

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-11/0035
of 5 March 2016

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

Load-bearing bolt stair System "Edenharder & Räder"

Product family
to which the construction product belongs

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

Manufacturer

Edenharder & Räder GbR
Max-Planck-Straße 21
92224 Amberg

Manufacturing plant

Edenharder & Räder, Werk 1 bis 50

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 Load-bearing bolt stair System "Edenharder & Räder" is a prefabricated stair system, 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 load-bearing bolts both on the wall side and the wall-free side. On the wall side each step is equipped with one wall tie, which is anchored in the staircase wall. Alternatively the staircase wall can be replaced by an additional stringer.

The steps and risers are either made of solid wood or wood-based products. 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 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

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)

The wood-based panels used fulfil the class E1 according to EN 13986:2004+A1:2015.

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 Steps made of wood based products with a surface of laminate can be untreated

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

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

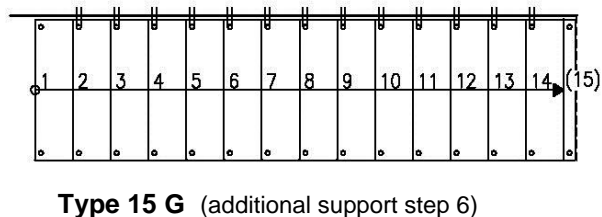
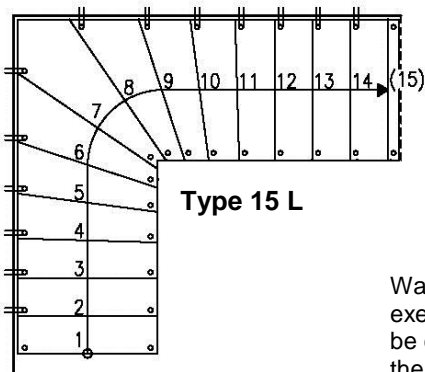
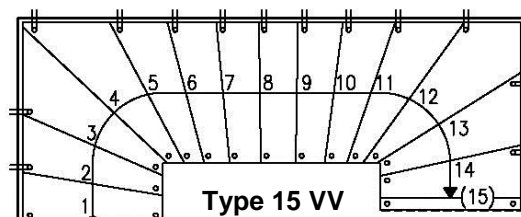
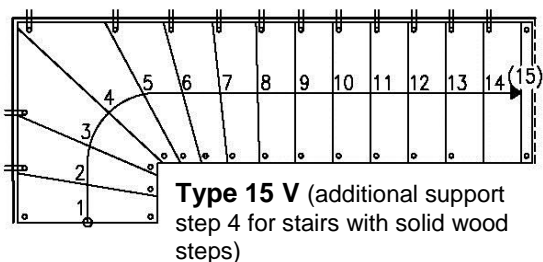
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 5 March 2016 by Deutsches Institut für Bautechnik

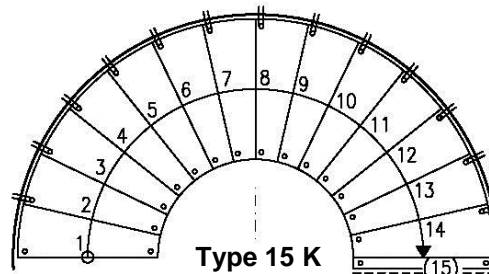
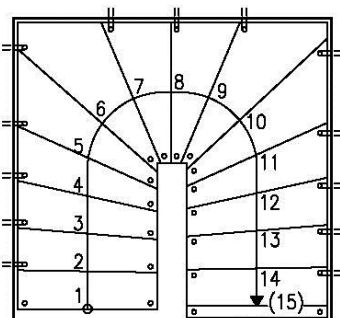
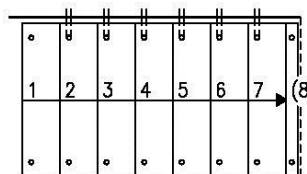
Uwe Bender
Head of Department

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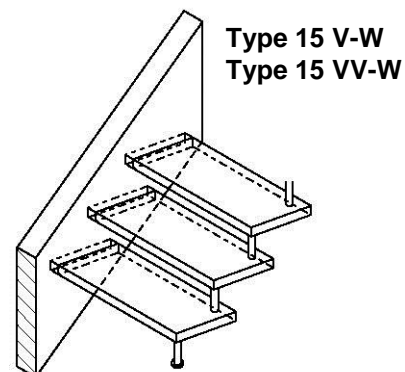
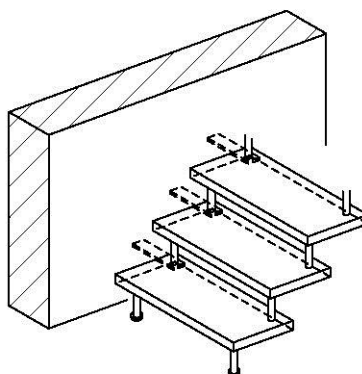
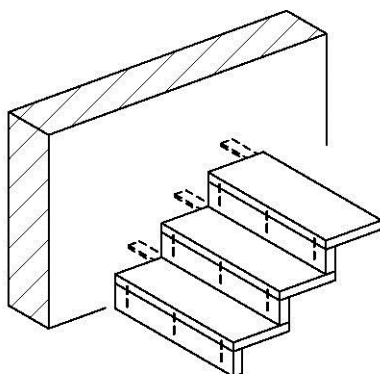
Types of plan



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



additional support of stringer according to technical documentation

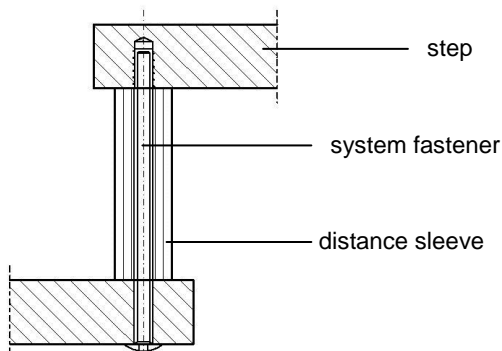
Load-bearing bolt stair System "Edenharder & Räder"

Product and intended use

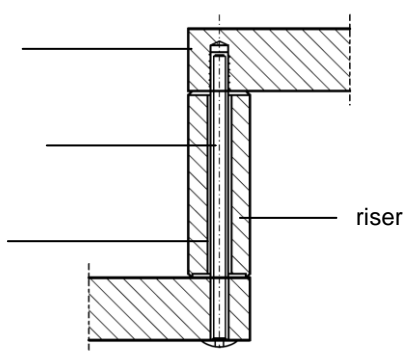
Annex A1

Load-bearing bolts

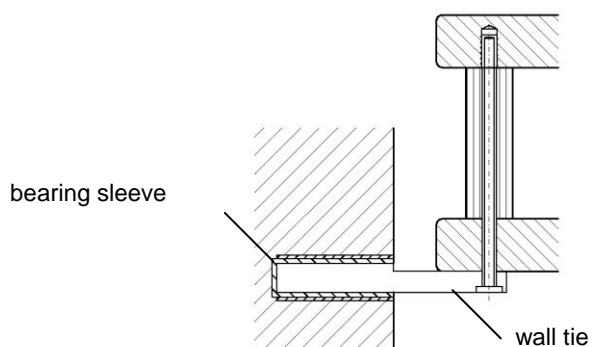
Load-bearing bolt style



Folded plate style

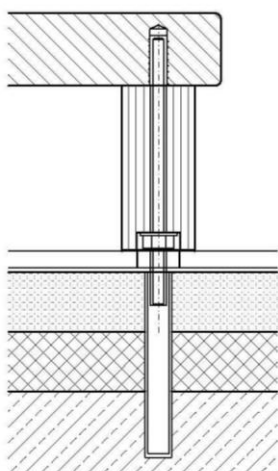


Wall tie

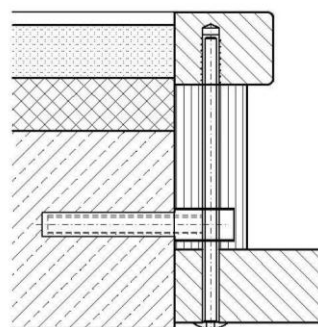


Minimum wall thickness and minimum strength of the wall material as well as distances to the wall according to the technical documentation

Support at bottom step



Support at the top



more details according to the technical documentation

Load-bearing bolt stair System "Edenharder & Räder"

Load-bearing bolts, Wall ties, Support at bottom step and the top

Annex A2

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

Component		Material ¹⁾	Dimension		Value	Reaction to fire
steps, risers		solid wood ²⁾	thickness	[mm]	55	D-s2, d0
steps		wood-based product ³⁾	thickness	[mm]	65	D-s2, d0
load-bearing bolt threaded bolt		steel	diameter	[mm]	10	A1
load-bearing bolt distance sleeve	type 15L, 15V, 15VV-W	solid wood ²⁾	diameter	[mm]	50	D-s2, d0
			cross section a x b	[mm]	50 x 50	
	type 15K, 15H, 8G, 15G, 15-VV, 15V-W	solid wood ²⁾	diameter	[mm]	40	
			cross section a x b	[mm]	40 x 40	
folded plate style	round steel	diameter	[mm]	17.2 ⁴⁾	A1	
wall tie		round steel	diameter	[mm]	25	A1
			embedment depth wall	[mm]	100	
		flat steel	width x thickness	[mm]	30 x 15	
			embedment depth wall	[mm]	100	
bearing sleeve	round steel wall tie	steel pipe	diameter x thickness	[mm]	40 x 3	not relevant
		plastics	diameter x thickness	[mm]	34 x 4	
	flat steel wall tie	plastics	diameter	[mm]	40	

¹⁾ characteristic values of material according to technical documentation

²⁾ only hardwood of the following species: beech and oak

³⁾ particleboard with CPL-layer (layer composition and mechanical properties according to technical documentation)

⁴⁾ with washer d = 50 mm

Load-bearing bolt stair System "Edenharder & Räder"

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 ≤ 0.90 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 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

Load-bearing bolt stair System "Edenharder & Räder"

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 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

Load-bearing bolt stair System "Edenharder & Räder"

Specification of intended use (Part 2)

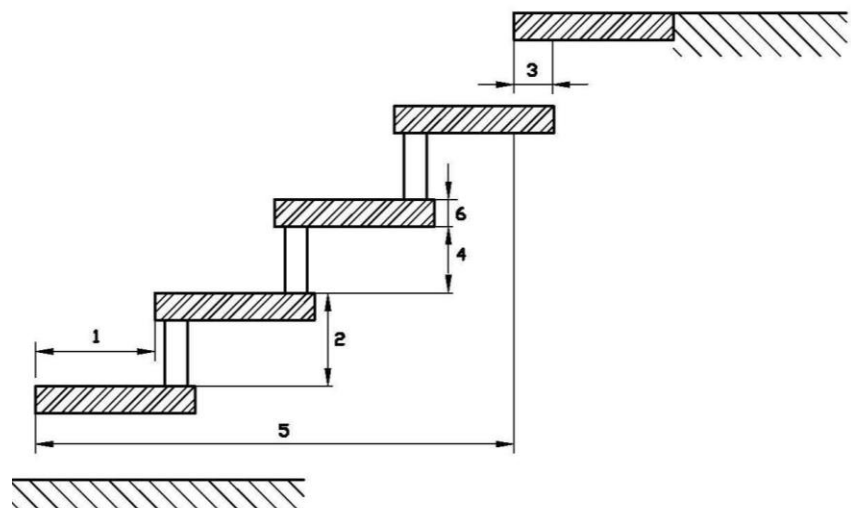
Annex B2

Table 2: Geometry

Designation			Dimension	
			Minimum	Maximum
going	step on walking line ¹⁾	[mm]	210	370 ²⁾
	tapered step	[mm]	80 ^{2) 3)}	600 ^{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	15
openings	between stairs and walls	[mm]	- ⁵⁾	30
	between consecutive steps	[mm]	- ⁵⁾	155
clear width of stairs		[mm]	500	1000
minimum headroom		[mm]	- ⁵⁾	
length of the flight		[mm]	- ⁵⁾	3640
thickness of steps		[mm]	55	- 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 riser
- 3 overlap
- 4 opening between consecutive steps
- 5 length of the flight
- 6 thickness of steps



Load-bearing bolt stair System "Edenharder & Räder"

Geometry of the stair

Annex C1

Table 5: 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]	0,8	

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

Table 6: 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]	3640 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),
additional support at step 6 for stair type 15G (L=2080mm) and at step 4 for stair type 15V (L=2600mm)

Table 7: 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

Load-bearing bolt stair System "Edenharder & Räder"

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

Annex C2