

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-21/0778
of 17 December 2021

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

Staples Type N, Type Q and Type S (SP) galvanized or
made from stainless steel with resin coating for long-term
and permanent load duration withdrawal capacity

Product family
to which the construction product belongs

Dowel-type fasteners with resin coating

Manufacturer

Kyocera SENCO Netherlands
Pascallaan 88
8218 NJ LELYSTAD
NIEDERLANDE

Manufacturing plant

Werk 1, Werk 2
Plant 1, Plant 2

This European Technical Assessment
contains

14 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 130019-00-0603 – DOWEL-TYPE FASTENERS
WITH RESIN COATING

European Technical Assessment

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Page 2 of 14 | 17 December 2021

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Specific Part**1 Technical description of the product**

Staples Type N, Q and S (SP) with resin coating are dowel-type fasteners made of non-alloy steel rods C20D in accordance with EN ISO 16120¹ or made from stainless steel drawn from austenitic steel rods in accordance with EN 10088-1² for timber constructions. The staples have a special resin coating with a minimum length of 50 % of the legs.

The diameters of the staple legs are $d = 1.54 \text{ mm} \pm 0.03 \text{ mm}$ for Type N, $d = 1.8 \text{ mm} \pm 0.03 \text{ mm}$ for Type Q or $d = 2.03 \text{ mm} \pm 0.03 \text{ mm}$ for Type S (SP). Further dimensions are shown in Annex 1.

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 staples Type N, Q and S (SP) are used in compliance with the specifications and conditions given in Annex 2 and 3.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of staples Type N, Q and S (SP) 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 1
Characteristic yield moment	See Annex 3.1
Withdrawal capacity for short-term and medium-term loads	See Annex 3.1
Withdrawal capacity for long-term and permanent loads	See Annex 3.1
Characteristic head pull-through parameter	See Annex 3.2
Minimum tensile strength of the wire	See Annex 3.2
Minimum and maximum thickness of the connected material	See Annex 3.1
Durability against corrosion	See Annex 2.2
Durability of the resin coating	See Annex 2.2

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1

¹ EN ISO 16120:2017

² EN 10088-1:2014

Non-alloy steel wire rod for conversion to wire (all parts)

Stainless steels – Part 1: List of stainless steels

3.3 Safety and accessibility in use (BWR 4)

The essential characteristics of BWR 4 are covered by BWR 1.

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

In accordance with EAD No.130019-00-0603, the applicable European legal act is: 97/176/EC.
The system to be applied is: 3

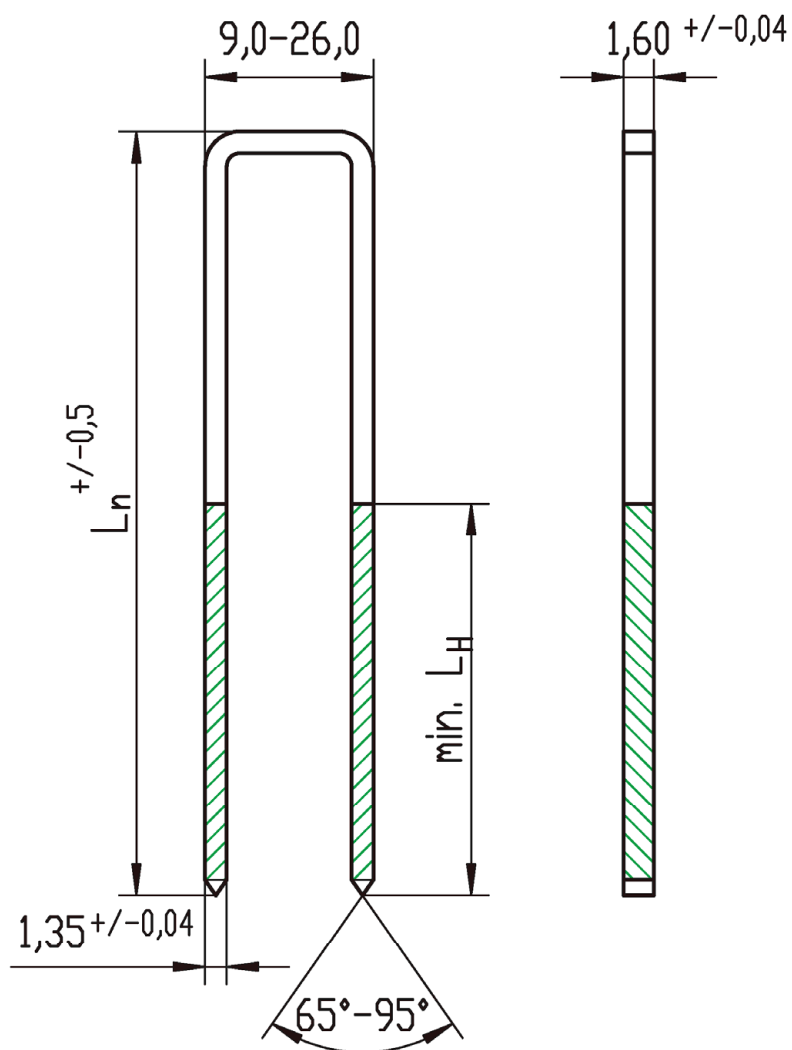
5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

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 17 December 2021 by Deutsches Institut für Bautechnik

Anja Dewitt
Head of Section

beglaubigt:
Blümel



staple raw material:
galvanized round steel wire C20
 $\varnothing 1,54 \pm 0,03$ mm

R_m min. 900 N/mm²

A₁₀₀ min. 3%

$\varnothing_n 1,54 \pm 0,03^A$ mm

zinc thickness min. 12µm

lacquer, adhesive

- KS Type 101
- KS Type 102

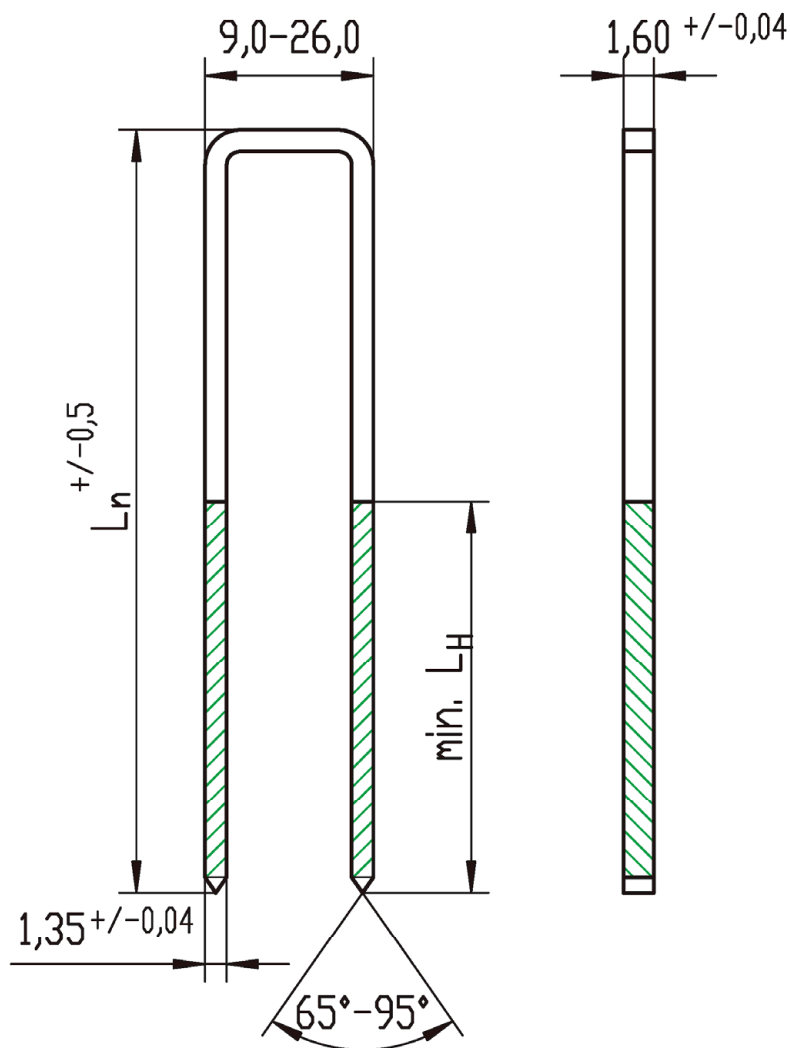
shank length L_n [mm]	28,0 to 100,0
coating L_H [mm]	min. 0,5 L_n >= 20 mm

Staples Type N, Type Q and Type S (SP) galvanized or made from stainless steel with resin coating for long-term and permanent load duration withdrawal capacity

Technical description of the product

Staple Type N galvanized

Annex 1.1



staple raw material:
stainless round wire
mat.no. 1.4301 (AISI 304),
1.4401 (AISI 316); 1.4529
 $\varnothing 1,54 \pm 0,03$ mm
Rm min. 900 N/mm²
A₁₀₀ min. 5%
 $\varnothing_n 1,54 \frac{+}{-0,03^A}$ mm

lacquer, adhesive

- KS Type 101
- KS Type 102

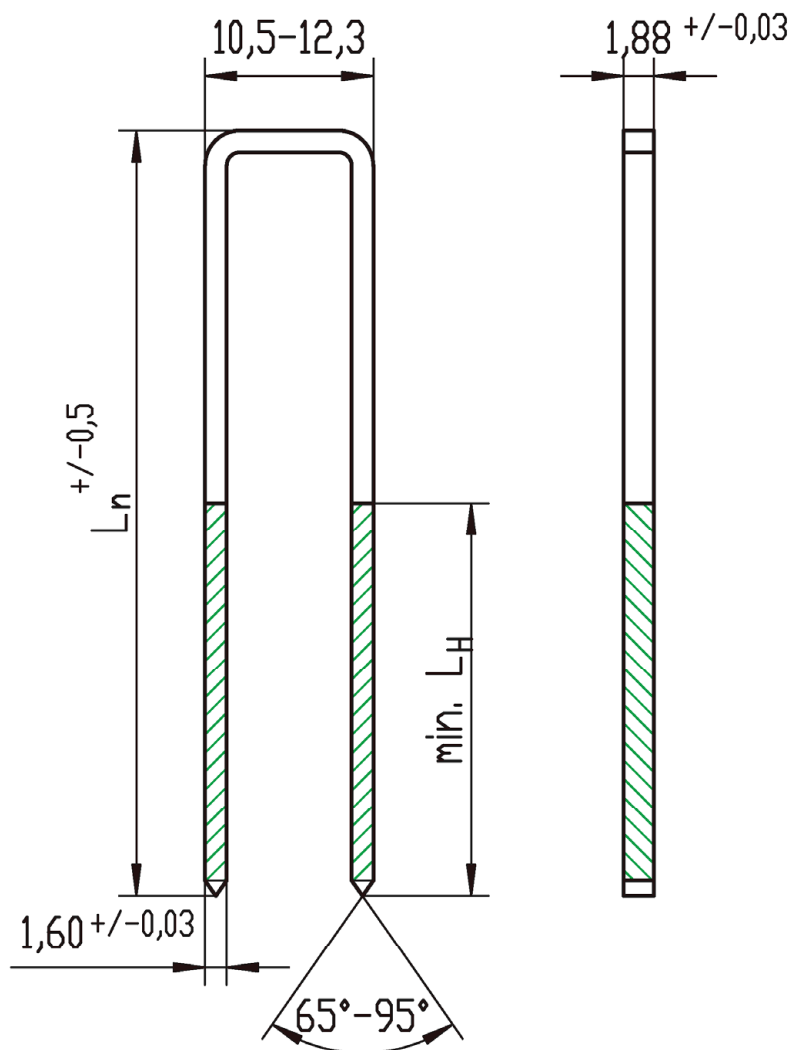
shank length L_n [mm]	28,0 to 100,0
coating L_H [mm]	min. 0,5 L_n >= 20 mm

Staples Type N, Type Q and Type S (SP) galvanized or made from stainless steel with resin coating for long-term and permanent load duration withdrawal capacity

Technical description of the product

Staple Type N stainless steel

Annex 1.2



staple raw material:
galvanized round steel wire C20
 $\varnothing 1,80 \pm 0,03$ mm

R_m min. 900 N/mm^2

A_{100} min. 3%

$\varnothing_n 1,80 \pm 0,03^A$ mm

zinc thickness min. $12 \mu\text{m}$

lacquer, adhesive

- KS Type 101
- KS Type 102

shank length L_n [mm]	32,0 to 115,0
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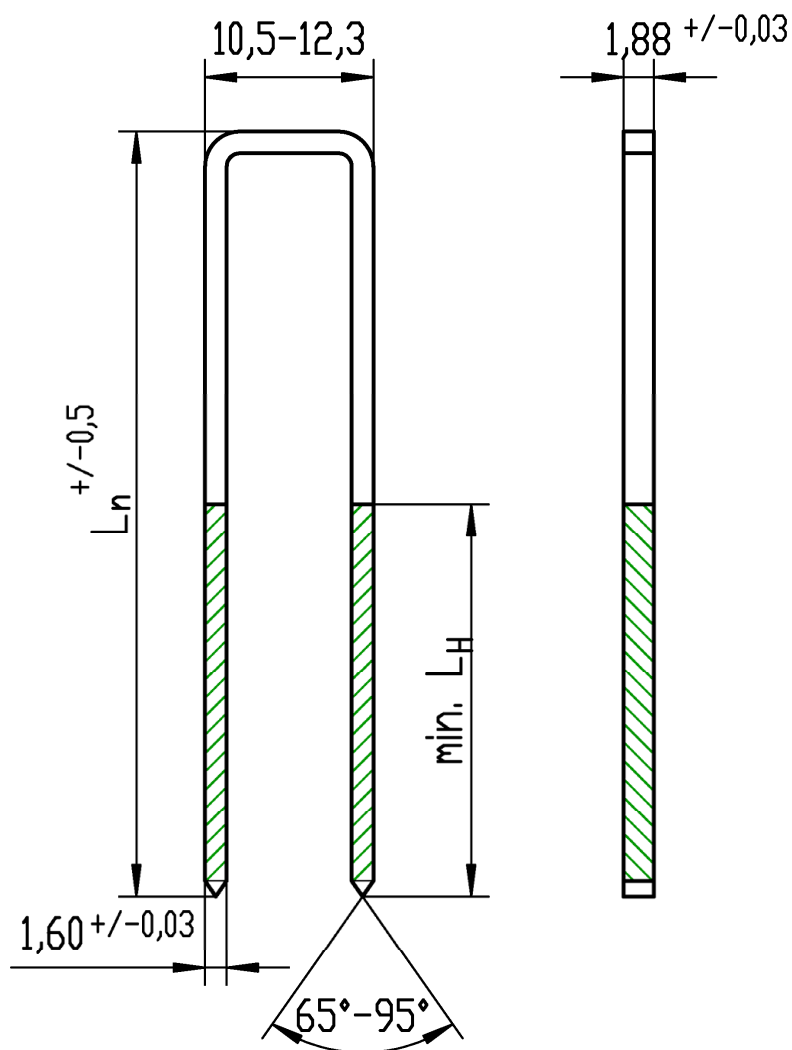
coating L_H [mm]	min. $0,5 L_n$ $\geq 22 \text{ mm}$
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Staples Type N, Type Q and Type S (SP) galvanized or made from stainless steel with resin coating for long-term and permanent load duration withdrawal capacity

Technical description of the product

Staple Type Q galvanized

Annex 1.3



staple raw material:
stainless round wire
mat.no. 1.4301 (AISI 304),
1.4401 (AISI 316); 1.4529
 $\varnothing 1,80 \pm 0,03$ mm
 R_m min. 900 N/mm²
 A_{100} min. 5%
 $\varnothing_n 1,80 \frac{+}{-0,03^A}$ mm

lacquer, adhesive

- KS Type 101
- KS Type 102

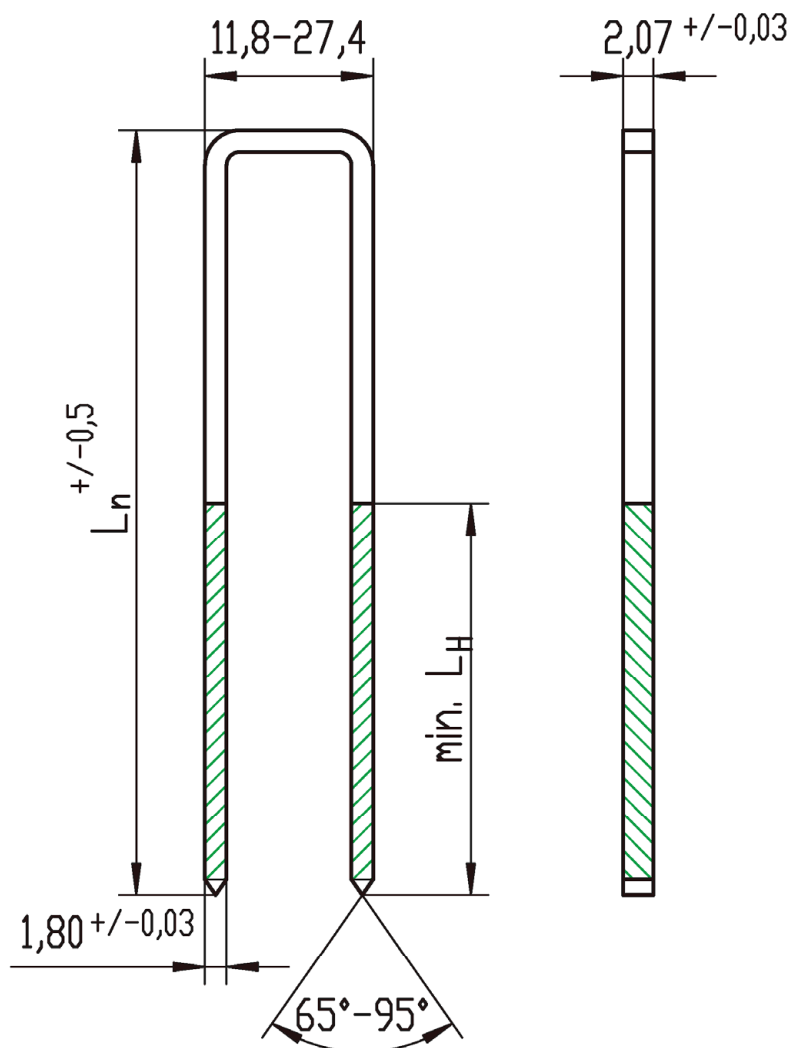
shank length L_n [mm]	32,0 to 115,0
coating L_H [mm]	min. 0,5 L_n >= 22 mm

Staples Type N, Type Q and Type S (SP) galvanized or made from stainless steel with resin coating for long-term and permanent load duration withdrawal capacity

Technical description of the product

Staple Type Q stainless steel

Annex 1.4



staple raw material:
galvanized round steel wire C20
 $\varnothing 2,03 \pm 0,03$ mm

R_m min. 900 N/mm^2

A_{100} min. 3%

$\varnothing_n 2,03 \pm 0,03^A$ mm

zinc thickness min. $12 \mu\text{m}$

lacquer, adhesive

- KS Type 101
- KS Type 102

shank length L_n [mm]	36,0 to 172,0
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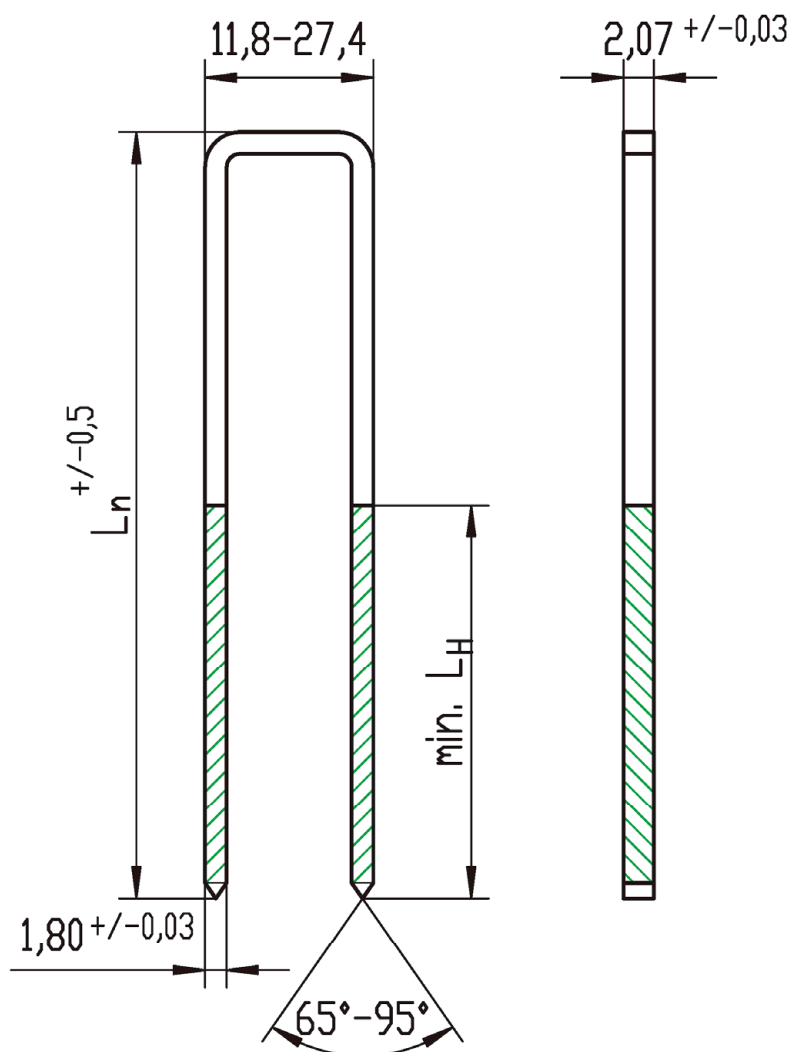
coating L_H [mm]	min. $0,5 L_n$ $\geq 25 \text{ mm}$
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Staples Type N, Type Q and Type S (SP) galvanized or made from stainless steel with resin coating for long-term and permanent load duration withdrawal capacity

Technical description of the product

Staple Type S (SP) galvanized

Annex 1.5



staple raw material:
stainless round wire
mat.no. 1.4301 (AISI 304),
1.4401 (AISI 316); 1.4529
 $\varnothing 2,03 \pm 0,03$ mm
Rm min. 900 N/mm²
A₁₀₀ min. 5%
 $\varnothing_n 2,03 \frac{+}{-0,03^A}$ mm

lacquer, adhesive

- KS Type 101
- KS Type 102

shank length L_n [mm]	36,0 to 172,0
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coating L_H [mm]	min. 0,5 L_n ≥ 25 mm
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Staples Type N, Type Q and Type S (SP) galvanized or made from stainless steel with resin coating for long-term and permanent load duration withdrawal capacity

Technical description of the product

Staple Type S (SP) stainless steel

Annex 1.6

Annex 2 Specifications of intended use

A.2.1 Loading

- Static and quasi-static loads (not relevant to fatigue)
- Short-, medium-, long-term and permanent load duration withdrawal as well as lateral loading

A.2.2 Connection materials

Staples Type N, Q and S (SP) with resin coating are used for load bearing connections of the following material.

Material for base building components

- Solid timber (softwood) in accordance with EN 14081-1¹,
- Glued laminated timber in accordance with EN 14080²,
- Glued solid timber in accordance with EN 14080,
- Laminated veneer lumber LVL (softwood) in accordance with EN 14374³,
- Cross laminated timber (softwood) in accordance with European Technical Assessments.

Material for connected building components

- Oriented strand board (OSB) in accordance with EN 300⁴ and EN 13986⁵,
- Plywood in accordance with EN 636⁶ and EN 13986,
- Cement-bonded particleboards in accordance with EN 634-2⁷ and EN 13986,
- Fibreboards in accordance with EN 622-2⁸, EN 622-3⁹ and EN 13986,
- Laminated veneer lumber LVL (softwood) in accordance with EN 13986 in connection with EN 14279¹⁰ or EN 14374,
- Solid wood panels (SWP) in accordance with EN 13353¹¹ and EN 13986,
- Gypsum plasterboards in accordance with EN 520¹², density $\rho \geq 680 \text{ kg/m}^3$ including Type D with a density of $\rho \geq 800 \text{ kg/m}^3$,
- Gypsum boards with mat reinforcement in accordance with EN 15283-1¹³ and gypsum fibreboards in accordance with EN 15283-2¹⁴,
- Fibre-cement flat sheets in accordance with EN 12467¹⁵,
- Wood fibre insulation material in accordance with EN 13171¹⁶.

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 634-2:2007	Cement-bonded particleboards – Specifications – Part 2: Requirements for OPC bonded particleboards for use in dry, humid and external conditions
8	EN 622-2:2004/AC:2005	Fibreboards – Specifications – Part 2: Requirements for hardboards
9	EN 622-3:2004	Fibreboards – Specifications – Part 3: Requirements for medium boards
10	EN 14279:2004+A1:2009	Laminated Veneer Lumber (LVL) – Definitions, classification and specifications
11	EN 13353:2008+A1:2011	Solid wood panels (SWP) – Requirements
12	EN 520:2004+A1:2009	Gypsum plasterboards – Definitions, requirements and test methods
13	EN 15283-1:2008+A1:2009	Gypsum boards with fibrous reinforcement – Definitions, requirements and test methods – Part 1: Gypsum boards with mat reinforcement
14	EN 15283-2:2008+A1:2009	Gypsum boards with fibrous reinforcement – Definitions, requirements and test methods – Part 2: Gypsum fibreboards
15	EN 12467:2012+A1:2016+A2:2018	Fibre-cement flat sheets – Product specification and test methods
16	EN 13171:2012+A1:2015	Thermal insulation products for buildings – Factory made wood fibre (WF) products – Specification

A.2.3 Use conditions (environmental conditions)

A.2.3.1 Durability against corrosion

Staples Type N, Q and S (SP) made from non-alloy steel rods are galvanized. The mean thickness of the zinc coating is 12 µm. Steel no. 1.4301 (A2), 1.4401 (A4) and 1.4529 are used for staples Type N, Q and S (SP) made from stainless steel.

A.2.3.2 Durability of the resin coating

The resin coating of staples Type N, Q and S (SP) has a minimum length l_H of 50 % of the legs in accordance with Annex 1. The following kinds of resin are used:

- KS Type 101
- KS Type 102

Data sheets of chemical compositions (as well as the process of application and drying for resin coatings) are deposited at Deutsches Institut für Bautechnik.

The resin coating fulfills the requirements of the EAD 130019-00-0603, clause 2.2.9 "durability of the resin coating".

A.2.3.3 Installation

EN 1995-1-1¹⁷ applies for the installation of constructions with staples Type N, Q and S (SP).

The pointside penetration length t_2 of the staples is at least $14 \cdot d$.

For connections of wood fibre insulation material the maximum length of the leg is $l = 85 \cdot d$, the minimum width is $b = 20 \text{ mm}$ and the maximum thickness of the insulation is $70 \cdot d$.

¹⁷ EN 1995-1-1:2004+AC:2006
+A1:2008+A2:2014

Eurocode 5: Design of timber structures – Part 1-1: General – Common rules and rules for buildings

Annex 3 Specifications of essential characteristics

A.3.1 Characteristic yield moment

Table A.3.1 Characteristic yield moment $M_{y,k}$ of one leg of staples Type N, Q and S (SP)

Type	Nominal diameter d [mm]	Characteristic yield moment $M_{y,k}$ [Nm]	
		galvanized	stainless steel
Type N	1.54	0.72	0.71
Type Q	1.80	0.94	1.05
Type S (SP)	2.03	1.56	1.42

A.3.2 Withdrawal capacity for short-term and medium-term loads

The characteristic withdrawal parameter $f_{ax,k}$ of one leg (at an angle of at least 30° between the width of staple crown and the direction of the grain) for material with a characteristic density $\rho_k \geq 350 \text{ kg/m}^3$ as well as for short-term and medium-term withdrawal loads shall be taken from Table A.3.2:

Table A.3.2 Characteristic withdrawal parameter $f_{ax,k}$ of one leg of staples Type N, Q and S (SP)

Type	Nominal diameter d [mm]	Withdrawal parameter short- and medium-term $f_{ax,k}$ [N/mm ²]
Type N	1.54	4.91
Type Q	1.80	4.97
Type S (SP)	2.03	5.54

The withdrawal parameter given in Table A.3.2 have been determined for a maximum length of staples in the base building components of $14 \cdot d \leq t_2 \leq 20 \cdot d$.

A.3.3 Design value of withdrawal capacity for long-term and permanent loads

The design value of the withdrawal capacity for long-term and permanent loads for service class 1 and 2 for one staple may be taken as:

$$R_{ax,d} = 70 \text{ N with } \gamma_M = 1.3.$$

The design value of the withdrawal capacity applies for a characteristic density of $\rho_k \geq 350 \text{ kg/m}^3$.

A.3.4 Maximum thickness of connected material

The maximum thickness t_1 given in Table A.3.3 applies for connected material (made of material described in chapter A.2.2) depending on the density of the connected material.

Table A.3.3 Maximum thickness t_1 of connected material

Maximum thickness t_1 [mm]	Range of density ρ_k [kg/m ³]	Material of connected components examples
80	$\rho_k \leq 400$	Solid timber (softwood)
60	$400 < \rho_k \leq 650$	Wood-based panels
40	$650 < \rho_k \leq 900$	Wood-based panels and gypsum boards
25	$900 < \rho_k \leq 1200$	Hardboards, gypsum fibreboards, cement-bonded particleboards
20	$1200 < \rho_k \leq 1600$	Highly compressed gypsum fibreboards

The maximum thickness of wood fibre insulation material is $t_1 \leq 70 \cdot d$.

A.3.5 Head pull-through capacity of wood and wood-based panels

The characteristic head pull-through parameter $f_{head,k}$ for one staple of staples Type N, Q and S (SP) for a minimum thickness of material given in Table A.3.4 (for material with a characteristic density of $\rho_k \geq 350 \text{ kg/m}^3$) shall be taken from Table A.3.5:

Table A.3.4 Minimum thickness t_1 of wood and wood-based panels

Wood or wood-based panels	Minimum thickness t_1 [mm]
Solid timber (softwood)	24
Solid wood panels (SWP)	$7d^*$
Plywood	6^*
Oriented strand boards (OSB)	8^*
Resin-bonded particleboards	8^*
Cement-bonded particleboards	8^*

* if staple crown is countersunk it has to be increased by 2 mm

The characteristic head pull-through capacity may be calculated with equation (1)

$$R_{ax,2,k} = f_{head,k} \cdot b \cdot d \quad [N] \quad (1)$$

with:

- $f_{head,k}$: characteristic head pull-through parameter in N/mm^2
- b : width of staple crown in mm, $b \leq 27 \text{ mm}$
- d : nominal diameter of raw staple wire in mm

Table A.3.5 Characteristic head pull-through parameter $f_{head,k}$ for material $\rho_k \geq 350 \text{ kg/m}^3$, $b \leq 27 \text{ mm}$

Type	Nominal diameter d [mm]	Width of staple crown b_{min} [mm]	Head pull-through parameter $f_{head,k}$ [N/mm^2]
Type N	1.53	9	41
Type Q	1.80	10.5	32
Type S (SP)	2.03	11.8	29
		26	39

A.3.6 Head pull-through capacity of wood fibre insulation material

The characteristic head pull-through parameter $f_{head,k}$ for one staple of staple Type S (SP) for wood fibre insulation material with a mean density of at least 200 kg/m^3 and a minimum thickness of the material of 60 mm is $f_{head,k} = 9.36 \text{ N/mm}^2$.

A.3.7 Minimum tensile strength of the wire

Table A.3.6 Minimum tensile strength f_u [N/mm^2] of the raw wire of staples Type N, Q and S (SP)

Nominal diameter d [mm]	1.54	1.80	2.03
galvanized	900		
stainless steel	900		