

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-13/0293
of 14 December 2015

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

Air - Stair System Treppenmeister

Product family
to which the construction product belongs

Prefabricated stair with strings made of steel and steps
made of wood and steel for use as an indoor stair in
buildings.

Manufacturer

Treppenmeister GmbH
Emminger Straße 38
71131 Jettingen
DEUTSCHLAND

Manufacturing plant

Treppenmeister, Werk 1 bis 85

This European Technical Assessment
contains

12 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

Guideline for European technical approval of
"Prefabricated stair kits", ETAG 008 Part 1: "Prefabricated
stair kits in general (excluding severe climatic
conditions)", January 2002,
used as European Assessment Document (EAD)
according to Article 66 Paragraph 3 of Regulation (EU)
No 305/2011.

**European Technical Assessment
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Specific Part

1 Technical description of the product

The Air - Stair System Treppenmeister is a prefabricated stair system, which consists of steps, strings, wall ties and system fasteners. On the wall-free side the steps are rest on the string. Additionally they are connected with the strings by system fasteners. On the wall side each step is equipped with two wall ties which are anchored in the staircase wall.

The steps are made of a composite material made of wood and steel, the strings, the wall ties and the system fasteners are made of steel.

The product description is given in Annex A.

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.

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	See Annex C2
Load/displacement behaviour	See Annex C2
Vibration behaviour	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
Resistance of fixings	See technical documentation of this European Technical Assessment

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3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	See Annex A3
Fire resistance	No performance assessed

3.3 Hygiene, health and the environment (BWR 3)

Regarding dangerous substances there may be requirements (e.g. transposed European legislation and national laws, regulations and administrative provisions) applicable to the products falling within the scope of this European Technical Assessment. In order to meet the provisions of Regulation (EU) No 305/2011, these requirements need also to be complied with, when and where they apply.

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

3.5 General aspects

Essential characteristic	Performance
Resistance to deterioration caused by physical, chemical and biological agents	Adequate resistance for the intended use under an appropriate use and maintenance
Finishes and surface layers	Components made of solid wood can be coated with varnish on all sides or they are oiled

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

In accordance with guideline for European technical approval ETAG 008, January 2002, used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011, the applicable European legal act is: 99/89/EC

The System to be applied is: 2+

In addition, with regard to reaction to fire for products covered by the guideline for European technical approval ETAG 008, January 2002, used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011, 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 EAD

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 14 December 2015 by Deutsches Institut für Bautechnik

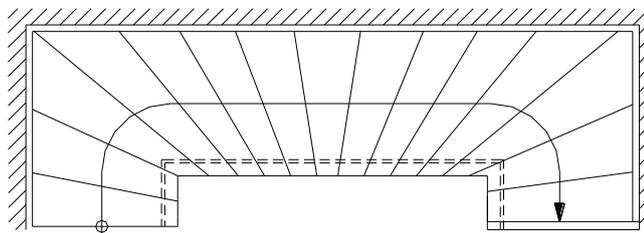
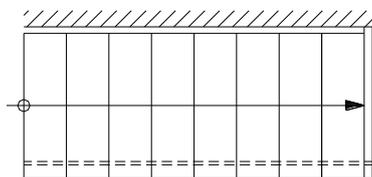
Uwe Bender
Head of Department

beglaubigt:
Wittstock

Types of plan

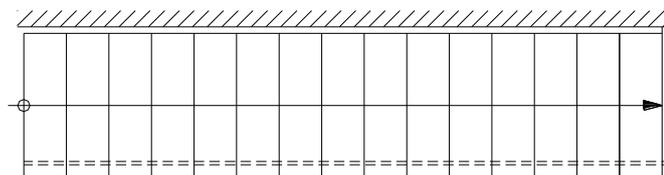
Walking line is exemplified, position may be chosen freely within the walking zone, walking zone is 20 % of the clear width of the stair in the middle of the stair

Type 9G

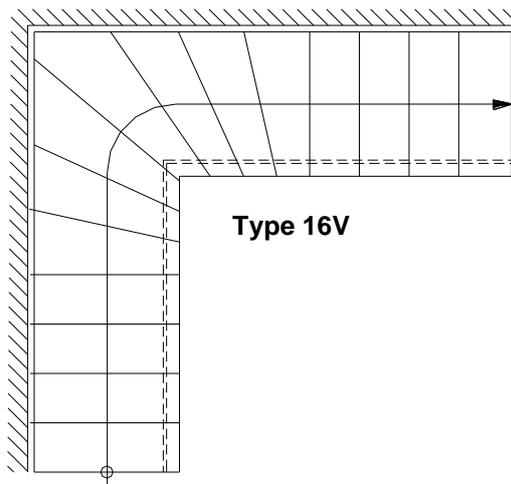
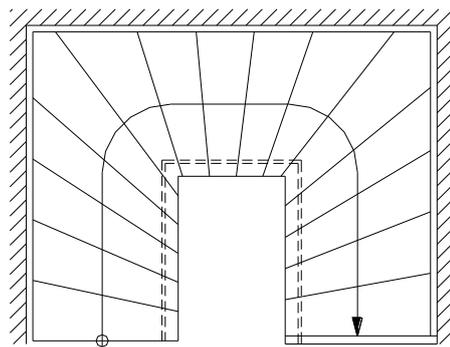


Type 16VV

Type 16G

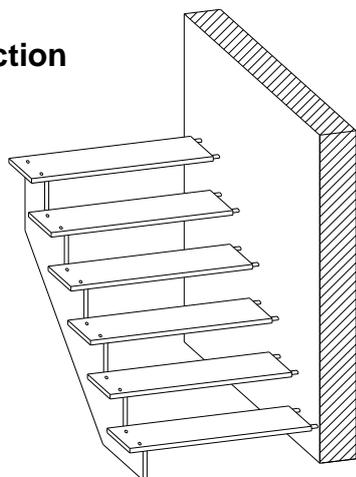


Type 16H



Type 16V

Construction

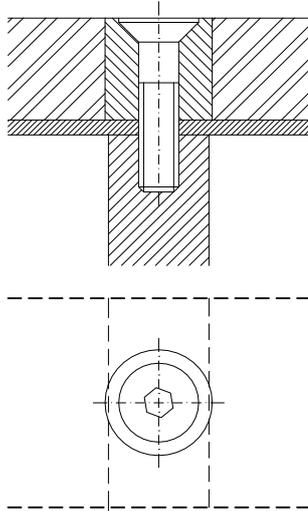


Air – Stair System Treppenmeister

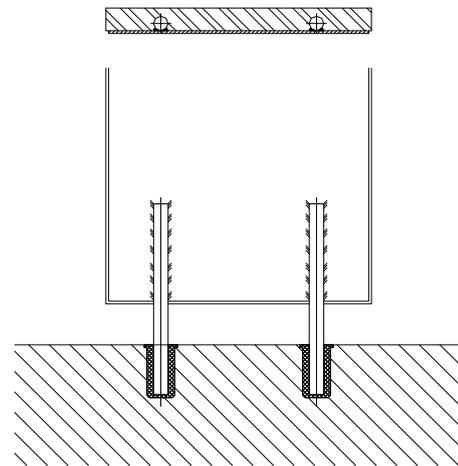
Product and intended use

Annex A1

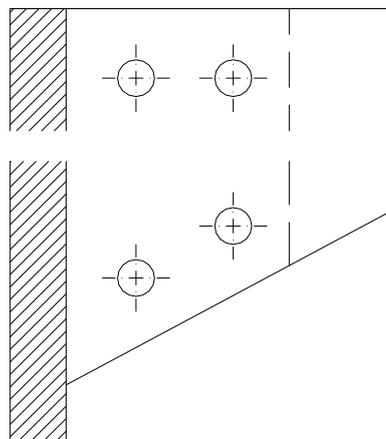
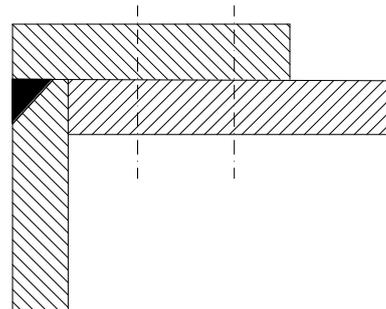
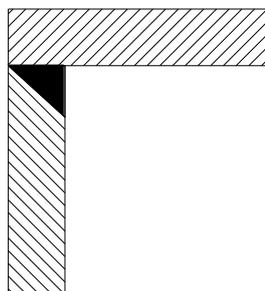
Step string joint



Wall tie



String corner joint



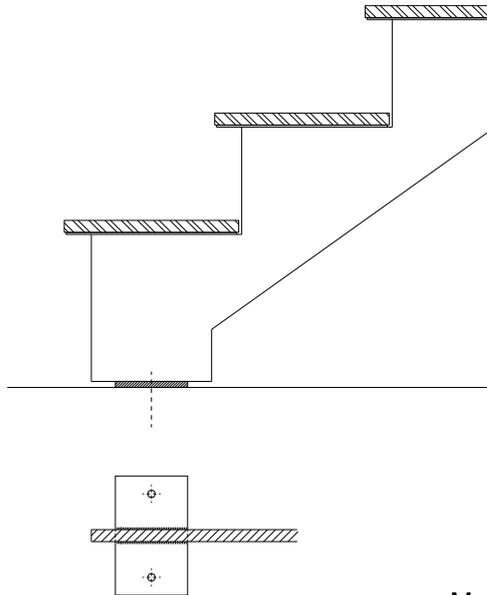
More details according to the technical documentation

Air – Stair System Treppenmeister

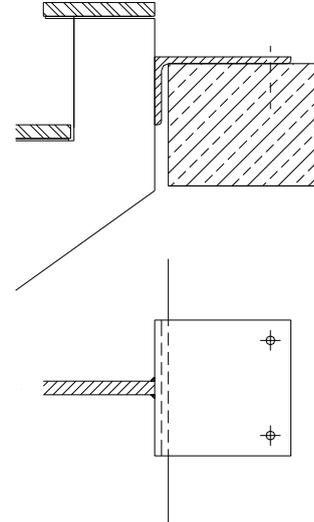
Step string joint, Wall tie, String corner joint

Annex A2

Joint at bottom



Joint at the top



More details according to technical documentation

Table 1: Minimum dimensions of components of stair and reaction to fire

Component of stair		Material ¹⁾	Dimensions		Value	Reaction to fire
Step		Steel - wood composite plate ²⁾	Thickness	[mm]	23.5	No performance assessed
String	Type 9G, Type 16G, 16VV, 16H ⁴⁾	Steel	Width x height	[mm]	20 x 120	A1
	Type 16V-a ⁵⁾				20 x 120	
	Type 16V-b ⁴⁾				20 x 140	
Wall tie		Steel	Diameter	[mm]	16	A1
			Width x height	[mm]	16 x 16	
			Embedment depth step	[mm]	60	
Bearing sleeve		Rubber	Diameter	[mm]	25	Not relevant
			Embedment depth wall	[mm]	70	
Bearing sleeve		Rubber	Diameter	[mm]	30	
			Embedment depth wall	[mm]	55	
System fastener		Steel	- ³⁾	[mm]	- ³⁾	A1

- 1) Characteristic values of material according to technical documentation
- 2) Layer composition and wood species according to technical documentation
- 3) According to technical documentation
- 4) Possible dead load of baluster: $g \leq 0.40$ kN/m (see also Use conditions Annex B1)
- 5) Possible dead load of baluster: $g \leq 0.06$ kN/m (see also Use conditions Annex B1)

Air – Stair System Treppenmeister

Annex A3

Joint at bottom, Joint at the top,
Minimum dimension of components of stair and reaction to fire

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 apply 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 ≤ 0.40 kN/m, (exception: Type 16V-a: $g \leq 0.06$ kN/m)
 Height ≤ 1.00 m
 Distance of baluster ≤ 0.81 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 1991-1-1:2010-12

$\gamma_Q = 1.5$: 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

Air – Stair System Treppenmeister

Specification of intended use (Part 1)

Annex B1

Specification of intended use (Part 2)

Installation:

- Installation by personal appropriately trained and authorized by the holder 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

Air – Stair System Treppenmeister

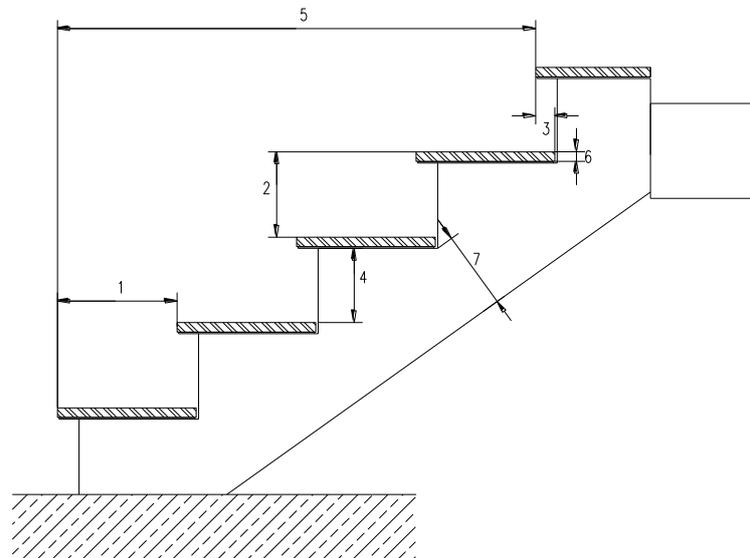
Specification of intended use (Part 2)

Annex B2

Table 2: Geometry

Designation			Dimension	
			Minimum	Maximum
Going	step on walking line ¹⁾	[mm]	210	370 ²⁾
	tapered step	[mm]	180 ^{2) 3)}	550 ^{2) 4)}
Rise of the stairs ¹⁾			140 ²⁾	210
Pitch of the walking line ¹⁾			21	45
Overlap of the steps			[mm]	40
Number of rises			[-]	3
Openings	between stair and wall	[mm]	0	40
	between consecutive steps	[mm]	- ⁵⁾	186.5
Clear width of stairs			[mm]	500
Minimum headroom			[mm]	- ⁵⁾
Length of the flight			[mm]	- ⁵⁾
Thickness of steps			[mm]	23.5
				- ⁵⁾

- 1) Values are constant within one flight
- 2) Tolerance between nominal value and actual value = ± 5 mm
- 3) Wall-free side of tapered step
- 4) Wall side of tapered step
- 5) Not relevant



- 1 Going
- 2 Rise
- 3 Overlap
- 4 Opening between consecutive steps
- 5 Length of flight
- 6 Thickness of step
- 7 Height of string

Air – Stair System Treppenmeister

Geometry of stair

Annex C1

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

Component	Type of Loading	Characteristic values of resistance			γ_M
Steps	Vertical variable uniformly distributed load	$q_{R,k}$	[kN/m ²]	6.8	1,5 ¹⁾
	Vertical variable single load	$Q_{R,k}$	[kN]	4.5	
	Horizontal variable uniformly distributed load on barrier	$h_{R,k}$	[kN/m]	0.8	
Strings	Vertical variable uniformly distributed load	$q_{R,k}$	[kN/m ²]	4.5	1,0 ²⁾
	Vertical variable single load	$Q_{R,k}$	[kN]	3.0	
	Horizontal variable uniformly distributed load on barrier	$h_{R,k}$	[kN/m]	0.5	

1) Recommended partial safety factor (wood-steel composite material decisive), in absence of other national regulations

2) Recommended partial safety factor (steel decisive), in absence of other national regulations

Table 4: Deflections under loading

Deflections of the flight under uniformly distributed load			
Uniformly distributed load	q_k	[kN/m ²]	3.0
Length of the median line of the flight	L	[mm]	4050
Deflection related to the median line of flight	w	[-]	≤ L/200
Deflection of the step under single point load			
Single load	Q_k	[kN]	2.0
Clear width of the stair	L	[mm]	1000
Deflection related to the clear width of stair	w	[-]	≤ L/200

Table 5: Imposed loads

Type of loading	Imposed loads		
Vertical variable uniformly distributed load	q_k	[kN/m ²]	3.0
Vertical variable single load	Q_k	[kN]	2.0
Horizontal variable uniformly distributed load on barrier	h_k	[kN/m]	0.5

Air – Stair System Treppenmeister

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

Annex C2