

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-08/0047
of 16 April 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

WE1 - and WF2 - Stair System Grünewald

Product family
to which the construction product belongs

Prefabricated stair with steps made of wood-based
products and load-bearing bolts for use as an indoor stair
in buildings

Manufacturer

Grünewald GmbH & Co. KG
Kerbfelder Straße 1
97491 Aidhausen - Happertshausen
DEUTSCHLAND

Manufacturing plant

Grünewald GmbH & Co. KG, Deutschland

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

EAD 340006-00-0506

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Specific Part

1 Technical description of the product

The "WE1- and WF2 - Stair System Grünewald" is a prefabricated stair system, which consists of steps, load-bearing bolts and wall ties.

The steps of the WF2-Stair are connected with each other by a load-bearing bolt on the wall-free side and on the wall side. On the wall side each step is equipped with a wall tie, which is anchored in the staircase wall.

The steps of the WE1-Stair are connected with each other by a load-bearing bolt and on the wall-free side only. On the wall side each step is equipped with two wall ties, which are anchored in the staircase wall.

The steps are made of wood-based boards, the load-bearing bolts are made of steel and solid wood, the fasteners and wall ties are made of steel.

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 the AVCP system, 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	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	See Annex A3
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	≤ 5 ppm
Radioactive emission	Not relevant

English translation prepared by DIBt

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.

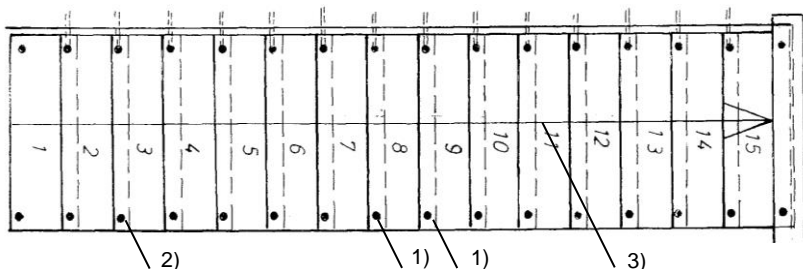
Issued in Berlin on 16 April 2018 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Head of Department

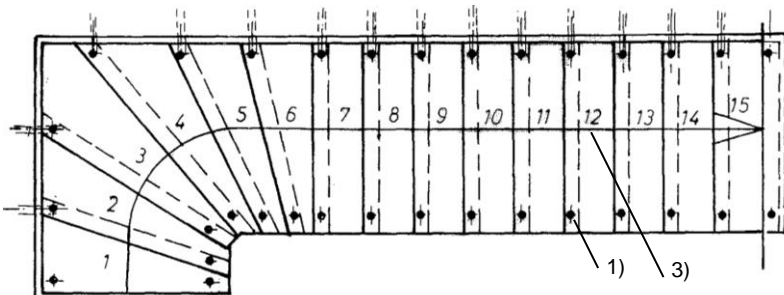
beglaubigt:
Stiller

Types of plan

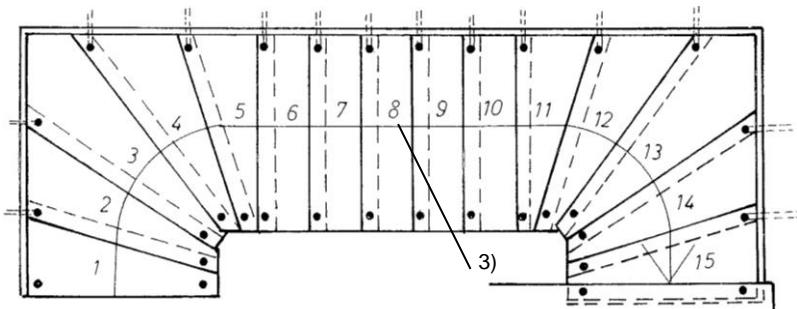
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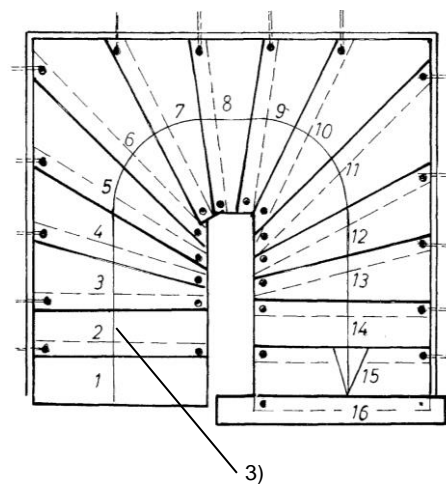
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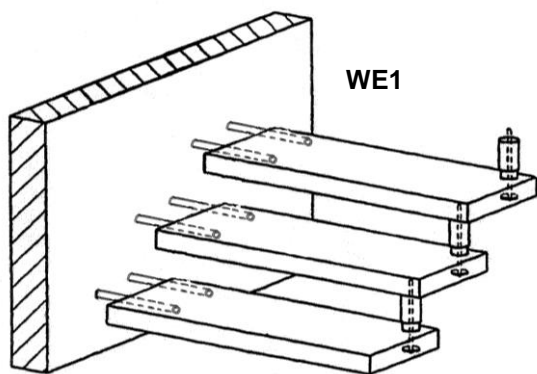
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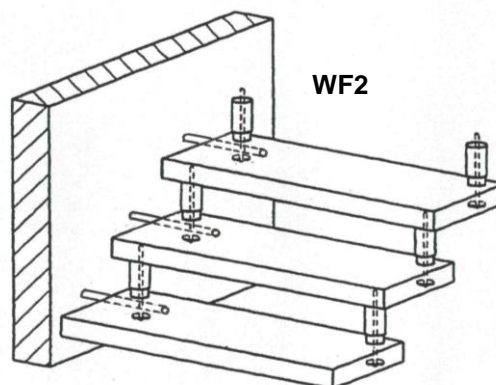


- 1) additional support WE1 stair according to Annex 3
- 2) additional support WF2 stair according to Annex 3
- 3) walking line is exemplified, position may be chosen freely within the walking zone, walking zone is 20 % of the clear width of the stair in the middle of the stair



WE1

Construction



WF2

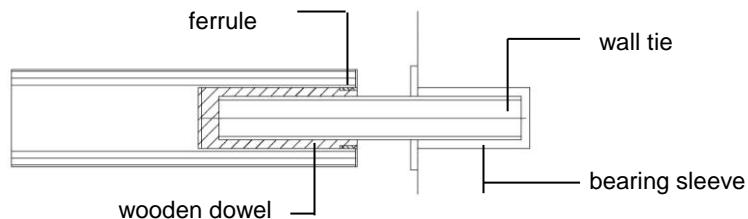
between the steps may be arranged an additional riser
(according to technical documentation)

WE1 – and WF2 – Stair System Grünwald

Product

Annex A1

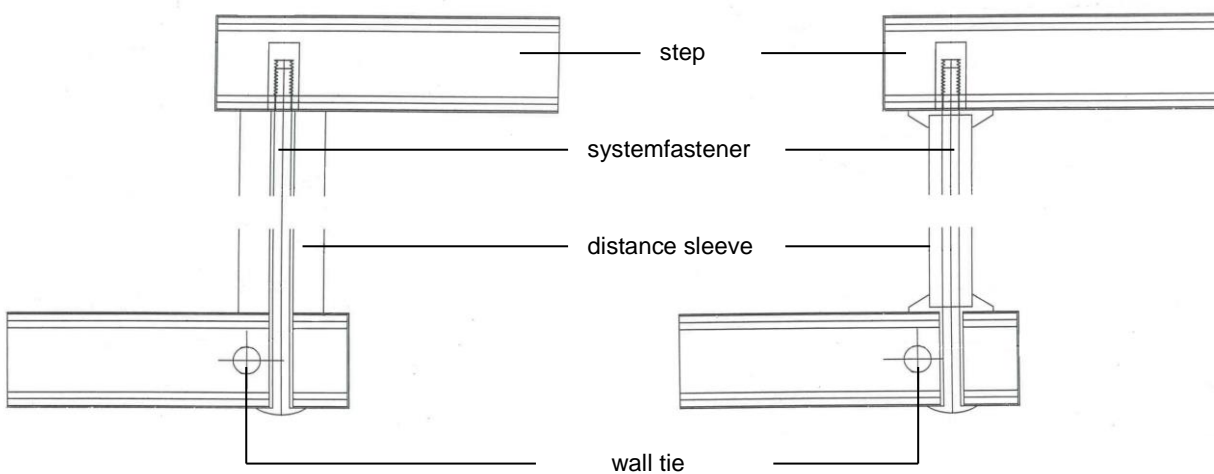
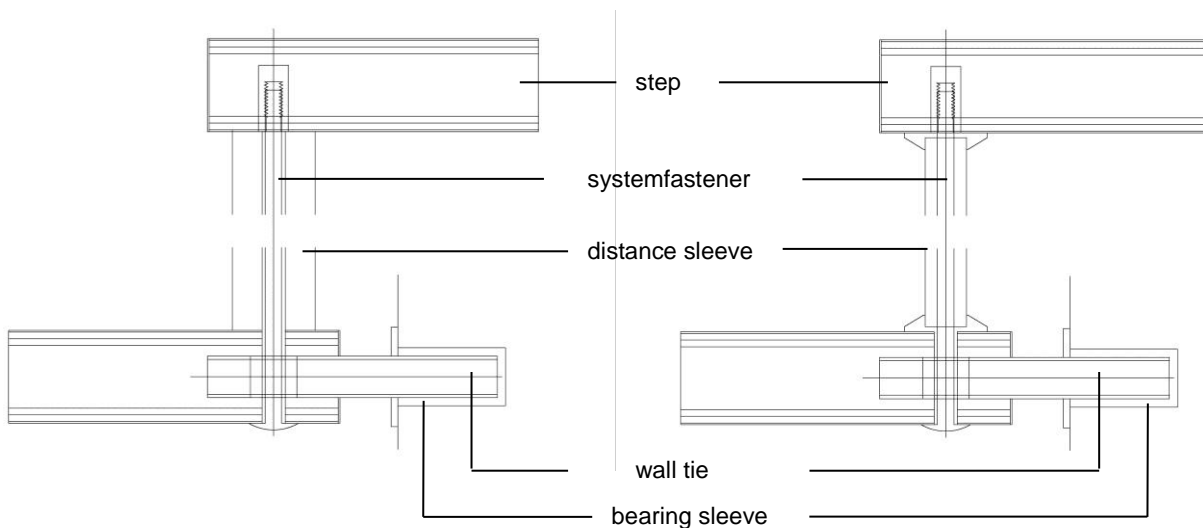
Wall tie



Load-bearing bolt and wall ties

distance sleeve: wood

distance sleeve: steel



WE1 – and WF2 – Stair System Grünwald

Load-bearing bolt and wall ties

Annex A2

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

Component	Material ¹⁾	Dimension		Value	Reaction to fire
steps	wood-based board I ²⁾	thickness	[mm]	55.5 ³⁾	no performance assessed
	wood-based board II ²⁾	thickness	[mm]	55.5 ³⁾	no performance assessed
load-bearing bolt – threaded rod	steel	diameter	[mm]	10	A1
load-bearing bolt – distance sleeve	solid wood	diameter	[mm]	50 ⁶⁾	no performance assessed
	steel pipe	diameter / wall thickness	[mm]	25 / 2.5 ⁴⁾	A1
wall tie	steel pipe or round steel	diameter / wall thickness	[mm]	25 / 2.5	A1
		diameter	[mm]	16	
		embedment depth - wall	[mm]	60	
		embedment depth - step	[mm]	80 ⁵⁾	
bearing sleeve (wall tie)	plastics	diameter	[mm]	35	not relevant

- 1) characteristic values of material according to technical documentation
 2) wood-based board I = particle board with veneer, wood-based board II = particle board with laminate layer composition according to technical documentation
 3) other thicknesses of steps and required additional support see Table 2
 4) with washer diameter 50 mm
 5) with additional wooden dowel according to technical documentation
 6) stairs with turns minimum 40 mm

Table 2: Minimum dimensions of thickness of steps and required additional support

Construction	Type of plan	Additional support at step	Wood-based board I	Wood-based board II
WF2	16G	without support	63.0 mm	62.0 mm
		1. step	61.0 mm	60.5 mm
		2. step	59.5 mm	58.5 mm
		3. step	57.5 mm	57.0 mm
		4. step	55.5 mm	55.5 mm
WE1	16G	8. step	55.5 mm	55.5 mm
	16V	12. step	55.5 mm	55.5 mm

WE1 – and WF2 – Stair System Grünwald

Minimum dimensions of relevant stair components and reaction to fire

Annex A3

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 ≤ 0.15 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:

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

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

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

with

q_{Rk}, Q_{Rk}, h_{Rk} : characteristic values of resistance; see Table 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 1991-1-1:2002 + 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 6

WE1 – and WF2 – Stair System Grünewald

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 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 retightens the bolting of the load-bearing bolts and connections according to Annex A2 after the first heating season and the information on the relationship between moisture content of timber components, air temperature and relative air humidity

WE1 – and WF2 – Stair System Grünewald

Specification of intended use (Part 2)

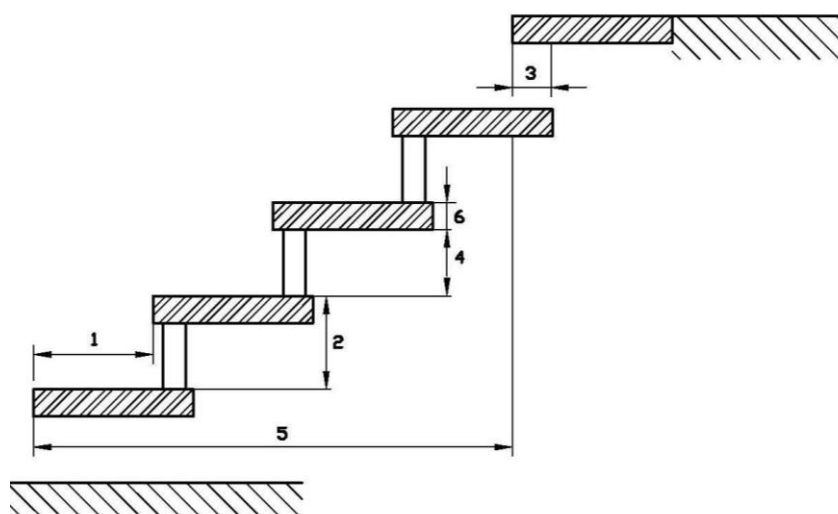
Annex B2

Table 3: Geometry

designation			dimension	
			minimum	maximum
going	step on walking line ¹⁾	[mm]	210	300 ²⁾
	tapered step	[mm]	160 ^{2) 3)}	540 ^{2) 4)}
rise of the stairs ¹⁾		[mm]	140 ²⁾	210
pitch of the walking line ¹⁾		[°]	21	45
overlap of the steps		[mm]	80 ⁶⁾	- ⁵⁾
number of risers		[-]	3	16
openings	between stairs and wall	[mm]	- ⁵⁾	35
	between consecutive steps	[mm]	- ⁵⁾	154.5
clear width of stairs		[mm]	500	1000
minimum headroom		[mm]	- ⁵⁾	
length of the flight		[mm]	- ⁵⁾	4050
thickness of steps		[mm]	55.5	- 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
- 6) with riser overlap 0 mm

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



WE1 – and WF2 – Stair System Grünewald

Geometry of the stair

Annex C1

Table 4: Load-bearing capacity - Characteristic values of resistance

Type of loading	Characteristic values of resistance			γ_M ¹⁾
vertical variable uniformly distributed load	$q_{R,k}$	[kN/m ²]	6.8	1.5
vertical variable single load	$Q_{R,k}$	[kN]	4.5	
horizontal variable uniformly distributed load on barrier	$h_{R,k}$	[kN/m]	1.1	

¹⁾ Recommended partial safety factor, in absence of other national regulations

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]	4050 ¹⁾
deflection under load F_S related to the median line of the 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 under load F_S related to the clear width of the stair	w	[-]	≤ L/200

¹⁾ L = reference length = distance between supports, with additional support according to Table 2

Table 6: 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

WE1 – and WF2 – Stair System Grünewald

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

Annex C2