

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-15/0367
of 20 October 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

Areo - stair system Treppenmeister

Product family
to which the construction product belongs

Prefabricated stair with steps made of aluminium for
use as an indoor stair in buildings

Manufacturer

Treppenmeister GmbH
Emminger Straße 38
71131 Jettingen
DEUTSCHLAND

Manufacturing plant

Treppenmeister, Werk 1 bis Werk 85

This European Technical Assessment
contains

13 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.

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Specific part

1 Technical description of the product

The Areo - stair system Treppenmeister is a prefabricated stair system, which can be constructed as a load-bearing bolt stair or as a string stair.

The load-bearing bolt stair consists of steps, load-bearing bolts and wall ties. The steps of the load-bearing bolt stair are connected with each other by one load-bearing bolt on the wall-free side. On the wall side each step is equipped with two wall ties, which are anchored in the staircase wall. Alternatively, the wall ties can be anchored in a wall string.

The string stair consists of steps, strings and system fasteners. The steps are connected with the strings by system fasteners on both sides. On the wall side the steps can also be connected directly by two wall ties to the wall.

The steps are made of aluminium, the load-bearing bolts, system fasteners and wall ties are made of steel and the strings can be made of solid wood, steel or HPL.

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 stair.
Long-term behaviour	Load-bearing capacity is 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

English translation prepared by DIBt

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	See Annex A4
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 stair components	No brittle failure of individual stair 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	Stair 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 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.

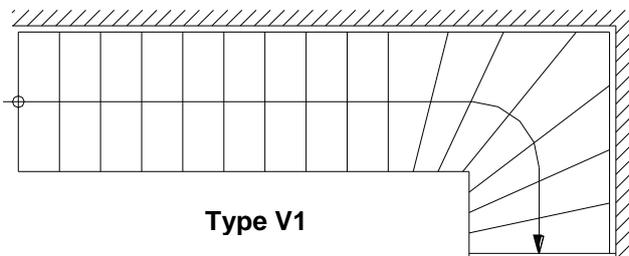
Issued in Berlin on 20 October 2015 by Deutsches Institut für Bautechnik

Andreas Kummerow
p.p. Head of Department

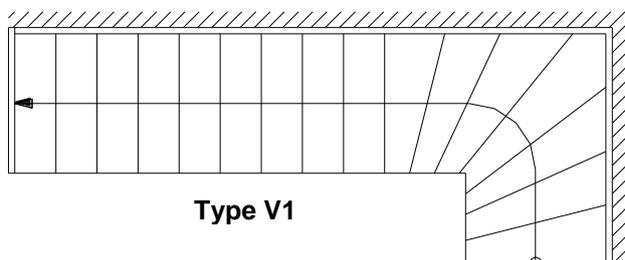
beglaubigt:
Wittstock

Types of plan

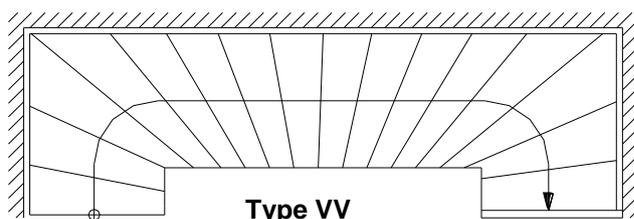
Walking line exemplified, position may be chosen freely within the walking zone,
walking zone is 20 % of the clear width of the stair in the middle of the stair



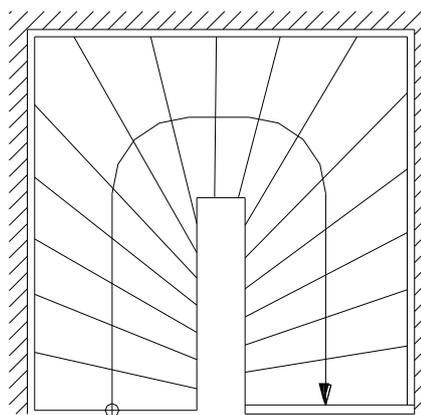
Type V1



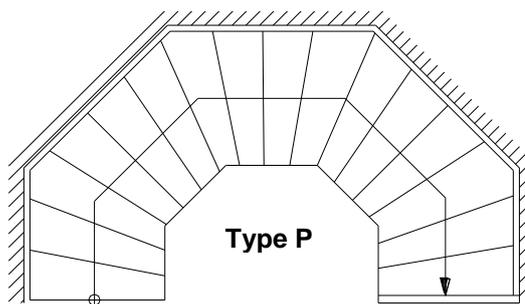
Type V1



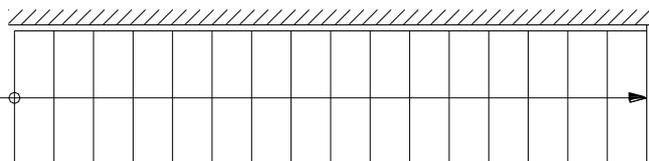
Type VV



Type H

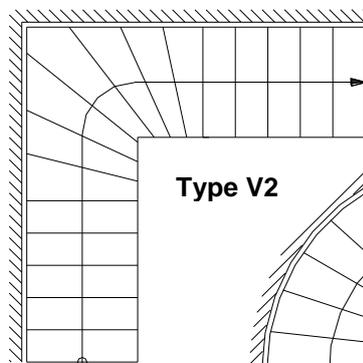


Type P

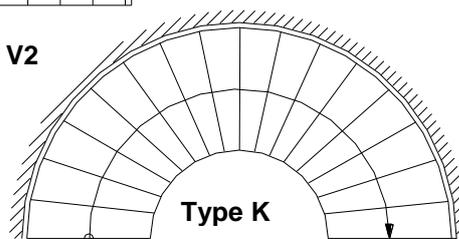


Type G

(Additional supports according to Annex A5,
Table 2)



Type V2



Type K

Support for string stair according to
ETA-10/0215, ETA-10/0317 and ETA-12/0183
and technical documentation

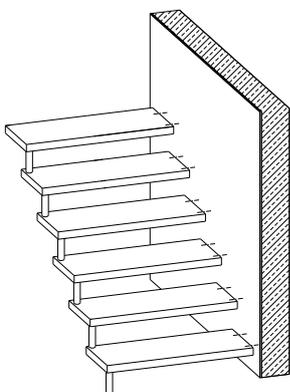
Areo – stair system Treppenmeister

Product and intended use (types of plane)

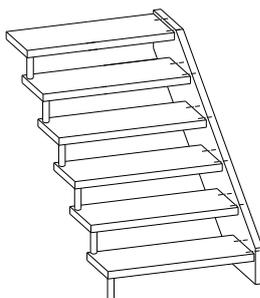
Annex A1

Types of construction

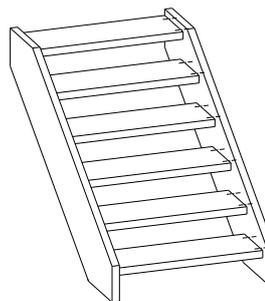
WE1 (2 wall ties)



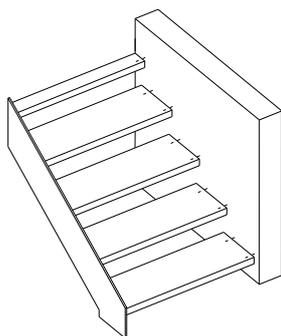
WF1 (2 wall ties,
wall string)



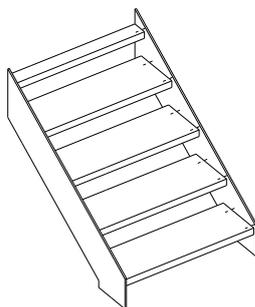
String (wood)



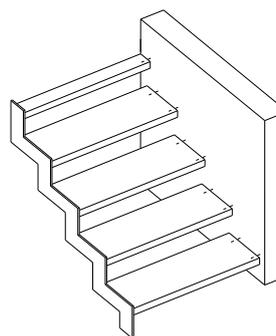
String (steel / HPL / wood)



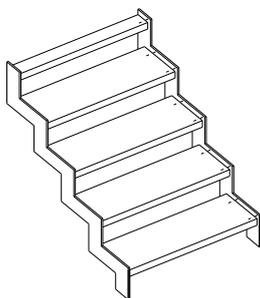
String (steel / HPL)



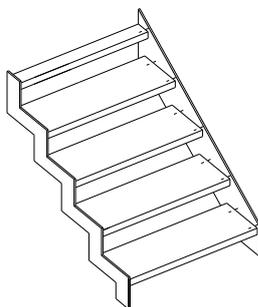
String (steel)



String (steel)



String (steel)

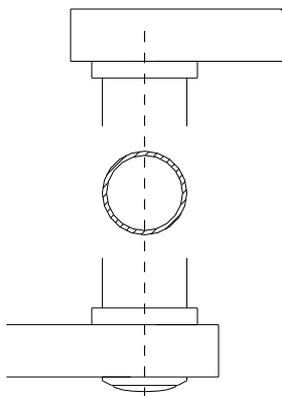


Areo – stair system Treppenmeister

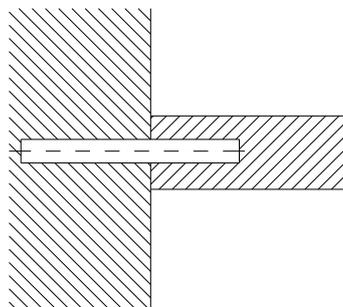
Product and intended use (types of construction)

Annex A2

Load-bearing bolt

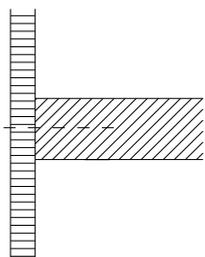


Wall tie

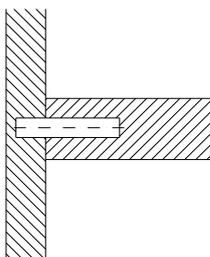


Step - String - Joint

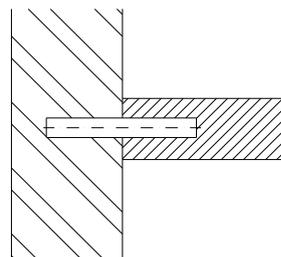
HPL



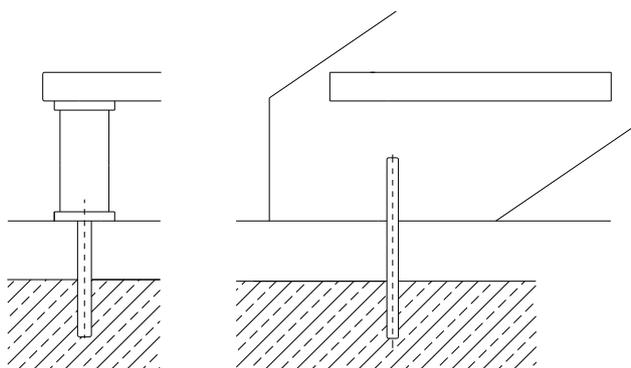
Steel



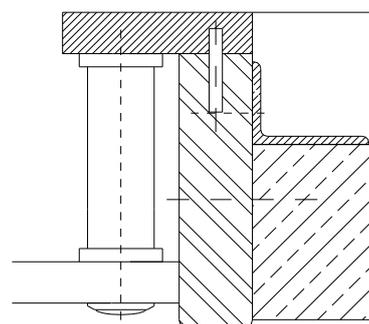
Wood



Support at the bottom (Load-bearing bolt, string made of wood)



Support at the top (Load-bearing bolt)



Corner-Joint and corner-support see ETA-10/0215 (wood), ETA-10/0317 (HPL) and ETA-12/0183 (steel)
Support for strings at the bottom see ETA-10/0317 (HPL) and ETA-12/0183 (steel)
Support for strings at the top see ETA-10/0215 (wood), ETA-10/0317 (HPL) und ETA-12/0183 (steel)

More details according to technical documentation

Areo – stair system Treppenmeister

Load-bearing bolt, Wall tie, Step – String - Joint,
Support at the bottom, Support at the top

Annex A3

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

Component of stair	Material ¹⁾	Dimension		Value	Reaction to fire
Step	Aluminium	Thickness	[mm]	25	A1
Load-bearing bolt / threaded rod	Steel	Diameter	[mm]	10	A1
Load-bearing bolt distance sleeve	Steel pipe	Diameter x Wall thickness	[mm]	42,4 x 2 ³⁾	
Wall tie	Round steel	Diameter	[mm]	12 (10) ⁴⁾	A1
		Embedment depth wall	[mm]	80	
String	Solid wood ²⁾	Width x Height	[mm]	44 x 240...310 ⁵⁾	D-s2, d0
String	HPL ⁸⁾	Width x Height	[mm]	10 x 240...340 ⁶⁾	D-s2, d0
String	Steel ⁸⁾	Width x Height	[mm]	12 x 240...310 ⁷⁾	A1
Cut string	Steel ⁸⁾	Width x Height	[mm]	16 x 100...140 ⁷⁾	A1

1) Characteristic values according to technical documentation

2) Only wood of following wood species:

Group 1: Amazakoué, Bangkirai, Bongossi, Beech, Oak, Ash, Iroko/Kambala, Merbau, Wengé, Zebrano

Group 2: Maple, Afzelia/Doussié, Acacia/Robinie, Birch, Bubinga, Cherry tree, Nut tree, Elm, Sapelli, Teak, Dibetou, Hevea

3) with washer d = 50 mm,

4) according to technical documentation

5) see ETA 10/0215

6) see ETA 10/0317

7) see ETA 12/0183

8) not for type of plan K

Table 2: Additional support for maximum clear width of the stair

Construction			WE1 Wall	WF1 Wall string
Type	Rises	Clear width of stair [mm]	Required additional support to step (rear edge)	
G	≤ 17	900	5	4 (only HPL)
		1000	4 + 13	-
	≤ 15	800	-	-

Areo – stair system Treppenmeister

Minimum dimensions of components of the stair and reaction to fire
Additional supports

Annex A4

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 may be attached to the stair optionally. Conditions for possible barrier/handrail:
 Dead load ≤ 0.5 kN/m
 Height ≤ 1.00 m
 Distance of baluster ≤ 0.26 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:

$$\begin{aligned} q_k \cdot \gamma_Q &\leq q_{Rk} / \gamma_M \\ Q_k \cdot \gamma_Q &\leq Q_{Rk} / \gamma_M \\ h_k \cdot \gamma_Q \cdot \psi_0 &\leq h_{Rk} / \gamma_M \end{aligned}$$

with

q_{Rk}, Q_{Rk}, h_{Rk} : characteristic values of resistance; see Table 4

γ_M : recommended material partial safety factor; see Table 4

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 6

Areo – 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 approval 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

Areo – stair system Treppenmeister

Specification of intended use (Part 2)

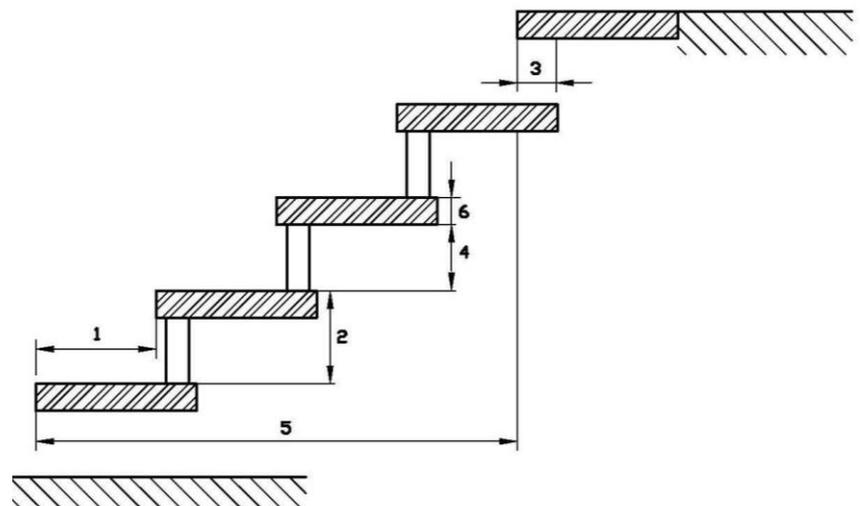
Annex B2

Table 3: Geometry

Designation			Dimension	
			Minimum	Maximum
Going	Step on walking line ¹⁾	[mm]	210	370 ²⁾
	Tapered step	[mm]	70 ^{2) 3)}	600 ^{2) 4)}
Rise of the stair ¹⁾		[mm]	140 ²⁾	210
Pitch of the walking line ¹⁾		[°]	21	45
Overlap of steps		[mm]	70	- ⁵⁾
Number of rises		[-]	3	17
Openings	Between stair and wall	[mm]	- ⁵⁾	0
	Between consecutive steps	[mm]	- ⁵⁾	185
Clear width of stairs		[mm]	500	1000
Minimum headroom		[mm]	- ⁵⁾	
Length of the flight		[mm]	- ⁵⁾	4160
Thickness of steps		[mm]	25	- 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 the flight**
- 6 **Thickness of steps**



Areo – stair system Treppenmeister

Geometry

Annex C1

Table 4: 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 5: Deflections under loading

Deflection 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]	4160 ¹⁾
deflection under load F_S related to the median line of the flight	w	[-]	$\leq L/200$
Deflection of the step under single point load			
single load	Q_k	[kN]	2.0
clear width of the stair	L	[mm]	1000
deflection under load F_S related to the clear width of the stair	w	[-]	$\leq L/200$

¹⁾ l = reference length = distance between supports (additional supports according to Annex A5, Tab. 2)

Table 6: 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

Areo – stair system Treppenmeister

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

Annex C2