

Approval body for construction products  
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and  
Laender Governments



## European Technical Assessment

**ETA-09/0195**  
**of 16 February 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

WE1- and WE2-Stair System H + I

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

H + I Treppentechnik AG  
Eschnerstraße 51  
9487 BENDERN  
FÜRSTENTUM LIECHTENSTEIN

Manufacturing plant

H+I Treppentechnik Werk 1-99

This European Technical Assessment  
contains

16 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.

This version replaces

ETA-09/0195 issued on 22 July 2014

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## Specific Part

### 1 Technical description of the product

The WE1- and WE2-Stair System H + I is a prefabricated stair system, which consists of steps, load-bearing bolts and wall ties. The steps have a minimum thickness of 54 mm. The stair can also be formed as a folded plate stair by additional risers.

The steps of the WE1-Stair are connected with each other by a load-bearing bolt on the wall-free side. The steps of the WE2-Stair are connected with each other by a load-bearing bolt on the wall-free side and on the wall side. In case of the folded plate style there are three load-bearing bolts at least inside of the riser. On the wall side each step is equipped with two wall ties, which are anchored in the staircase wall. Alternatively to the support by wall ties a stringer can be used.

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.

Handrail and barrier are not part of the stair system, but may be attached to the stair optionally according to the individual requirements.

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 ETA

### 3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	See Annex A6
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

English translation prepared by DIBt

**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.

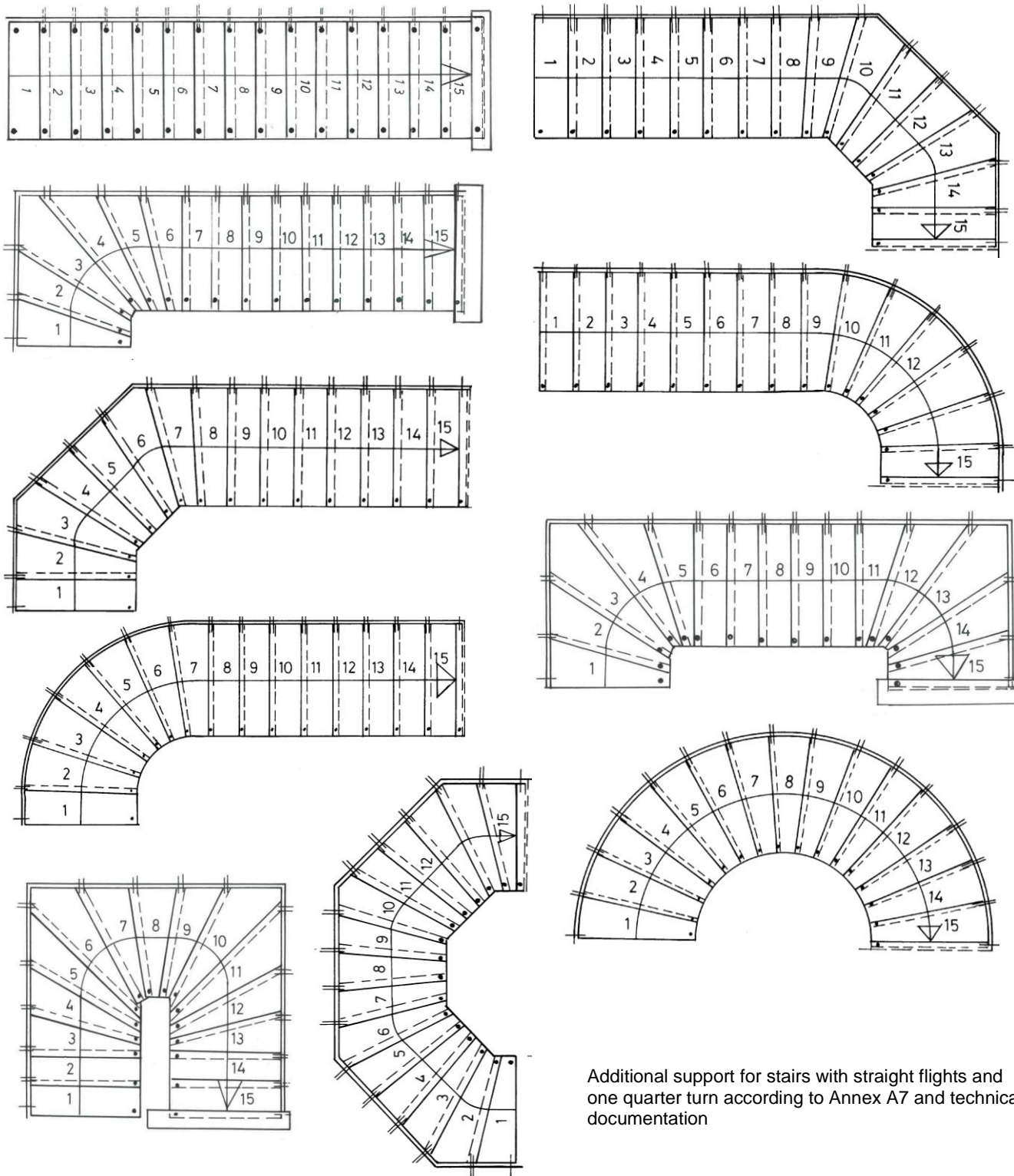
Issued in Berlin on 16 February 2016 by Deutsches Institut für Bautechnik

Andreas Kummerow  
p. p. Head of Department

*beglaubigt:*  
Wittstock

### Types of plan (Part 1)

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



Additional support for stairs with straight flights and one quarter turn according to Annex A7 and technical documentation

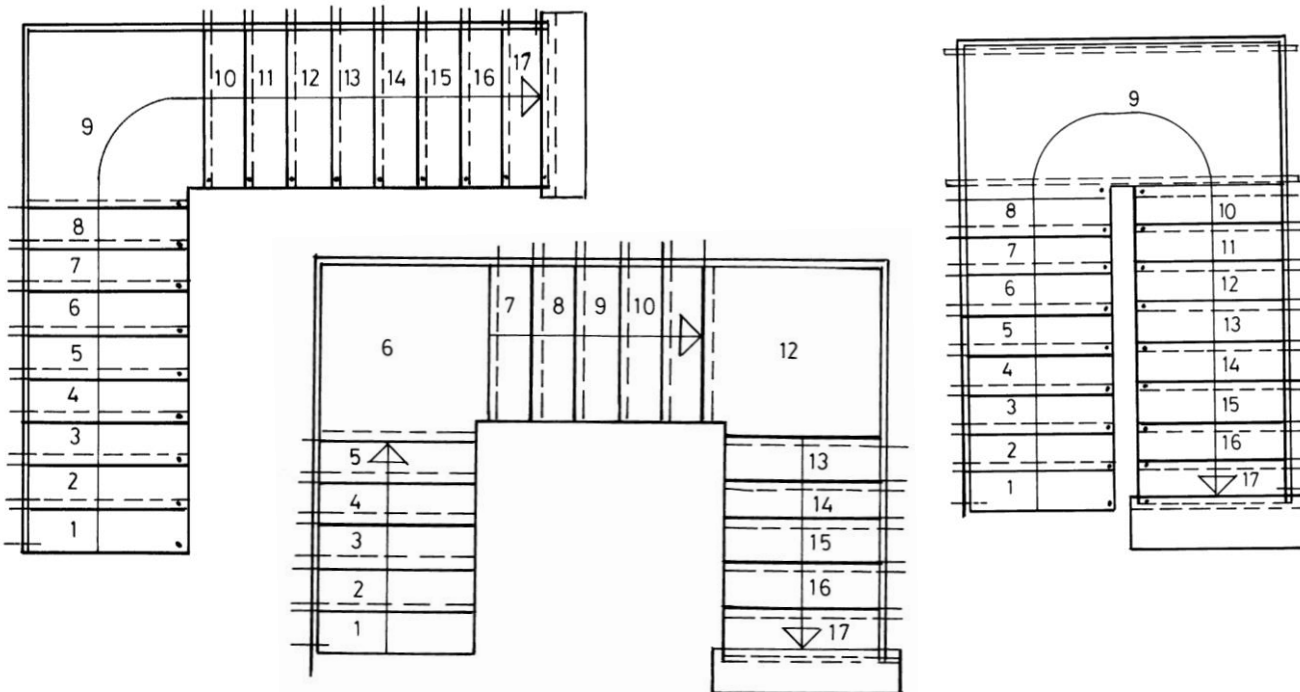
**WE1- und WE2-Stair System H + I**

Types of plan (Part 1)

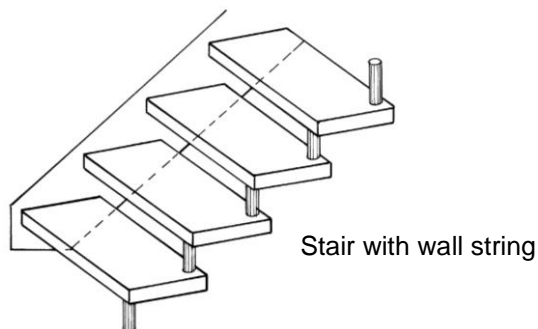
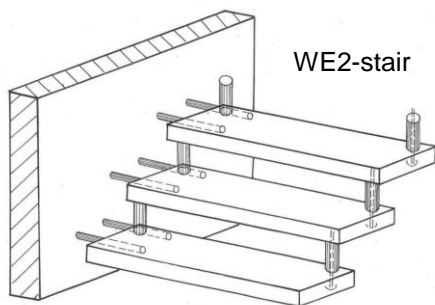
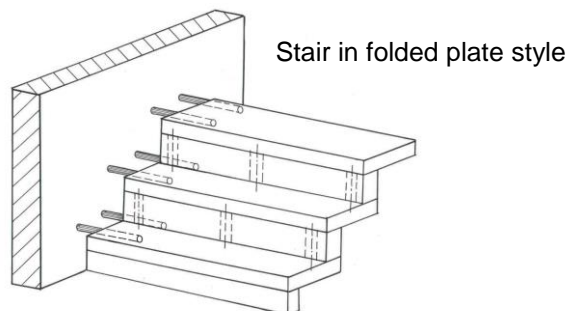
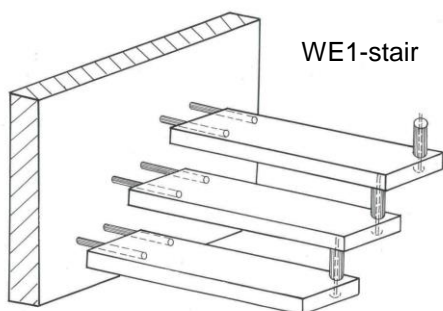
**Annex A1**

### Types of plan (Part 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



### Types of construction

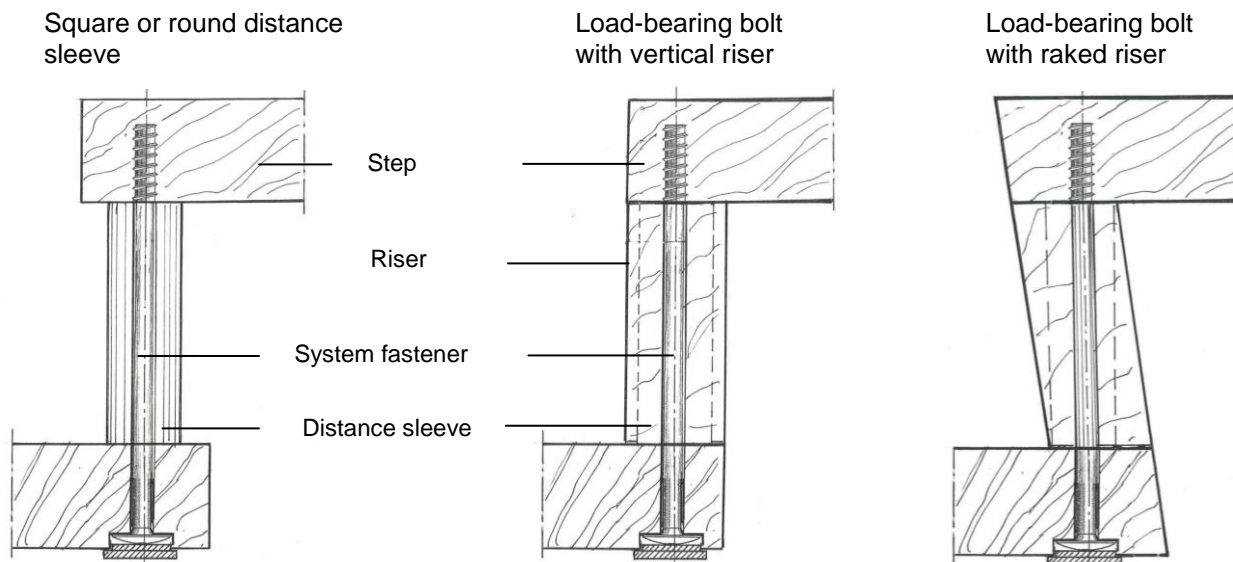


**WE1- und WE2-Stair System H + I**

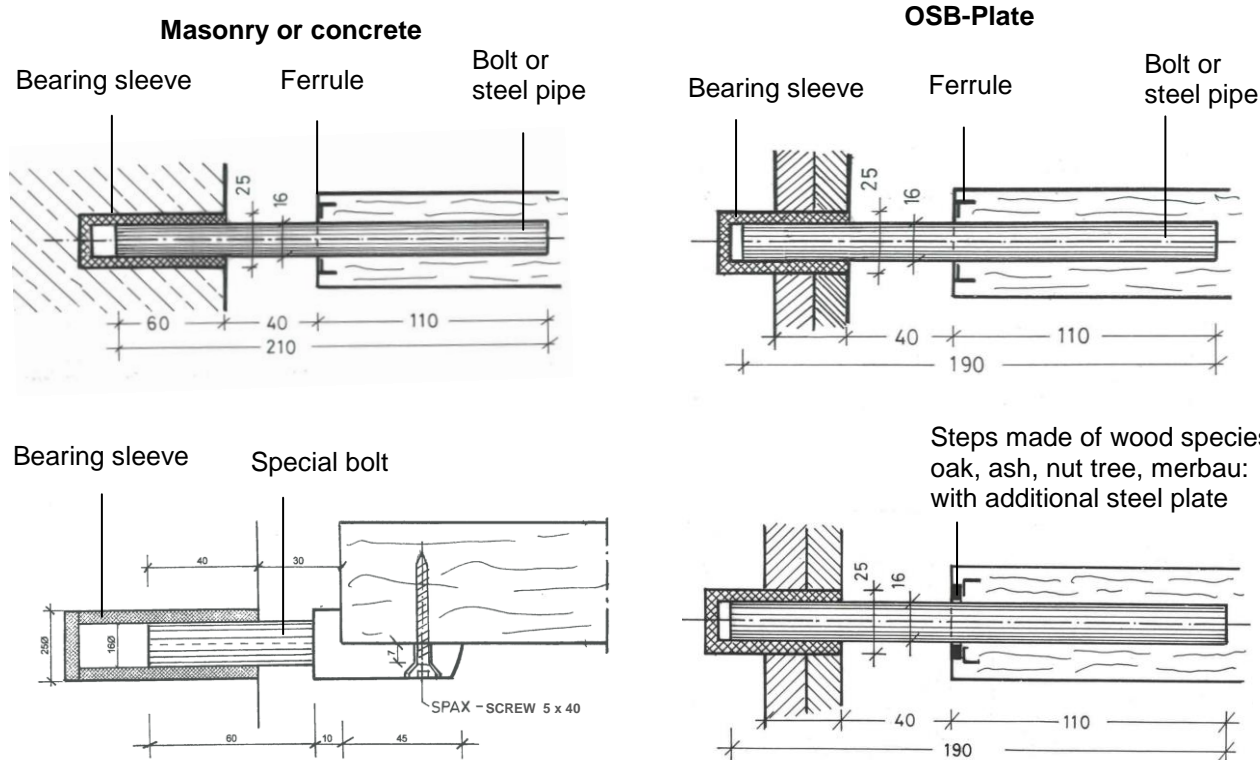
Types of plan (Part 2), Types of construction

**Annex A2**

### Load-bearing bolts (possible types)



### Wall ties (possible types)



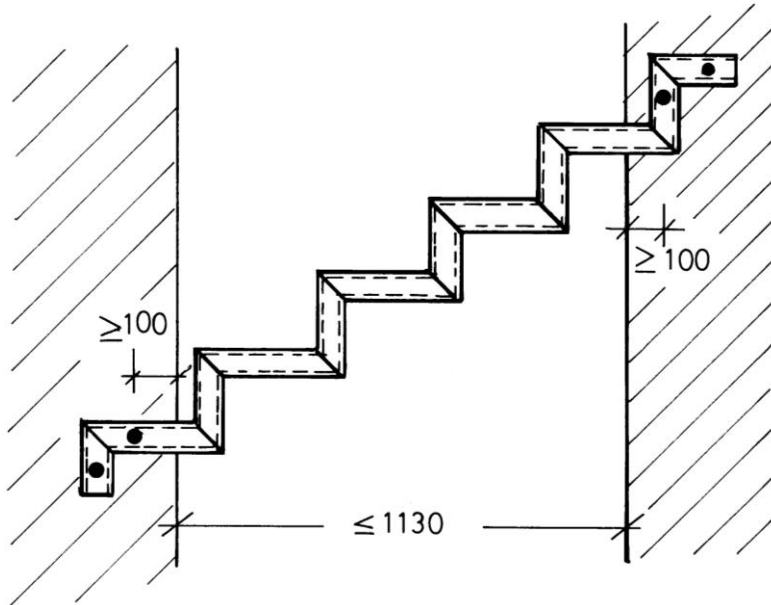
**WE1- und WE2-Stair System H + I**

Load-bearing bolts and wall ties

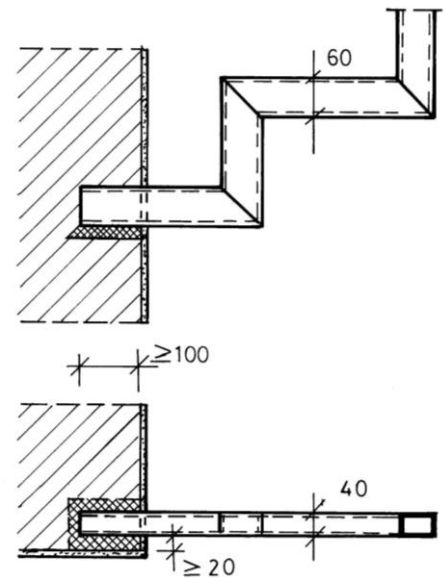
**Annex A3**



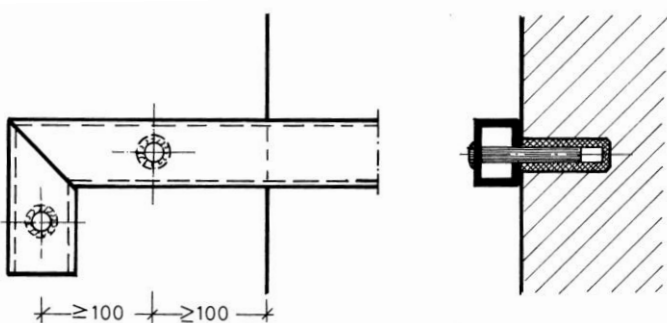
**Wall-replacement-beam made of steel**



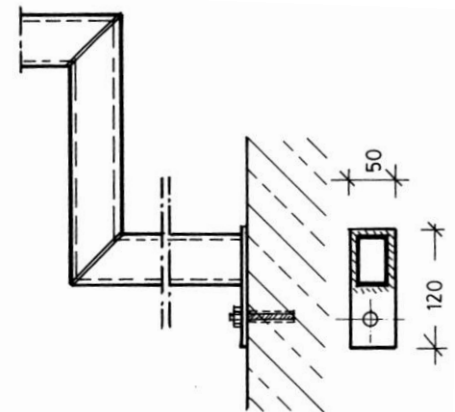
**Support Type A**



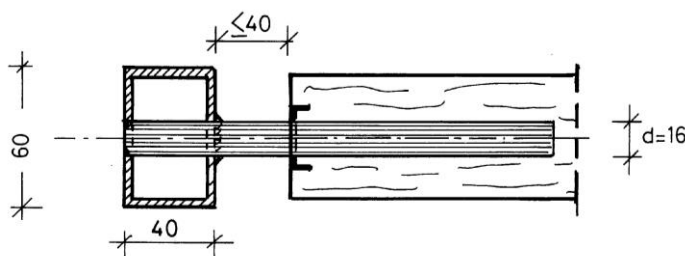
**Support Type B**



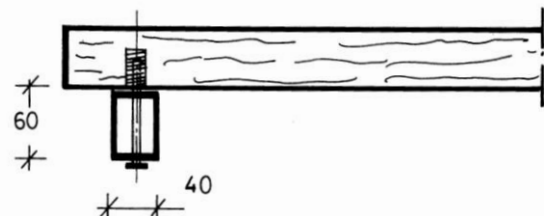
**Support Type C**



**Step - beam - joint (bolt)**



**Step - beam - joint (screwed)**



more details according to the technical documentation

all dimensions in mm

**WE1- und WE2-Stair System H + I**

Wall replacement beam made of steel

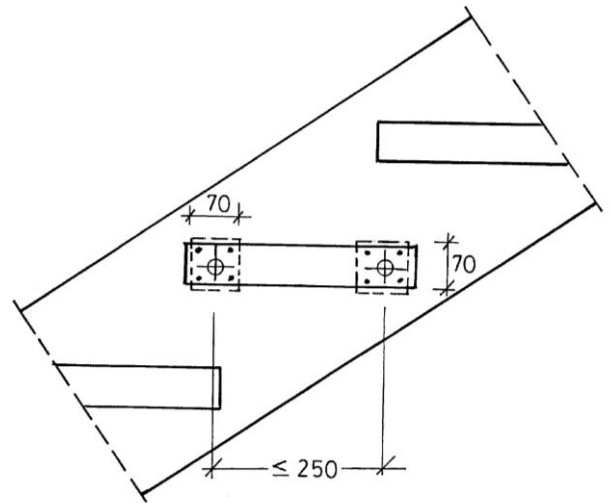
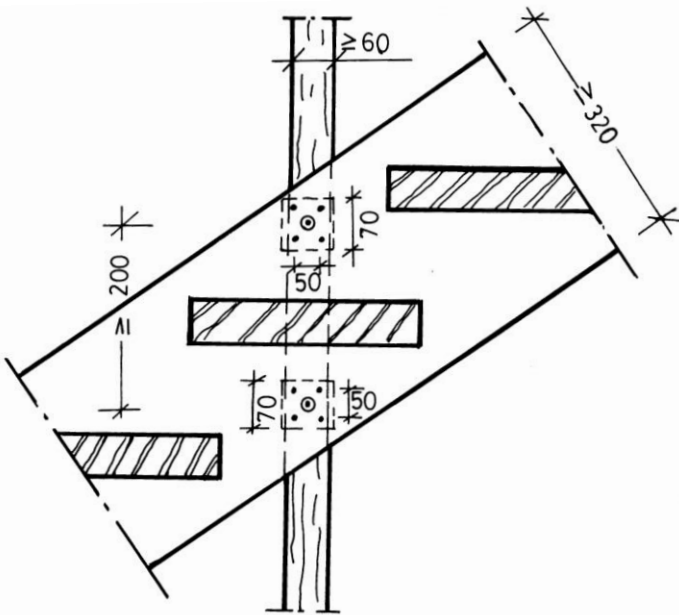
**Annex A4**

**Wall string made of wood**

Connection to wall with distance  $e \leq 800$  mm

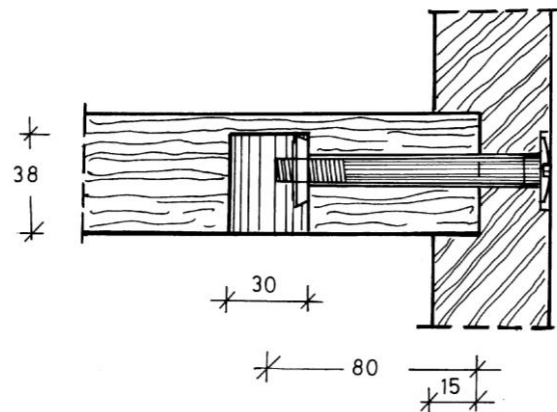
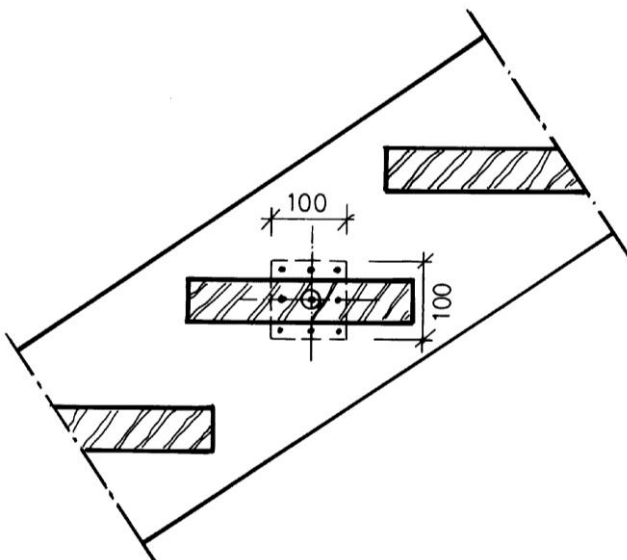
**Connection at wood frame wall**

**Connection at masonry wall**



**Connection at concrete wall**

**Step – string - joint**



more details according to the technical documentation

all dimensions in mm

**WE1- und WE2-Stair System H + I**

Wall string made of wood

**Annex A5**

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

Component	Material <sup>1)</sup>	Dimension		Value	Reaction to fire
steps, risers	solid wood <sup>2)</sup>	thickness	[mm]	54 <sup>3)</sup>	D-s2, d0
load-bearing bolt / system fastener	steel	diameter	[mm]	10	A1
load-bearing bolt - distance sleeve	solid wood <sup>2)</sup>	diameter	[mm]	45 or 50	D-s2, d0
		cross section a x b	[mm]	50 x 50	
wall tie	round steel or steel pipe	diameter	[mm]	16	A1
		diameter x wall thickness	[mm]	16 x 2.0	
		embedment depth wall	[mm]	60 (32) <sup>4)</sup>	
		embedment depth wall (special bolt)	[mm]	40	
		embedment depth step	[mm]	110	
wall replacement beam	steel hollow section	height / width / wall thickness	[mm]	60 / 40 / 4	A1
wall string	solid wood <sup>2)</sup>	height / width	[mm]	320 / 45	D-s2, d0
landing beam	solid wood <sup>2)</sup>	- <sup>5)</sup>	-	- <sup>5)</sup>	D-s2, d0
	steel hollow section	- <sup>5)</sup>	-	- <sup>5)</sup>	A1
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, acacia, nut tree, ash, merbau  
 3) thicknesses of steps for type of plan G and V depending on additional support (according to Table 2 and 3)  
 4) value in brackets for OSB-wall  
 5) according to technical documentation

**WE1- und WE2-Stair System H + I**

Minimum dimensions of relevant stair components and reaction to fire

**Annex A6**

**Table 2: Minimum dimensions of thickness of steps of stairs with straight flights depending on additional support**

Thickness of steps	Number of rises without support				Stair in folded plate style
	WE1-stair with distance sleeve		WE2-stair with distance sleeve		
	Ø 50 mm	50 x 50 mm	Ø 50 mm	50 x 50 mm	
58 mm	7	9	10	11	11
62 mm	8	9	11	12	13
68 mm	8	9	13	14	16
72 mm	-	-	-	16	16
74 mm	-	-	16	16	16

**Table 3: Minimum dimensions of thickness of steps of stairs with one quarter turn depending on additional support**

Thickness of steps	Number of rises without support					
	WE1-stair with distance sleeve			WE2-stair with distance sleeve		
	Ø 45 mm	Ø 50 mm	50 x 50 mm	Ø 45 mm	Ø 50 mm	50 x 50 mm
54 mm	-	-	-	-	14	16
58 mm	12	13	13	-	14	16
60 mm	-	-	-	-	-	16
62 mm	-	-	13	-	16	16
63 mm	-	-	-	-	16	16
66 mm	-	-	-	16	16	16
72 mm	-	-	14	16	16	16

**WE1- und WE2-Stair System H + I**

Minimum dimensions of thickness of steps of stairs with straight flights and quarter turn

**Annex A7**

## 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  $\leq 0.15$  kN/m

Height  $\leq 1.00$  m

Distance of baluster  $\leq 0.85$  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 5

$\gamma_M$ : recommended material partial safety factor; see Table 5

$q_k, Q_k, h_k$ : 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 7

**WE1- und WE2-Stair System H + I**

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 Annexes A3 to A5 after the first heating season and the information on the relationship between moisture content of timber components, air temperature and relative air humidity

**WE1- und WE2-Stair System H + I**

Specification of intended use (Part 2)

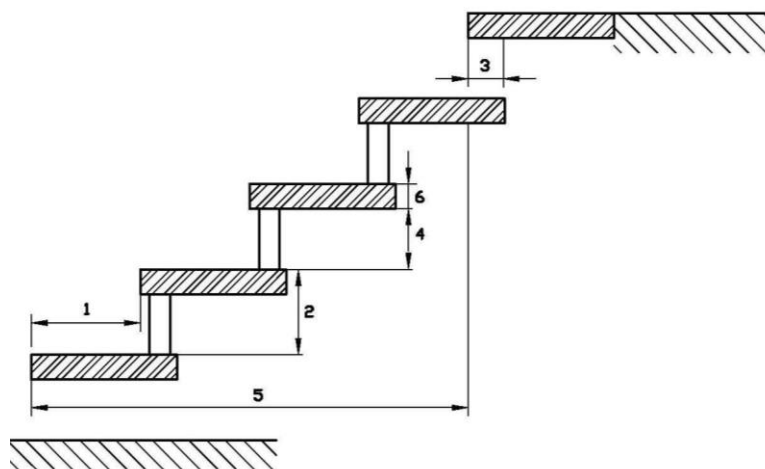
**Annex B2**

**Table 4: Geometry**

Designation			Dimension	
			minimum	maximum
going	step on walking line <sup>1)</sup>	[mm]	210	370 <sup>2)</sup>
	tapered step	[mm]	60 <sup>2) 3)</sup>	540 <sup>2) 4)</sup>
rise of the stairs <sup>1)</sup>		[mm]	140 <sup>2)</sup>	210
pitch of the walking line <sup>1)</sup>		[°]	21	45
overlap of the steps	Wall side	[mm]	30 <sup>6)</sup>	- <sup>5)</sup>
	Wall free side	[mm]	70 <sup>6)</sup>	- <sup>5)</sup>
number of rises		[-]	3	16 (18) <sup>8)</sup>
openings	between stairs and wall	[mm]	- <sup>5)</sup>	40 (30) <sup>7)</sup>
	between consecutive steps	[mm]	- <sup>5)</sup>	156
clear width of stairs		[mm]	500	1000
minimum headroom		[mm]	- <sup>5)</sup>	
length of the flight		[mm]	- <sup>5)</sup>	4050
thickness of steps		[mm]	54	- <sup>5)</sup>

- 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 20 mm  
 7) values in brackets for wall ties with special bolt  
 8) values in brackets for stairs with landing

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



**WE1- und WE2-Stair System H + I**

Geometry of the stair

**Annex C1**

**Table 5: Load-bearing capacity - Characteristic values of resistance**

Component	Type of loading	Characteristic values of resistance			$\gamma_M$
Flight	vertical variable uniformly distributed load	$q_{R,k}$	[kN/m <sup>2</sup> ]	6,8	1,5 <sup>1)</sup>
	vertical variable single load	$Q_{R,k}$	[kN]	4,5	
	horizontal variable uniformly distributed load on barrier	$h_{R,k}$	[kN/m]	0,8	
Wall-replacement-beam / Landing beam	vertical variable uniformly distributed load	$q_{R,k}$	[kN/m <sup>2</sup> ]	5,0	1,1 <sup>2)</sup>
	vertical variable single load	$Q_{R,k}$	[kN]	3,3	
	horizontal variable uniformly distributed load on barrier	$h_{R,k}$	[kN/m]	0,6	

<sup>1)</sup> Recommended partial safety factor (wood decisive), in absence of other national regulations

<sup>2)</sup> Recommended partial safety factor (steel decisive), 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 <sup>2</sup> ]	3.0
length of the median line of the flight	L	[mm]	4050 <sup>1)</sup>
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

<sup>1)</sup> with additional support according to Annex A7, l = reference length = distance between supports

**Table 7: Imposed loads**

Type of loading	Imposed loads		
vertical variable uniformly distributed load	q	[kN/m <sup>2</sup> ]	3.0
vertical variable single load	Q	[kN]	2.0
horizontal variable uniformly distributed load on barrier	h	[kN/m]	0.5

**WE1- und WE2-Stair System H + I**

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

**Annex C2**