

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-19/0436
of 28 August 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

WASI self-tapping screws

Product family
to which the construction product belongs

Screws for use in timber constructions

Manufacturer

WASI GmbH
WASI-Straße 1
42287 Wuppertal
DEUTSCHLAND

Manufacturing plant

WASI GmbH
WASI-Straße 1
42287 Wuppertal
DEUTSCHLAND

This European Technical Assessment
contains

10 pages including 3 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 130118-01-0603

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Specific part

1 Technical description of the product

WASI self-tapping screws are screws made of stainless steel. The outer thread diameter is 10 mm. The overall length of the screw is ranging from 60 mm to 140 mm (nominal dimension). Further dimensions are shown in Annex 3.

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 WASI self-tapping screws are used in compliance with the specifications and conditions given in Annex 1 and 2.

Durability is only ensured if the specifications of intended use according to Annex 1 and 2 are taken into account.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the 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 3
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	No performance assessed
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
Durability against corrosion	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

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

In accordance with EAD No. 130118-01-0603, 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 28 August 2019 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Head of Department

beglaubigt:
Dewitt

Annex 1 Specifications of intended use

A.1.1 General

Use of WASI self-tapping screws only for:

- Static and quasi-static loads

The screws are intended to be used for connections in timber constructions that are designed according to EN 1995-1-1 or national provisions that apply at the installation site. When designing the screw connections according to EN 1995-1-1 the outer thread diameter d shall be used as effective diameter of the screw according to EN 1995-1-1.

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 14081-1¹,
- Glued laminated timber (softwood) according to EN 14080²,
- Laminated veneer lumber LVL made of softwood according to EN 14374³, arrangement of the screws only perpendicular to the plane of the veneers,
- Glued solid timber according to EN 14080 or national provisions that apply at the installation site,
- Cross-laminated timber made from softwood according to European Technical Assessments or national provisions that apply at 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 636⁴ and EN 13986⁵,
- Oriented Strand Board, OSB according to EN 300⁶ and EN 13986,
- Particleboard according to EN 312⁷ and EN 13986,
- Fibreboards according to EN 622-2⁸, EN 622-3⁹ and EN 13986,
- Cement-bonded particle boards according to EN 634-2¹⁰ and EN 13986,
- Solid-wood panels according to EN 13353¹¹ and EN 13986.

Wood-based panels are only arranged on the side of the screw head.

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 636:2012+A1:2015	Plywood - Specifications
5	EN 13986:2004+A1:2015	Wood-based panels for use in construction - Characteristics, evaluation of conformity and marking
6	EN 300:2006	Oriented strand boards (OSB) – Definition, classification and specifications
7	EN 312:2010	Particleboards - Specifications
8	EN 622-2:2004	Fibreboards – Specifications – Part 2: Requirements for hardboards
9	EN 622-3:2004	Fibreboards - Specifications - Part 3: Requirements for medium boards
10	EN 634-2:2007	Cement-bonded particleboards – Specifications – Part 2: Requirements for OPC bonded particleboards for use in dry, humid and external conditions
11	EN 13353:2008+A1:2011	Solid wood panels (SWP) – Requirements

WASI self-tapping screws	Annex 1
Specifications of intended use	

A.1.3 Use Conditions (environmental conditions)

The corrosion protection of the WASI self-tapping screws is specified in Annex A.2.4. With regard to the use and the environmental conditions the national provisions of the place of installation apply.

A.1.4 Installation provisions

EN 1995-1-1¹² in conjunction with the respective national annex applies for the installation.

The screws are driven into softwood without pre-drilling.

The screw holes in steel members are pre-drilled with an adequate diameter greater than the outer thread diameter.

The minimum penetration length of the threaded part of the screw l_{ef} is

$$l_{ef} \geq \frac{4 \cdot d}{\sin \alpha} \tag{A.1}$$

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 is at least 6 mm. The inner thread diameter d_1 of the screws is greater than the maximal width of the gaps in the layer of cross laminated timber.

A minimum of two screws is used for connections in load bearing timber structures.

If the screws are driven into the wood-based member without pre-drilling, the structural solid or glued laminated timber, laminated veneer lumber and similar glued members is from spruce, pine or fir.

By fastening screws in wood-based members the head of the screws is flush with the surface of the wood-based member. Deeper countersinks are not covered by this ETA.

¹² EN 1995-1-1:2004+A1:2008+A2:2014 Eurocode 5: Design of timber structures – Part 1-1: General - Common rules and rules for buildings

WASI self-tapping screws	Annex 1
Installation provisions	

Annex 2 Essential characteristics of WASI self-tapping screws

A.2.1 Characteristic load-bearing capacities/ parameter, bending angle and insertion moment

Table A.2.1 Characteristic load-bearing capacities/ parameter, bending angle and insertion moment

Outer thread diameter [mm]	10.0
Characteristic yield moment $M_{y,k}$ [Nm]	24
Bending angle α	$\geq 45/d^{0.7} + 20$
Characteristic withdrawal parameter $f_{ax,k}$ [N/mm ²] with $\rho_a = 350 \text{ kg/m}^3$	12
Characteristic head pull-through parameter $f_{head,k}$ [N/mm ²] with $\rho_a = 350 \text{ kg/m}^3$	9.4
Characteristic tensile strength $f_{tens,k}$ [kN]	17.5
Characteristic torsional strength $f_{tor,k}$ [Nm]	29
Ratio of characteristic torsional strength and mean insertion moment $f_{tor,k}/R_{tor,mean}$	≥ 1.5

A.2.2 Spacing, end and edge distances of the screws and minimum thickness of the wood based material

A.2.2.1 Laterally and/or axially loaded screws

Screws in non pre-drilled holes

For WASI self-tapping screws in non 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 non pre-drilled holes. Here, the outer thread diameter d is used.

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

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

Minimum thickness for structural wood-based members made from solid timber, glued laminated timber, glued solid timber, laminated veneer lumber and cross laminated timber is $t = 40 \text{ mm}$ for screws with outer thread diameter $d = 10 \text{ mm}$.

A.2.2.2 Only axially loaded screws

For WASI self-tapping screws 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 non-predrilled holes and clause 8.7.2, Table 8.6.

A.2.2.3 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.2.2. 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: $10 \cdot d$

The tensile stresses perpendicular to the grain should be transferred by reinforcing screws for load components perpendicular to the plane surface.

WASI self-tapping screws	Annex 2.1
Essential characteristics	

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Table A.2.2 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)	$10 \cdot d$	$12 \cdot d$	$7 \cdot d$	$4 \cdot d$	$6 \cdot d$	$3 \cdot d$

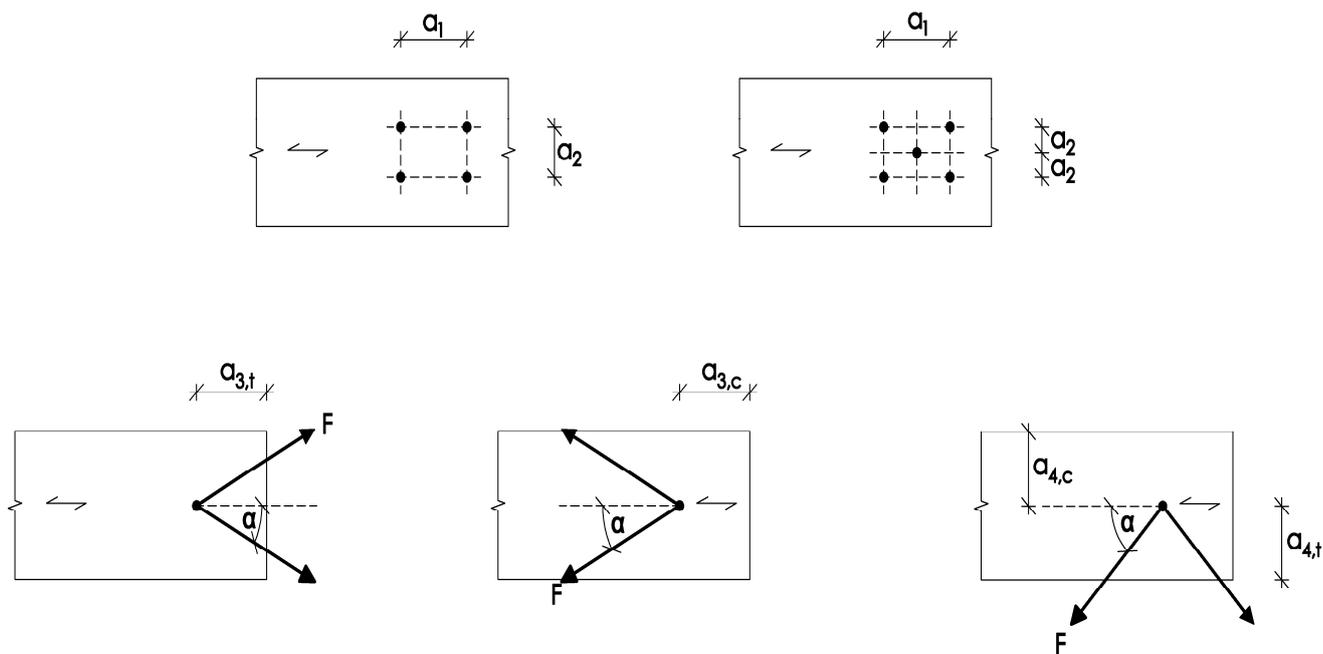


Figure A.2.1 Definition of spacing, end and edge distances in the plane surface of the cross laminated timber:

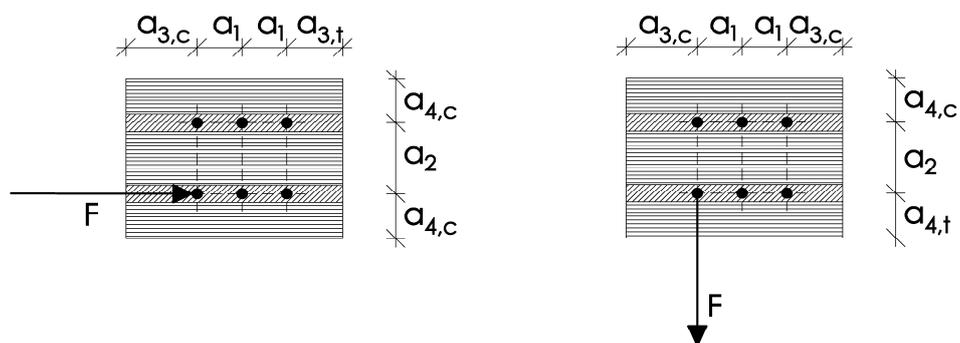


Figure A.2.2 Definition of spacing, end and edge distances in the edge surface of the cross laminated timber. For screws in the edge surface, a_1 and a_3 are parallel to the CLT plane face, a_2 and a_4 perpendicular to CLT plane face.

Electronic copy of the ETA by DIBt: ETA-19/0436

WASI self-tapping screws	Annex 2.2
Essential characteristics	

A.2.3 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 per side is independent of angle α to the grain:

$$K_{\text{ser}} = 25 \cdot l_{\text{ef}} \cdot d \quad [\text{N/mm}] \quad (\text{A.2})$$

where

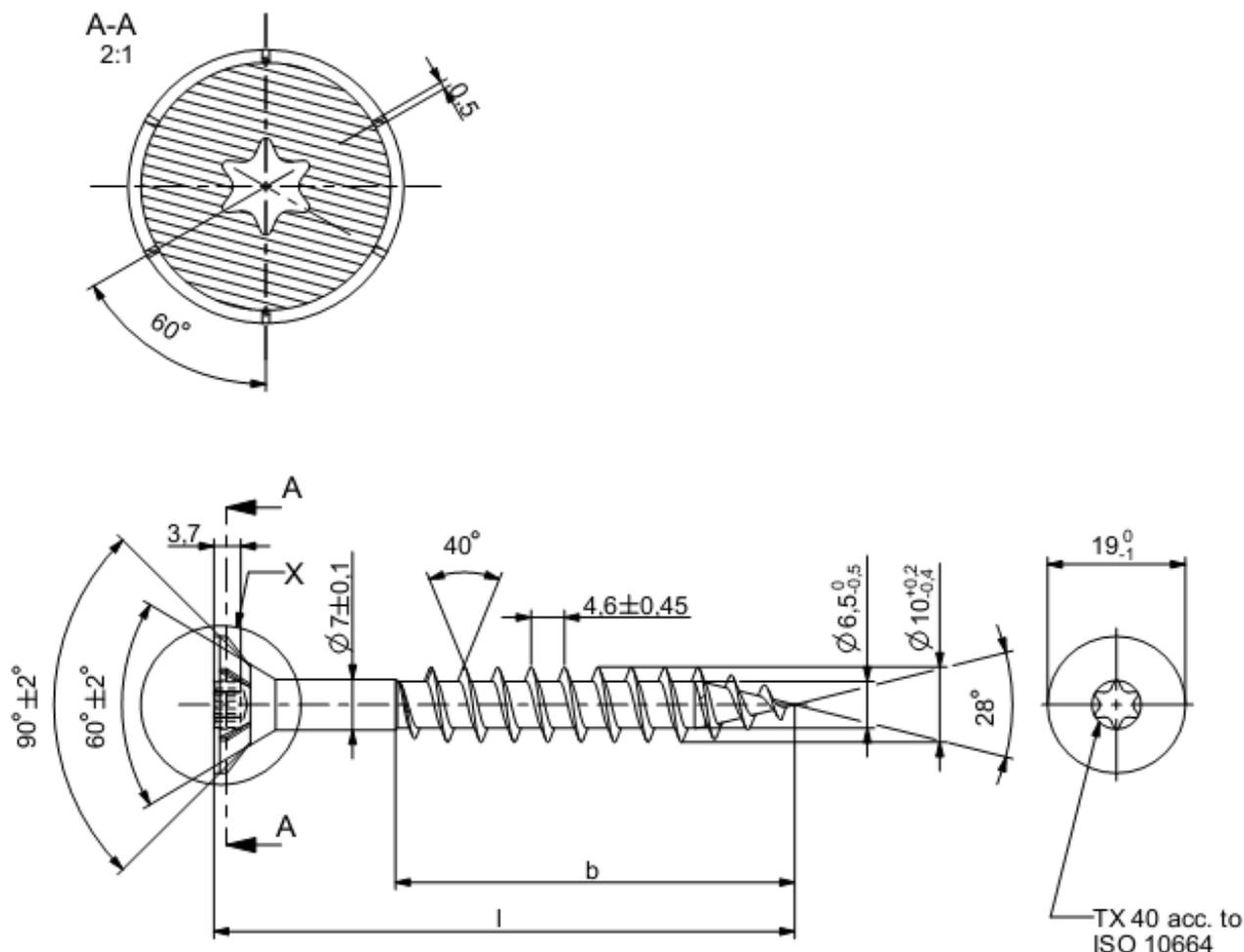
d outer thread diameter of the screw [mm]

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

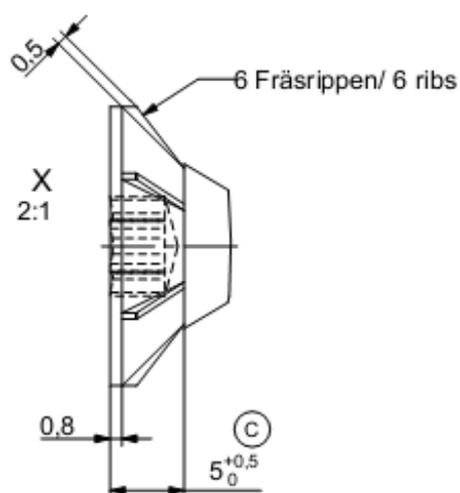
A.2.4 Durability against corrosion

WASI self-tapping screws are made of stainless steel no. 1.4301 or 1.4567.

WASI self-tapping screws	Annex 2.3
Essential characteristics	



Artikel/ item	l	b ± 1
9136-2-10X60	60 -1,5	50
9136-2-10X80	80 -1,5	55
9136-2-10X100	100 -1,75	55
9136-2-10X120	120 -1,75	80
9136-2-10X140	140 -2,0	80



fließender Übergang vom Gewinde zum Schaft/
floating crossing between shank and thread

WASI self-tapping screws

TX countersunk timber screws with cutting ribs

Annex 3