

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-11/0107
of 12 March 2018

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

Cantilever step stair system Bastian

Product family
to which the construction product belongs

Prefabricated stair with steps made of steel and panelling
made of solid wood and wood-based products for use as
an indoor stair in buildings

Manufacturer

Treppenbau Heinz Bastian GmbH
Auf Hambuch 3
54497 Morbach
DEUTSCHLAND

Manufacturing plant

Schreinerei Bastian

This European Technical Assessment
contains

15 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 340006-00-0506

**European Technical Assessment
ETA-11/0107**

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Specific Part

1 Technical description of the product

The Cantilever step stair system Bastian is a prefabricated stair system, which consists of steps and fasteners.

The steps consist of a welded steel section (step type 1) or two single hollow sections made of steel (step type 2), which are fixed on the wall side. The steel sections are covered by wood panelling.

The product description is given in Annex A. The material values, dimensions and tolerances of the components of the stair not indicated in the annexes shall correspond to the values laid down in the technical documentation¹.

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 stair is used in compliance with the specifications and conditions given in Annex B.

The verification and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the stair 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.

¹ The technical documentation comprises all information of the holder of this ETA necessary for the production, installation and maintenance of the stair; these are in particular the structural analysis, design drawings and the manufacturer's installation instructions. The part to be treated confidentially is deposited with Deutsches Institut für Bautechnik and, as far as this is relevant to the tasks of the approved bodies involved in the procedure of attestation of conformity, shall be handed over to the approved body.

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
Load-bearing capacity of stair	See Annex C2
Load-bearing capacity of fixings	See technical documentation of this European Technical Assessment
Load/displacement behaviour	See Annex C2
Vibration behaviour	Construction type 1 according to Annex A1: Walking on the stair does not result in vibration of the entire construction. Construction type 2 according to Annex A2: First natural frequency: $f_1 \geq 5$ Hz (inclusive a single mass of 100 kg) Deflection under a single load $F = 1$ kN: $w \leq 5$ mm
Prevention of progressive collapse	Failure of individual components of the stair does not lead to a progressive collapse of the complete stair
Residual load-bearing capacity	Local material failure does not lead to an abrupt total loss of load-bearing capacity of the steps.
Long-term behaviour	Load-bearing capacity are ensured under an appropriate use and maintenance over the indicated working life
Resistance to earthquakes	No performance assessed
Durability against physical, chemical and biological agents	Adequate durability for the intended use under an appropriate use and maintenance

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Components made of wood (step type 1): No performance assessed Components made of solid wood (step type 2): D-s2, d0 Components made of steel: A1
Fire resistance	No performance assessed

3.3 Hygiene, health and the environment (BWR 3)

Essential characteristic	Performance
Release of formaldehyde	Class E1
Release of pentachlorophenol	No pentachlorophenol treated materials are used
Radioactive emission	Not relevant

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3.4 Safety in use (BWR 4)

Essential characteristic	Performance
Geometry	See Annex C1
Slipperiness	No performance assessed
Equipment of the stair for a safe use	No performance assessed
Safe breakage of components	No brittle failure of individual components
Impact resistance	No performance assessed

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

In accordance with the European Assessment Document EAD No. 340006-00-0506 the applicable European legal act is: 1999/89/EC

The System to be applied is: 2+

In addition, with regard to reaction to fire for products covered by the European Assessment Document EAD No. 340006-00-0506 the applicable European legal act is: 2001/596/EC

The System to be applied is: 4

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

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

Issued in Berlin on 12 March 2018 by Deutsches Institut für Bautechnik

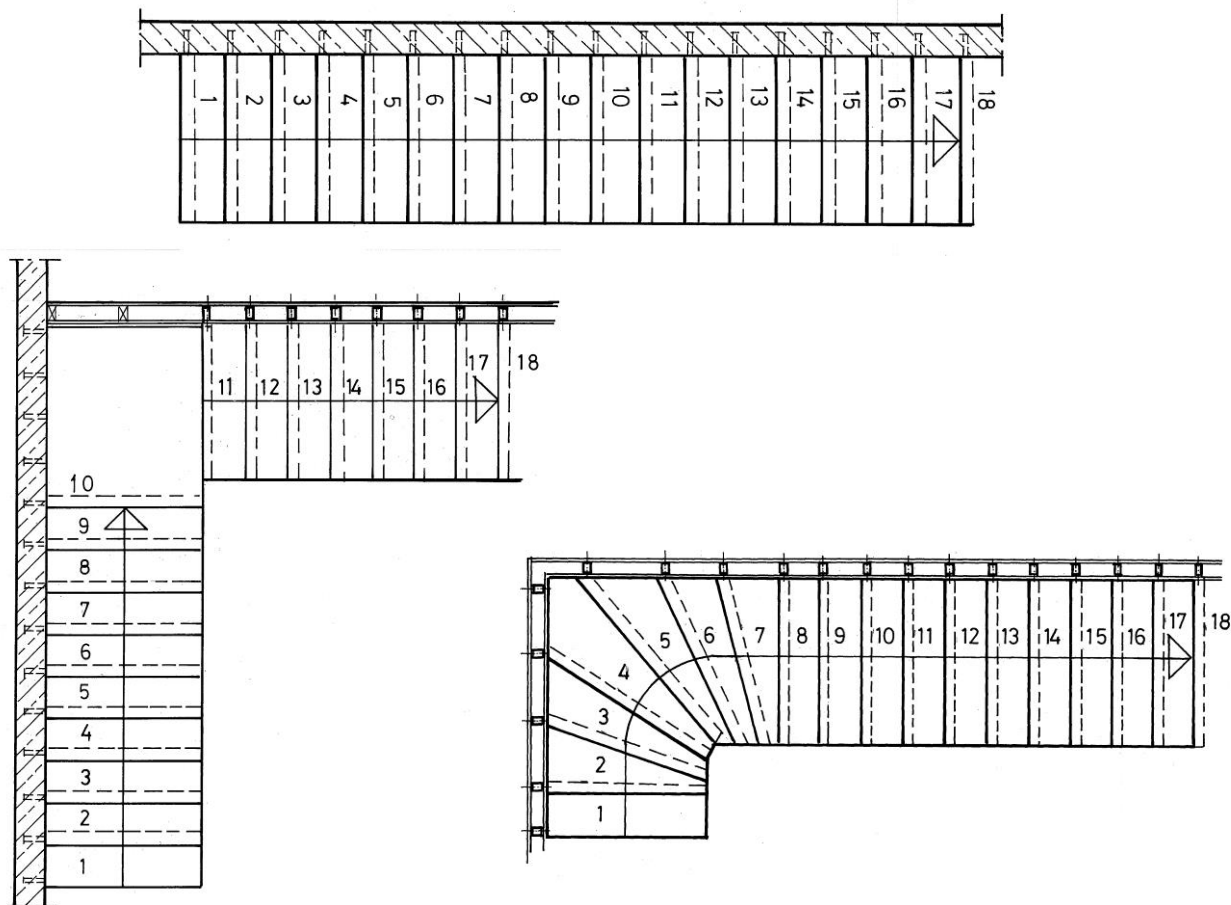
BD Dipl.-Ing. Andreas Kummerow
Head of Department

beglaubigt:
Stiller

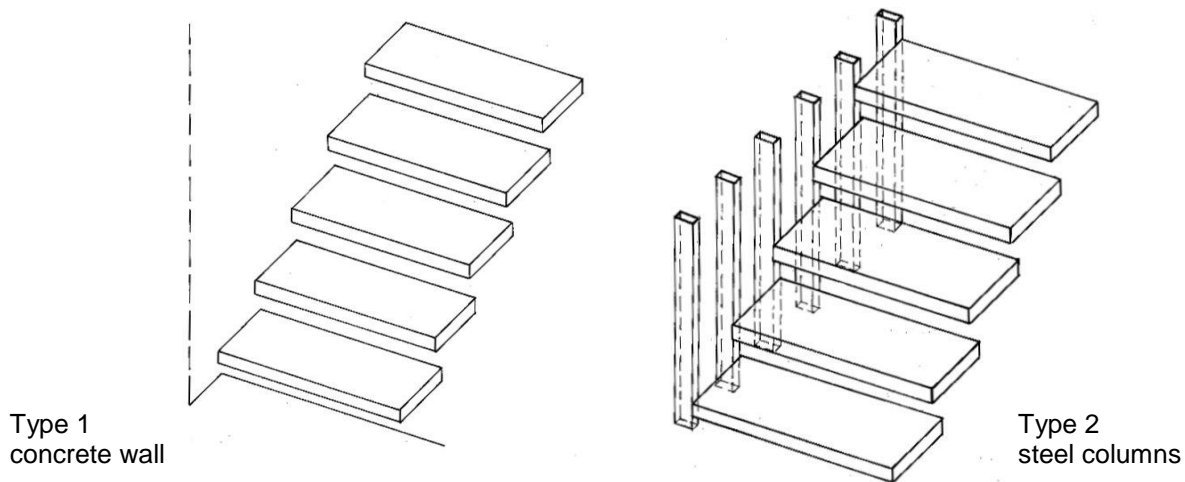
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Types of plan

Walking line is exemplified, position may be chosen freely within the walking zone, walking zone is 20 % of the clear width of the stair in the middle of the stair



Types of construction

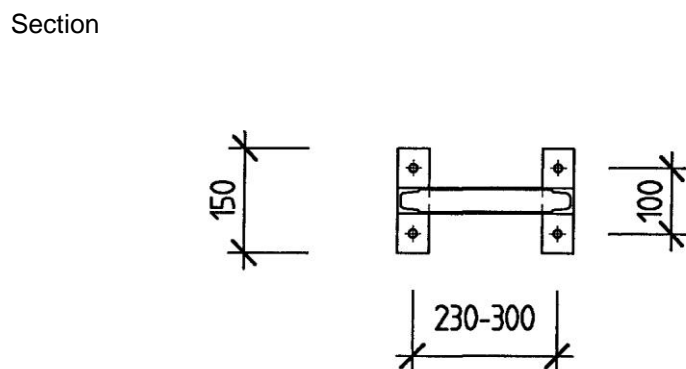
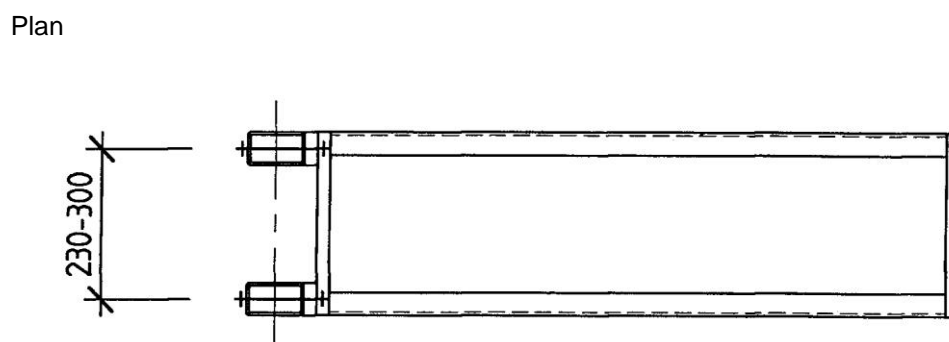
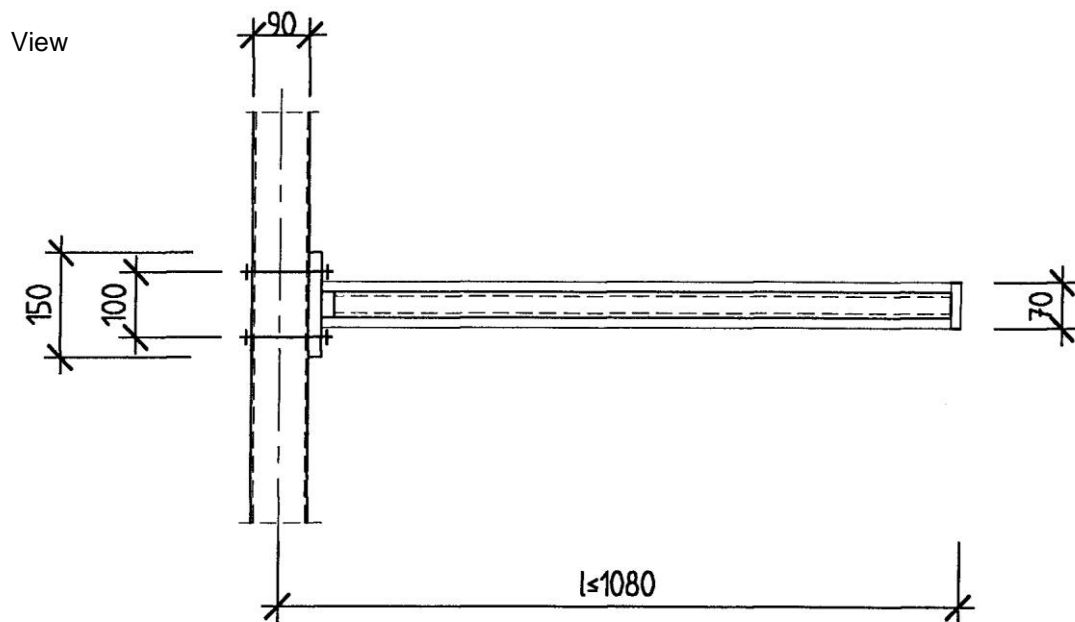


Cantilever step stair system Bastian

Product

Annex A1

Step type 1: Square step (box section with wood panelling)



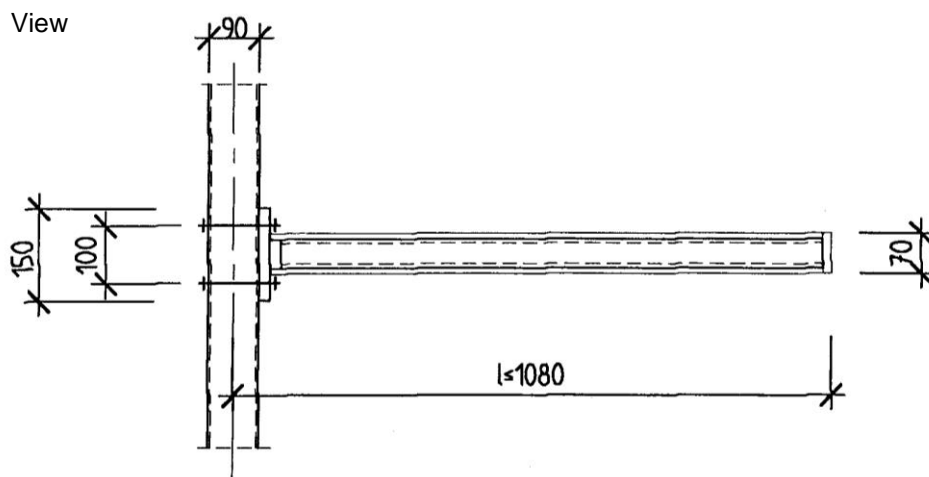
Dimensions in mm,
more details
(geometry, sections,
joints etc.) according
to technical
documentation

Cantilever step stair system Bastian

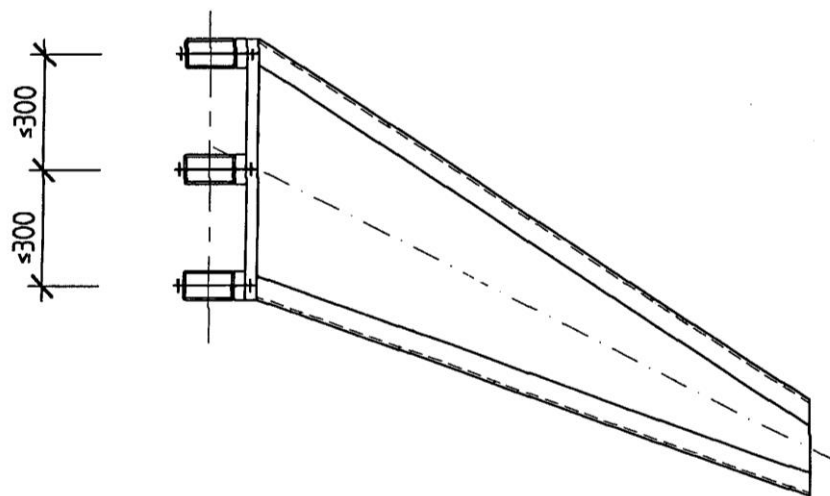
Step type 1: Square step

Annex A2

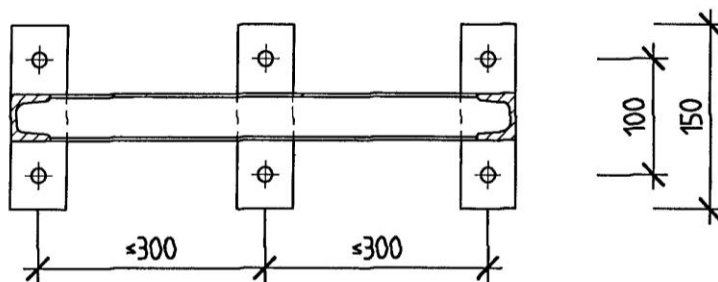
Step type 1: Trapezium step (box section with wood panelling)



Plan



Section



Dimensions in mm,
more details
(geometry, sections,
joints etc.) according
to technical
documentation

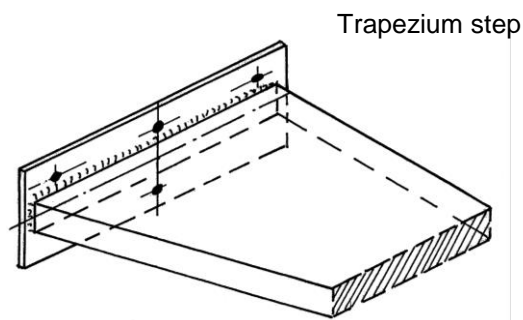
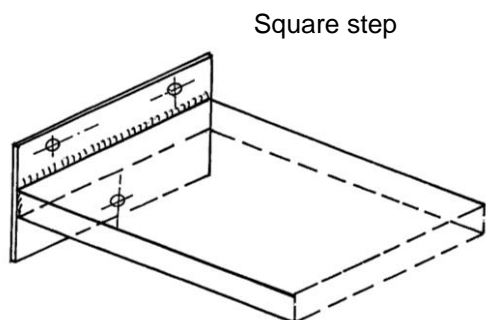
Cantilever step stair system Bastian

Step type 1: Trapezium step

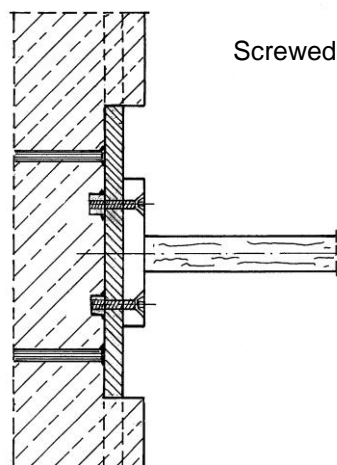
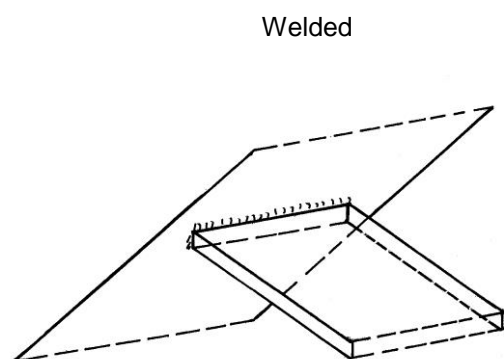
Annex A3

Connection options for step type 1

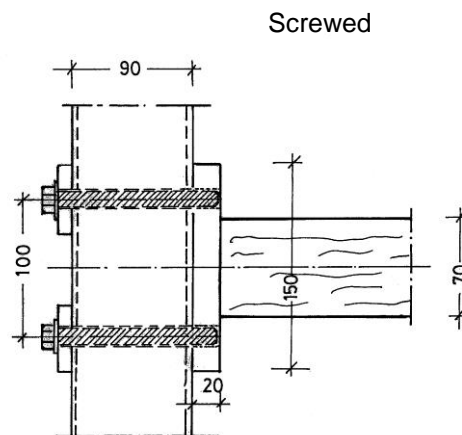
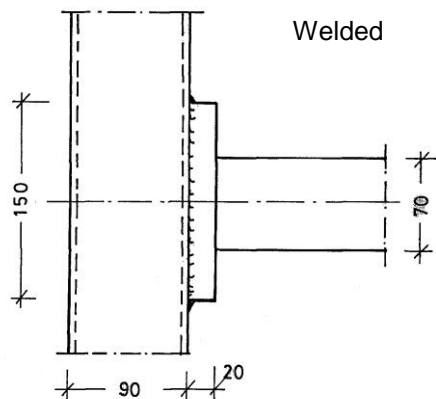
Fastening to concrete wall ($\geq C20/25$ $d \geq 200$ mm)



Fastening to a cast-in steel stringer



Fastening to steel column



Dimensions in mm, more details (geometry, sections, joints etc.) according to technical documentation

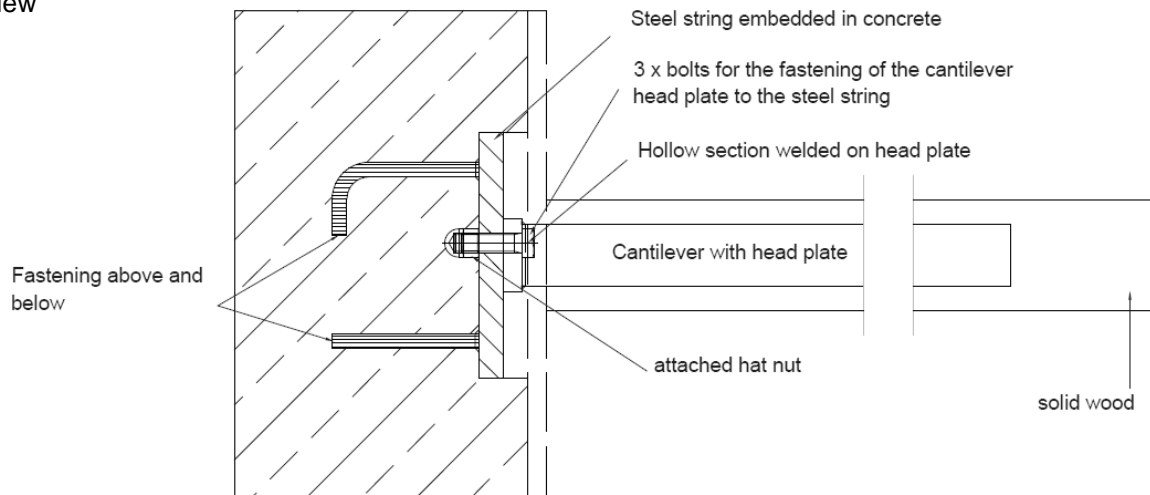
Cantilever step stair system Bastian

Step type 1: Fastening to concrete wall, steel stringer and steel column

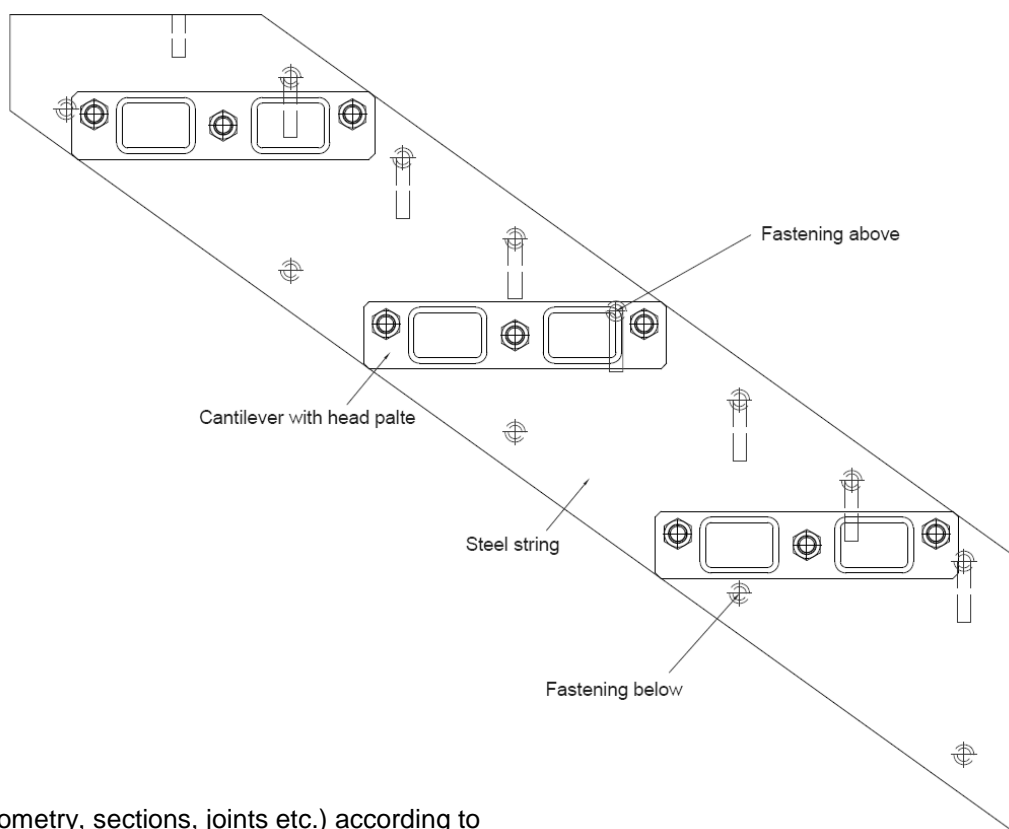
Annex A4

Step type 2: Square step (hollow steel section with solid wood cover)

View



Section



more details (geometry, sections, joints etc.) according to technical documentation

Cantilever step stair system Bastian

Step type 2

Annex A5

Table 1: Minimum dimensions and materials of relevant stair components

Component of stair	Minimum dimensions			Material
Step type 1 (box section)	thickness / width	[mm]	40 / 320 ³⁾	Steel S235
Step type 2 (composite section)	height / width (outer dimensions)	[mm]	90 / 320	Steel S235 and solid wood ⁵⁾
Stringer	height / width	[mm]	260 / 15	Steel S235
Stringer	height 7 width	[mm]	200 / 20	Steel S235
Column ²⁾	Square section	[mm]	90 / 50 / 4 ⁴⁾	Steel S235
Fasteners (step type 1)	diameter	[mm]	12	Steel ¹⁾
Fasteners (step type 2)	diameter	[mm]	16	Steel ¹⁾

¹⁾ further characteristic values of material according to technical documentation

³⁾ maximum length: 3.00 m; horizontal support bottom and at the top; maximum distance between columns: 260 mm

³⁾ Trapezium step according to technical documentation

⁴⁾ middle column with trapezium steps with a length > 1,25 m: 90 / 90 / 5,6 (further details according to technical documentation)

⁵⁾ only solid wood of the species: beech, oak, ash, merbau

Cantilever step stair system Bastian

Minimum dimensions and material of relevant stair components

Annex A6

Specification of intended use (Part 1)

Intended use:

- European Technical Assessment applies for a construction system.
- For the specific case of use the corresponding type of stair is manufactured within the context of the values defined in this European Technical Assessment.
- Values of this ETA applies to all types of stairs, the real dimensions follow in accordance with the relevant case of use.

Stair subject to:

- Static and quasi static loads

Use conditions:

- Indoor stair
- Air temperatures between +5 °C and +30 °C
- Relative air humidity between 30% and 70%
- To the individual requirements handrail and barrier can be attached to the stair optionally. Conditions for possible handrail/barrier:
 - Dead load step type 1 ≤ 0.50 kN/m
 - Dead load step type 2 ≤ 0.10 kN/m
 - Height ≤ 0.90 m
 - Distance of baluster ≤ 0.90 m

Design:

- Design of the stair according to the annexes and the technical documentation of this European Technical Assessment.
- Fastening of the stair to the construction works according to the annexes and the technical documentation of this Technical European Assessment.
- Verification of the transmission of loads to the construction works by the civil engineer responsible for the construction works.
- Load bearing capacity at ultimate limit state:

$$q_k \cdot \gamma_Q \leq q_{RK} / \gamma_M$$

$$Q_k \cdot \gamma_Q \leq Q_{RK} / \gamma_M$$

$$h_k \cdot \gamma_Q \cdot \psi_0 \leq h_{RK} / \gamma_M$$

with

q_{RK}, Q_{RK}, h_{RK} : characteristic values of resistance; see Table 3

γ_M : recommended material partial safety factor; see Table 3

q_k, Q_k, h_k : characteristic values of imposed loads according to EN 1991-1-1:2002 + AC:2009

$\gamma_Q = 1.5$: recommended partial safety factor, in absence of other national regulations

$\psi_0 = 0.7$: recommended combination factor, in absence of other national regulations

- Maximum characteristic values of imposed loads under consideration of the partial factors mentioned above; see Table 5

Cantilever step stair system Bastian

Specification of intended use (Part 1)

Annex B1

Specification of intended use (Part 2)

Installation:

- Installation by personal appropriately trained and authorized by the manufacturer of the assessment by means of the technical documentation of this European Technical Assessment
- Installation only in the way as specified in the technical documentation of this European Technical Assessment
- Installation of timber components when moisture content of timber components is $8 \pm 2 \%$
- Sufficient support of the stair when assembling
- Installation of stair components without imposed deformations
- Installation of stair components without significant defects and cracks
- Replacing of stair components, which begin tearing when assembling
- Bolted connection are protected such that they will not be loosened by vibrations

Indication of the manufacturer:

- Ensure that all persons involved will be appropriately informed about the specific conditions according to sections 1 and 2 (including the annexes to which reference is being made as well as the not confidential parts of the technical documentation deposited to this European Technical Assessment)
- Packaging of timber components such that the wood moisture is $8 \pm 2 \%$ during transport and storage
- Instructions for use should provide information as to use, maintenance and repair of the stair. Including the information of avoidance of moisture penetration of the timber components and the information on the relationship between moisture content of timber components, air temperature and relative air humidity

Cantilever step stair system Bastian

Specification of intended use (Part 2)

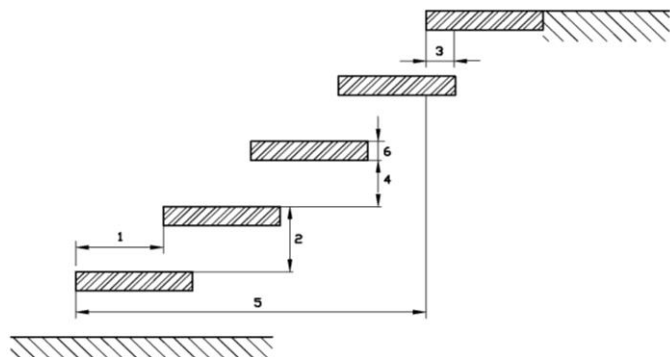
Annex B2

Table 2: Geometry

designation			dimension	
			minimum	maximum
going	step on walking line ¹⁾	[mm]	210	320 ²⁾
	tapered step	[mm]	120 ^{2) 3)}	560 ^{2) 4)}
rise of the stairs ¹⁾		[mm]	140 ²⁾	210
pitch of the walking line ¹⁾		[°]	21	45
overlap of the steps		[mm]	30	- ⁵⁾
number of rises		[-]	3	18
openings	between stairs and wall	[mm]	0	0
	between consecutive steps	[mm]	- ³⁾	140
clear width of stairs		[mm]	500	1000
length of the flight		[mm]	- ³⁾	
thickness of steps	step type 1	[mm]	70	- ⁵⁾
	step type 2	[mm]	90	- ⁵⁾

- 1) values are constant within one flight
 2) tolerance between nominal value and actual value
 = ± 5 mm
 3) inside of tapered step
 4) outside of tapered step
 5) not relevant

- 1 going
 2 rise
 3 overlap
 4 opening between consecutive steps
 5 length of the flight
 6 thickness of steps



Cantilever step stair system Bastian

Minimum dimensions and materials of relevant stair components,
geometry of the stair

Annex C1

Table 3: Load-bearing capacity – Characteristic values of resistance

Type of loading	Characteristic values of resistance			γ_M
vertical variable uniformly distributed load	$q_{R,k}$	[kN/m ²]	5.0	1.1
vertical variable single load	$Q_{R,k}$	[kN]	3.3	
horizontal variable uniformly distributed load on barrier	$h_{R,k}$	[kN/m]	0.6	

Table 4: Deflections under loading

Deflection of the step under single point load			
single load	Q_k	[kN]	2.0
clear width of the stair	L	[mm]	1000
deflection under load F_S related to the clear width of the stair	w	[-]	$\leq L/150$

Table 5: Imposed loads

Type of loading	Imposed loads		
vertical variable uniformly distributed load	q	[kN/m ²]	3.0
vertical variable single load	Q	[kN]	2.0
horizontal variable uniformly distributed load on barrier	h	[kN/m]	0.5

Cantilever step stair system Bastian

Load-bearing capacity – Characteristic values of resistance,
Deflections under loading,
Imposed loads

Annex C2