Deutsches Institut für Bautechnik

Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

Member of EOTA
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Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

European Technical Assessment

ETA-09/0345 of 2 March 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	RCD-WF2-Stair
Product family to which the construction product belongs	Prefabricated stair with steps made of solid wood and load-bearing bolts for use as an indoor stair in buildings
Manufacturer	RCD Treppensysteme GmbH & Co. KG Holler Landstraße 56a 27798 Hude DEUTSCHLAND
Manufacturing plant	Tischlerei "Ralf Carstens", Werk 1 bis 99
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.

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Specific Part

1 Technical description of the product

The "RCD-WF2-Stair" is a prefabricated stair, which consists of steps, load-bearing bolts and wall ties. The stair can also be formed as a folded plate stair by additional risers. The steps 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 at least one wall tie, which is anchored in the staircase wall.

The steps and risers are made of solid wood, 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.

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 determined (NPD)
Resistance of fixings	See technical documentation of this European Technical Assessment

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	See Annex A3
Fire resistance	No performance determined (NPD)

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 determined (NPD)
Equipment of the stair for a safe use	No performance determined (NPD)
Safe breakage of stair components	No brittle failure of individual stair components
Impact resistance	No performance determined (NPD)

3.5 Protection against noise (BWR 5)

Not applicable.

3.6 Energy economy and heat retention (BWR 6)

Not applicable.

3.7 Sustainable use of natural resources (BWR 7)

The sustainable use of natural resources was not investigated.

3.8 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

According to Decision of the Commission of 3 February 1999 (99/89/EC) (OJ L 029 of 25.01.1999 p. 34-37)) the system of assessment and verification of constancy of performance (see Annex V and Article 65 Paragraph 2 to Regulation (EU) No 305/2011) given in the following table applies.

Product	Intended use	Level or class	System
Prefabricated stair kits	For dwellings and other buildings	-	2+

Additional according to Decision of the Commission of 8 January 2001 (2001/596/EC) (OJ L 209 of 02.08.2001 p. 33-42) the system of assessment and verification of constancy of performance (see Annex V and Article 65 Paragraph 2 to Regulation (EU) No 305/2011) given in the following table applies.

Product	Intended use	Level or class	System
Prefabricated stair kits	For uses subject to regulations on reaction to fire	According to Annex A3, Table 1	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 2 March 2015 by Deutsches Institut für Bautechnik

Uwe Bender
Head of Department

beglaubigt:
Wittstock

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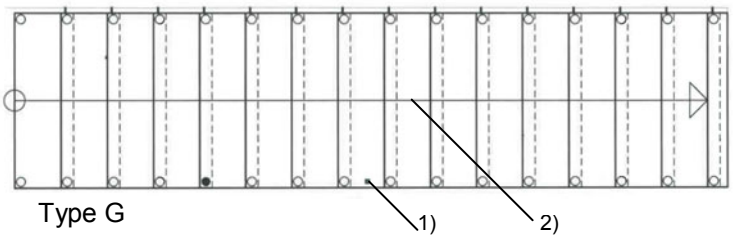
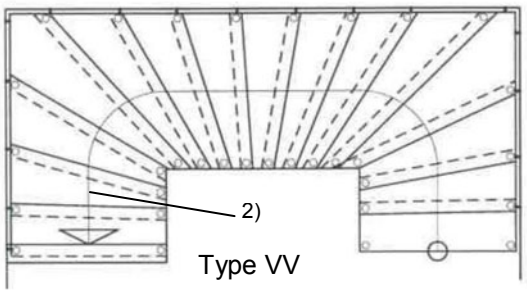
Types of plan



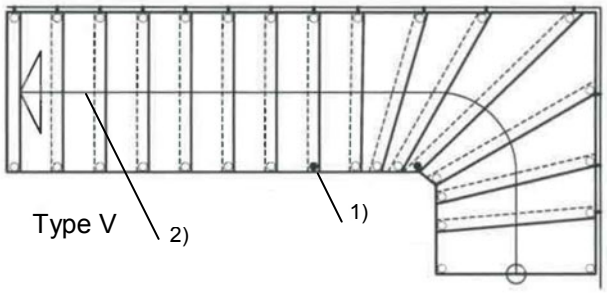
Type G

1) Additional support for stairs with straight flights and with one quarter turn according to technical documentation and Annex A3

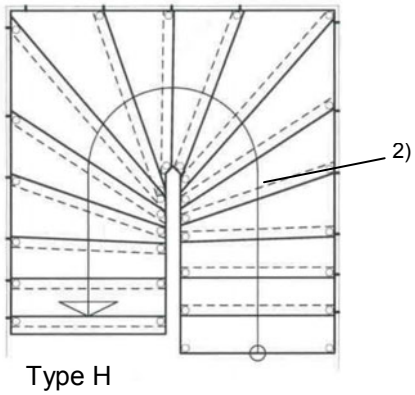
2) Walking line is exemplified, position may be chosen freely within the walking zone, walking zone is 20 % of the clear width of the stair in the middle of the stair



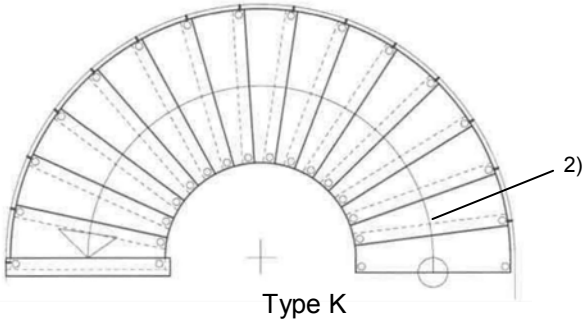
Type VV



Type V

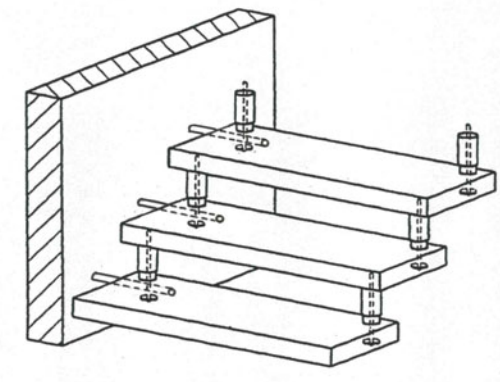


Type H



Type K

Construction



between the steps may be arranged an additional riser
(according to technical documentation and Annex A2)

"RCD-WF2-Stair"	**Annex A1**
Product and intended use	

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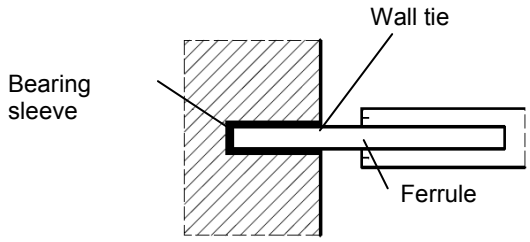
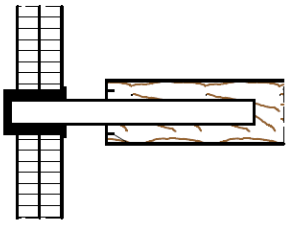
Wall ties (possible types)

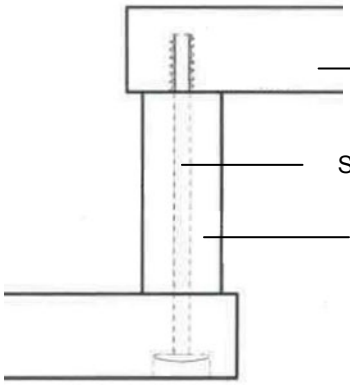
minimum wall thickness and minimum strength of wall materials according to the technical documentation



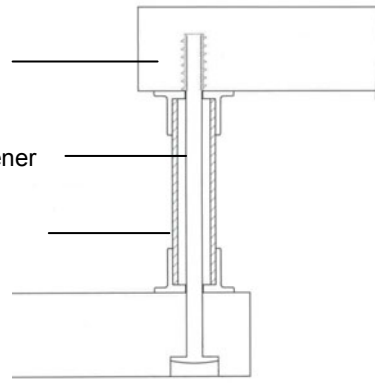


Load-bearing bolts (possible types)

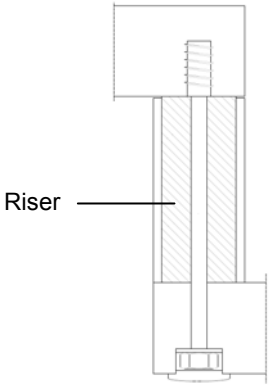
Solid wood



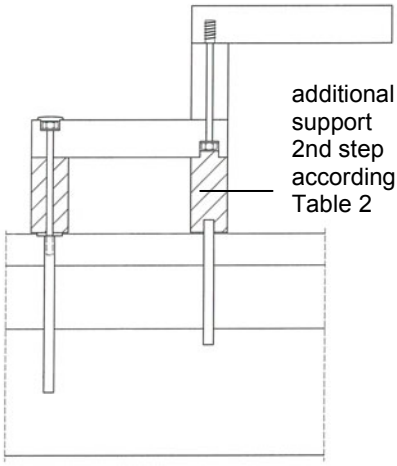
Steel



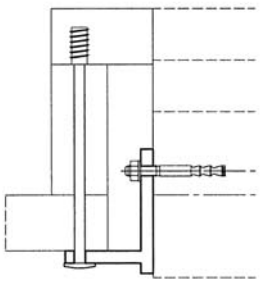
Solid wood with riser

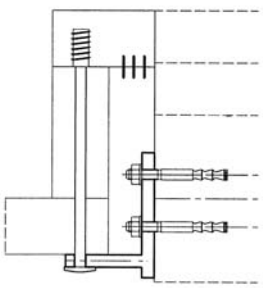


Support at bottom step



Support at the top (possible types)





more details according to the technical

"RCD-WF2-Stair"	Annex A2
Load-bearing bolts, wall ties, support at bottom step and at the top	

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

Component	Material[1)]	Dimension		Value	Reaction to fire [3)]
steps, risers	solid wood [2)]	thickness	[mm]	54 [4)]	D-s2, d0 (2003/593/EC)
load-bearing bolt-system fastener	steel	diameter	[mm]	10	A1 (96/603/EC)
load-bearing bolt-distance sleeve	solid wood [2)]	diameter	[mm]	50 [4)]	D-s2, d0 (2003/593/EC)
	solid wood [2)]	cross section a x b	[mm]	- [4)]	
	Steel pipe	diameter / thickness of wall	[mm]	26.9 / 3.2 [5)]	A1 (96/603/EC)
wall tie	round steel	diameter	[mm]	16	A1 (96/603/EC)
		embedment depth wall	[mm]	65 (43) [6)]	
		embedment depth step	[mm]	105	
bearing sleeve (wall tie)	plastics	diameter	[mm]	25	Not relevant

1) characteristic values of material according to technical documentation
2) only hardwood of the following species: beech, oak, maple, ash
3) according to the provisions of EC decisions
4) thicknesses of steps and distance sleeves for the relevant types of plan according to Table 2
5) with socket
6) value in brackets for OSB-Wall

Table 2: Minimum dimensions of thickness of steps and distance sleeves depending on additional support

Type of plan	Position of the additional support	Thickness of steps [mm]	Distance sleeve round [mm]	Distance sleeve square [mm x mm]
Type G [1)]	-	77	77	66 x 70
	Step 8 [2)]	59	59	48 x 48
Type V [1)]	-	64	64	53 x 100
	Step 13 [2)]	56	56	45 x 135
	Step 10 [2)]	54	54	43 x 135
Type VV	-	58	58	47 x 190
Type H	-	54	54	43 x 135
Type K	-	54	54	43 x 135

1) These types have to be supported on the wall-free side on the rear edge of first step generally.
2) Additional support for vertical loads at maximum number of steps (supports for less steps according to technical documentation)

"RCD-WF2-Stair"	**Annex A3**
Minimum dimensions of relevant stair components and reaction to fire	

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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 the 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 or 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 ≤ 0.15 kN/m

  Height ≤ 0.90 m

  Distance of baluster ≤ 1.00 m

Design:

- Design of the stair according to the annexes and the technical documentation to this European Technical Assessment
- Fastening of the stair to the construction works according to the annexes and the technical documentation to this European Technical 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 oft the partial factors mentioned above; see Table 5

"RCD-WF2-Stair"	**Annex B1**
Specification of intended use (Part 1)	

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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 ± 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 people 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 ± 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, 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

"RCD-WF2-Stair"	**Annex B2**
Specification of intended use (Part 2)	

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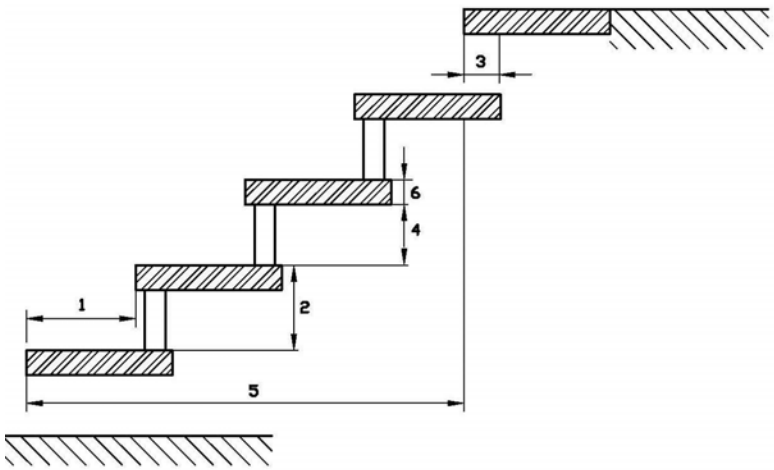
Table 3: Geometry

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]	60 [6]	- [5]
number of rises		[-]	3	16
openings	between stairs and wall	[mm]	- [5]	30
	between consecutive steps	[mm]	- [5]	156
clear width of stairs		[mm]	500	1000
minimum headroom		[mm]	- [5]	
length of the flight		[mm]	- [5]	3900
thickness of steps		[mm]	54	- [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
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



"RCD-WF2-Stair"

Geometry of the stair

Annex C1

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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/m²]	6.75	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	

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

Table 4: Deflections under loading

Durchbiegung des Treppenlaufs unter gleichmäßig verteilte Last			
Uniformly distributed load	q_k	[kN/m²]	3.0
Length of the median line of the flight	L	[mm]	3900 [1)]
Deflection related to the median line of flight	w	[-]	≤ L/200
Deflection under single 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

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

Table 5: Imposed loads

Type of loading	Imposed loads		
Vertical variable uniformly distributed load	q_k	[kN/m²]	3.0
Vertical variable single load	Q_k	[kN]	2.0
Horizontal variable uniformly distributed load on barrier	h_k	[kN/m]	0.5