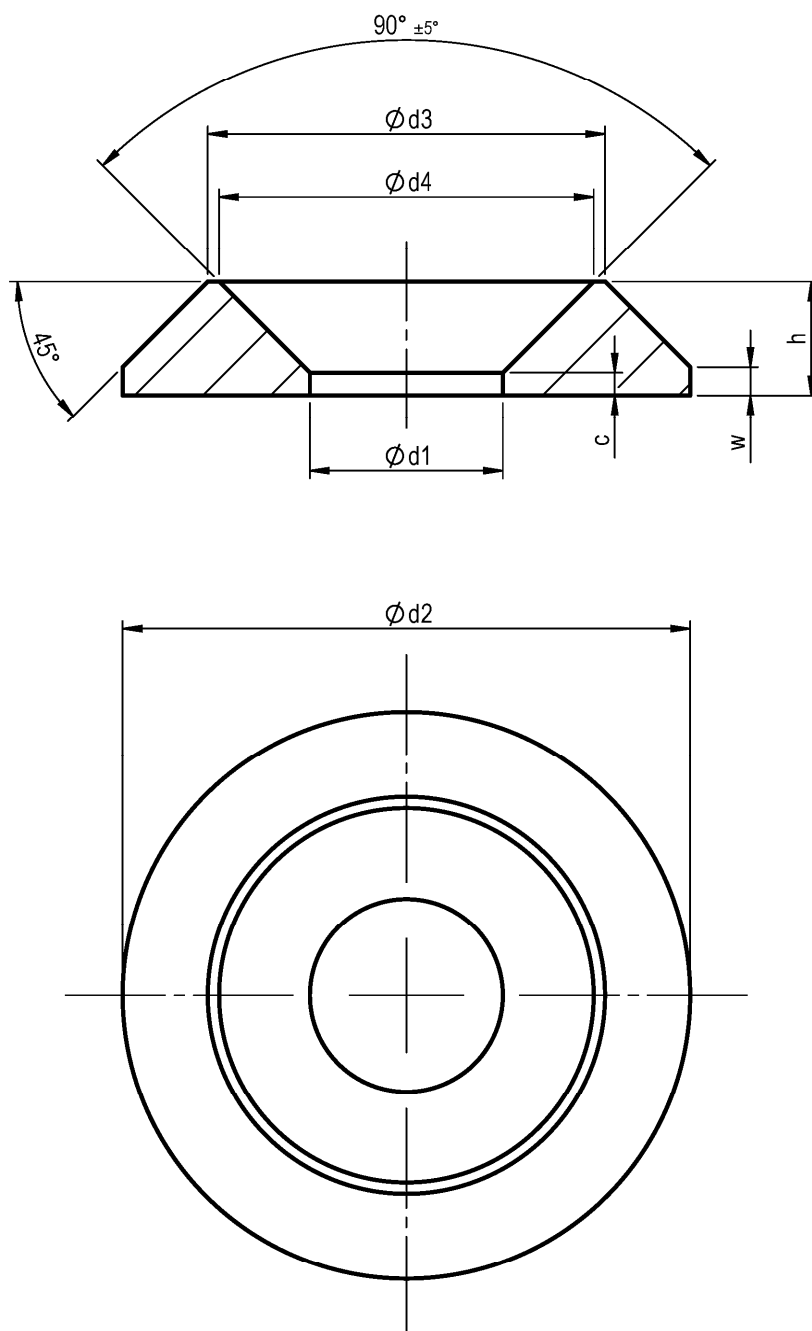
|	d1 ±0,3	d2 ±0,3	d3 ±0,3	d4 ±0,3	h ±0,3	w	c
Ø 8,0	8,5	25,0	17,5	16,5	5,0	~ 1,25	~ 1,0
Ø 10,0	11,0	32,0	22,5	21,5	6,0	~ 1,4	~ 0,75

Washers made of carbon steel shall be only used with screws made of carbon steel.
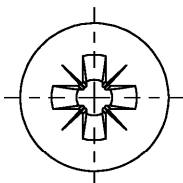Screws made of stainless steel shall not be used with washers made of carbon steel.

REISSER screws
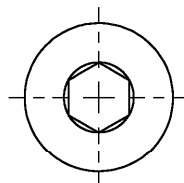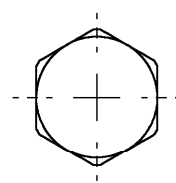
Countersunk washers made of carbon steel

Annex 5.16

Z56546.18

8.06.03-336/17

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für
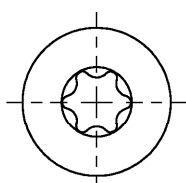Bautechnik

DIBt
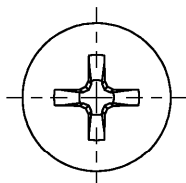
cross recess type H

cross recess type Z

hexagon socket

hexagon head

TX

TX Pin
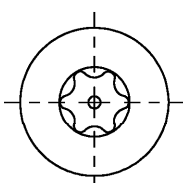
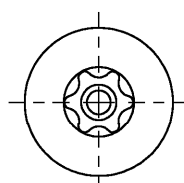TX Ttap

SIT
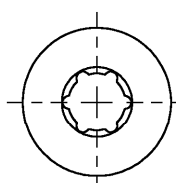
sizes of screw drives											
screw drive	Ø 3,0	Ø 3,5	Ø 4,0	Ø 4,5	Ø 5,0	Ø 5,5	Ø 6,0	Ø 7,0	Ø 8,0	Ø 10	Ø 12
cross recess type H	1	1 / 2	2	2	2	2 / 3	3	3			
cross recess type Z											
TX	10	10 / 15 / 20	15 / 20	20	20 / 25	20 / 25	25 / 30	30	30 / 40	40 / 50	40 / 50
TX Pin											
TX Ttap											
SIT											
heaxagon head					SW8		SW10		SW12	SW15	SW17
hexagon socket					SW 4		SW 5		SW 6		

REISSER screws

Screw drives

Annex 5.17