

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-06/0227
of 7 October 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

Kenngott WF2 - Timber stair

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

Kenngott - Treppen Servicezentrale
Longlife - Treppen GmbH
Neulandstraße 31
74889 Sinsheim
DEUTSCHLAND

Manufacturing plant

Kenngott-Treppen, Werk 1 und 2

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

European Assessment Document (EAD)
340006-00-0506

The European Technical Assessment is issued by the Technical Assessment Body in its official language. Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and shall be identified as such.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full. However, partial reproduction may only be made with the written consent of the issuing Technical Assessment Body. Any partial reproduction shall be identified as such.

This European Technical Assessment may be withdrawn by the issuing Technical Assessment Body, in particular pursuant to information by the Commission in accordance with Article 25(3) of Regulation (EU) No 305/2011.

Specific Part

1 Technical description of the product

The "Kenngott WF2 - Timber stair" is a prefabricated stair system, which consists of steps and landings made of solid wood or wood-based products, load-bearing bolts and wall ties.

On the wall-free side and on the wall side the steps are connected with each other by a load-bearing bolt. On the wall side each step is equipped with a wall tie, which is anchored in the staircase wall. In the area of openings in the wall alternatively a construction with double load-bearing bolts and strengthened wall ties at the beginning and at the end (according to Annex A3) or a stringer can be used. By using a stringer the steps are fastened to the stringer by an angle supported with a system fastener.

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 attestation of conformity, 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 A4
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	Solid wood panels: do not contain pentachlorophenol Other wood-based products: ≤ 0.5 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

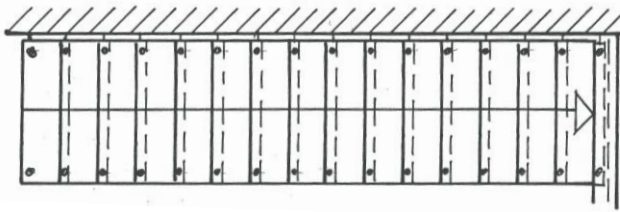
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 7 October 2016 by Deutsches Institut für Bautechnik

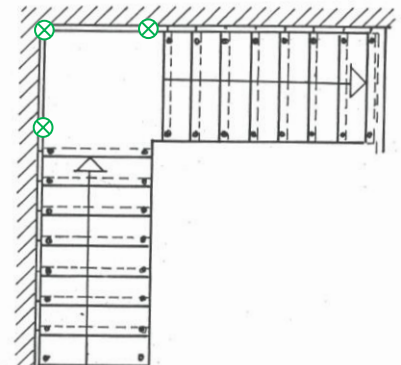
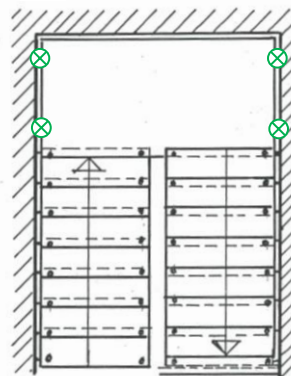
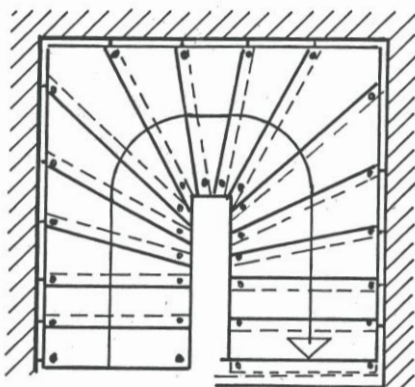
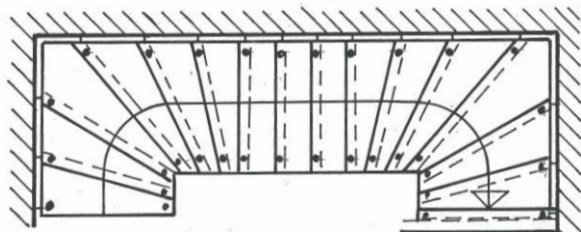
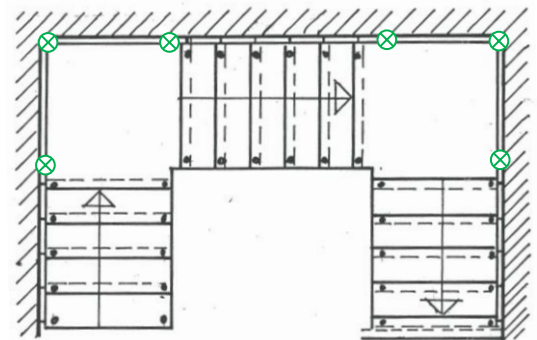
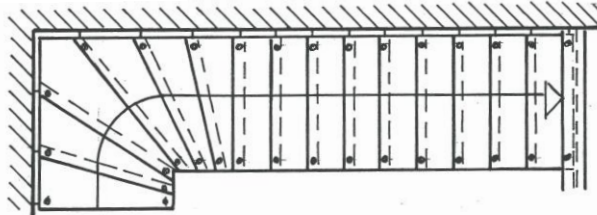
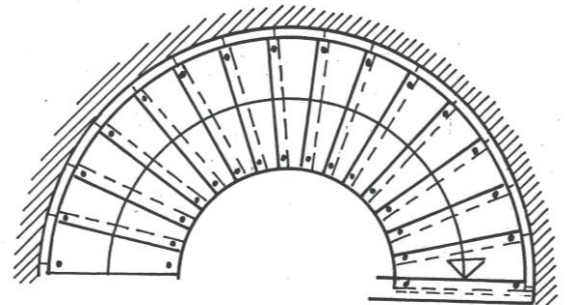
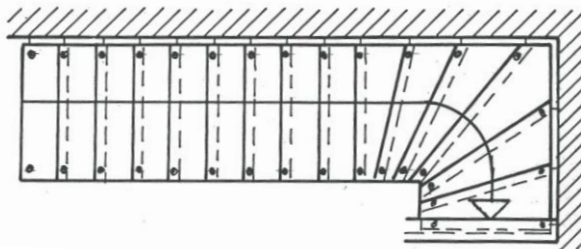
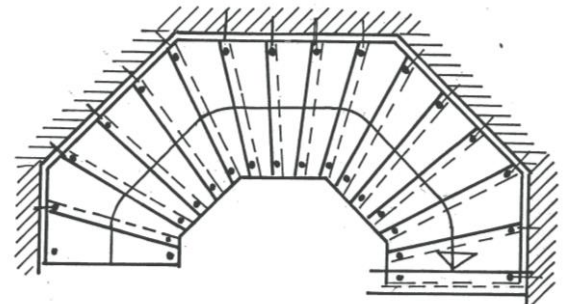
Uwe Bender
Head of Department

beglaubigt:
Stiller

Types of plan



additional support required (see Annex A4)



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 vertical loads

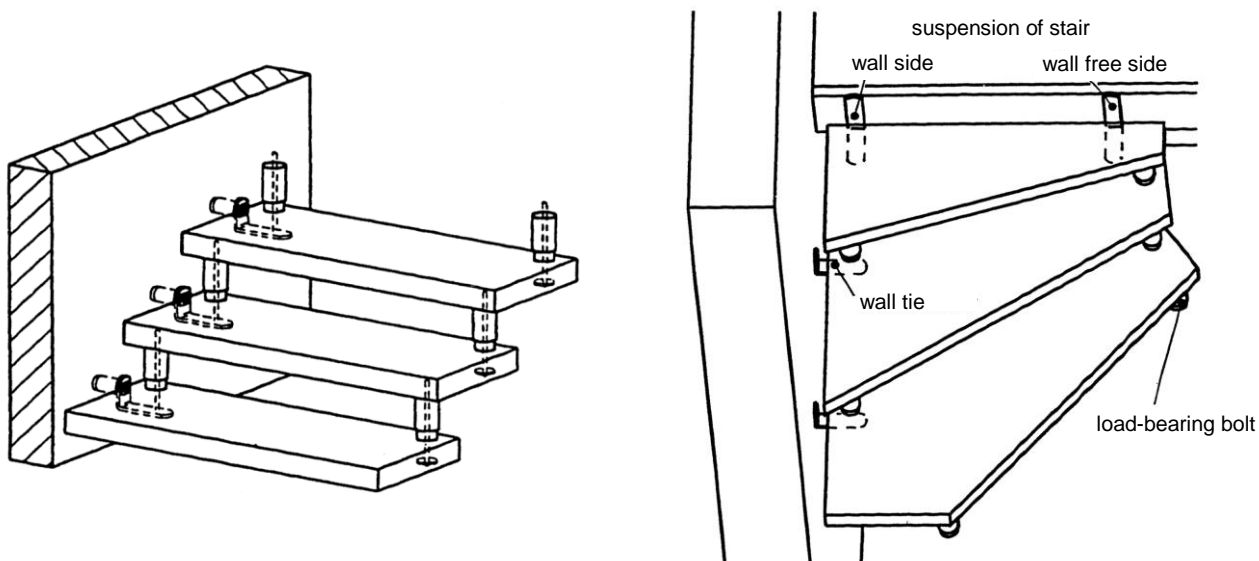
In the area of openings wall-replacement-beams are possible (see Annex A3)

Kenngott WF2 – Timber stair

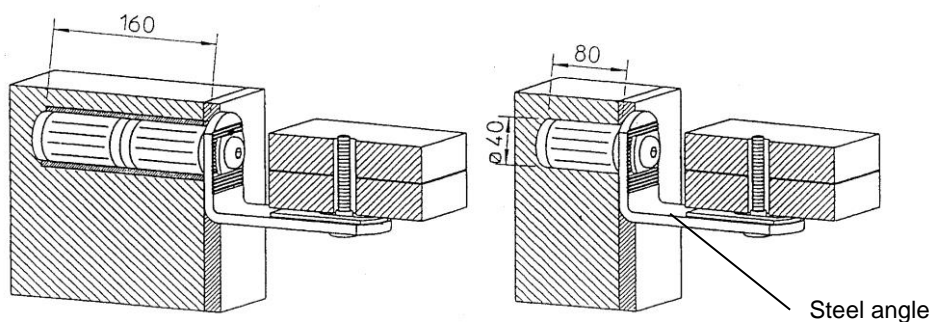
Product

Annex A1

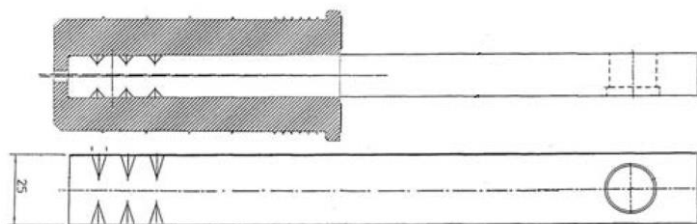
Construction



Wall tie – steel angle



Wall tie - flat steel



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

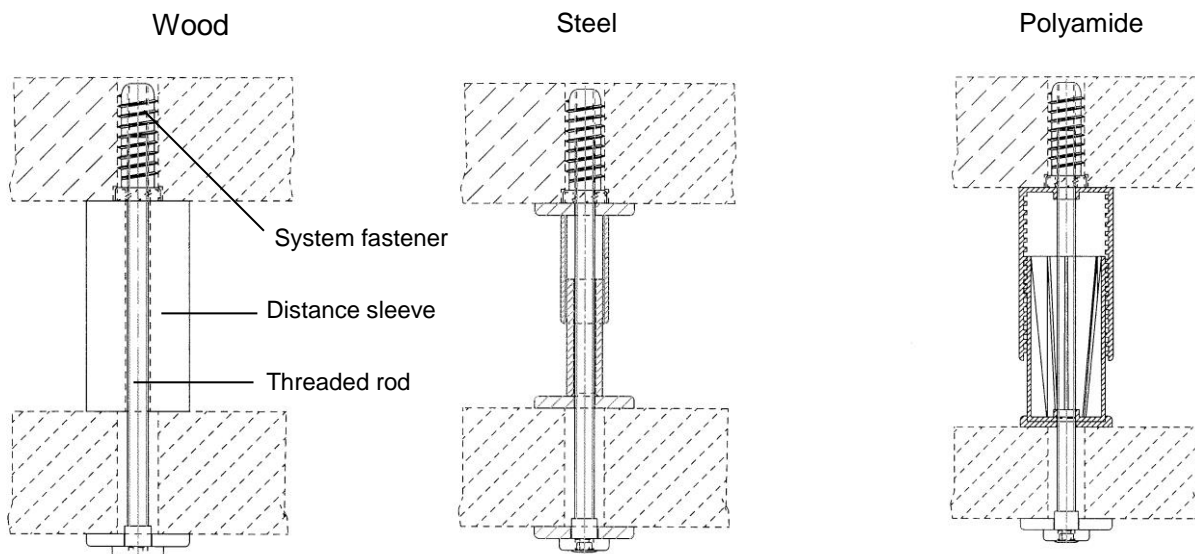
Dimensions in mm

Kenngott WF2 – Timber stair

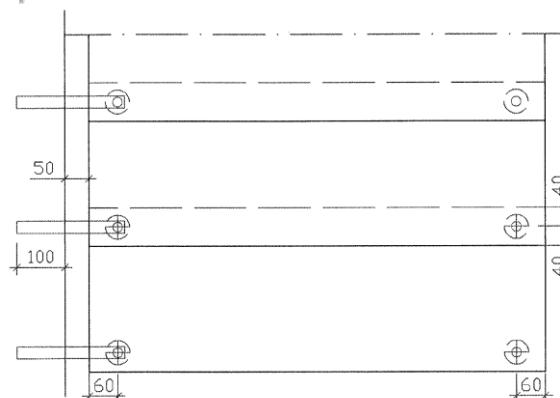
Construction, Wall tie

Annex A2

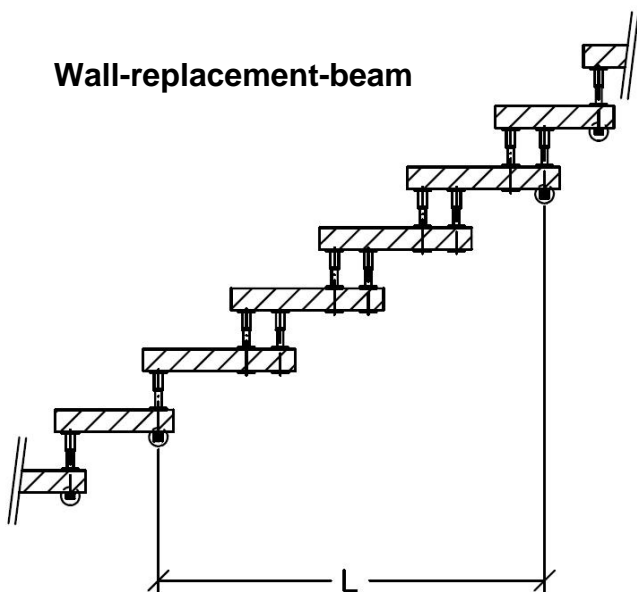
Load-bearing bolt



Edge distances of load-bearing bolt
(dimensions in mm)



Wall-replacement-beam



Load-bearing bolts steel or wood

Special wall ties on the ends of the wall-replacement-beam according to technical documentation

Maximum length of the wall-replacement-beam:
1.30 m for beech, oak, maple
1.00 m for wood-based boards
0.90 m for nut tree

more details according to the technical documentation

Kenngott WF2 – Timber stair

Load-bearing bolt

Annex A3

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

Components		Material ¹⁾	Dimensions		Value	Reaction to fire
Steps, landings	straight flight stair	Solid wood ²⁾	Thickness	[mm]	64 ⁴⁾	D-s2, d0
	other types	Solid wood ²⁾	Thickness	[mm]	64	
	straight flight stair	Wood based material ³⁾	Thickness	[mm]	64 ⁴⁾	
	other types	Wood based material ³⁾	Thickness	[mm]	64	
Landing beam		Steel	- ⁶⁾		- ⁶⁾	A1
		Solid wood ⁶⁾	- ⁶⁾		- ⁶⁾	D-s2, d0
Load-bearing bolt threaded rod		Steel	Diameter	[mm]	10	A1
Load-bearing bolt distance sleeve		Solid wood ²⁾	Diameter	[mm]	50	D-s2, d0
		Steel	Diameter	[mm]	18 / 25	A1
		Polyamide	Diameter	[mm]	50	No performance assessed
Wall tie		Flat steel	Height / width / length	[mm]	15 / 25 / 85-150	A1
			Embedment depth - wall	[mm]	160 (80) ⁵⁾	
Wall tie		Flat steel	Height / width / length	[mm]	25 / 25 / 85-150	A1
			Embedment depth - wall	[mm]	160 (80) ⁵⁾	

- 1) characteristic values of materials according to the technical documentation
2) solid wood I = only hardwood of the following species: oak
solid wood II = only hardwood of the following species: beech, maple, nut tree
3) wood-based board I = particle board with veneer
wood-based board II = particle board with laminate (layer composition according to the technical documentation)
4) with additional support wood-based material II: Step 2 (l = 3380 mm),
wood-based material I and solid wood II: Step 3 (l = 3120 mm),
solid wood I: Step 4 (l = 2860 mm)
5) value in brackets valid for solid brick walls
6) characteristic values according to the technical documentation

Kenngott WF2 – Timber stair

Minimum dimensions of relevant stair components and reaction to fire

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 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

Kenngott WF2 – Timber stair

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

Kenngott WF2 – Timber stair

Specification of intended use (Part 2)

Annex B2

Table 2: 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	- ⁵⁾
Number of rises		[-]	3	16
Openings	between stairs and wall	[mm]	- ⁵⁾	50
	between consecutive steps	[mm]	- ⁵⁾	145
Clear width of stairs		[mm]	500	1000
Minimum headroom		[mm]	- ⁵⁾	
Length of the flight		[mm]	- ⁵⁾	3900
Thickness of steps		[mm]	64	- ⁵⁾

¹⁾ values are constant within one flight

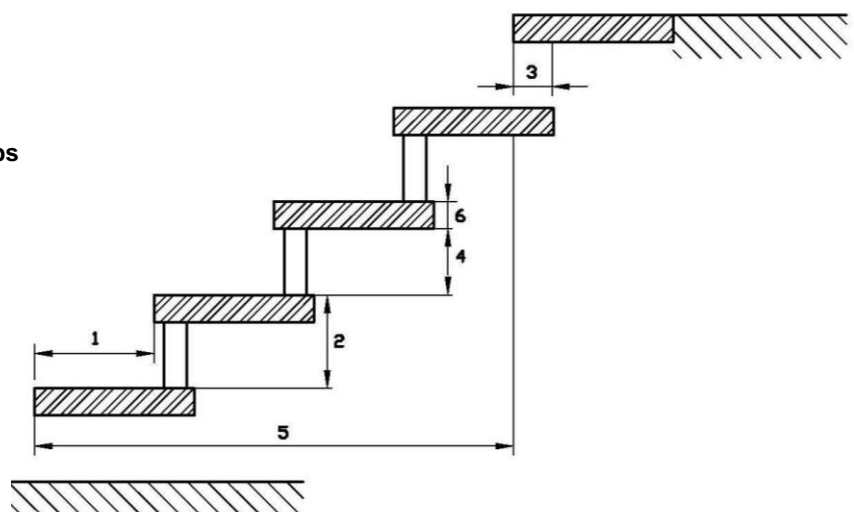
²⁾ tolerance between nominal value and actual value = ± 5 mm

³⁾ inside of tapered step

⁴⁾ outside of tapered step

⁵⁾ not relevant

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



Kenngott WF2 – Timber stair

Geometry of the stair

Annex C1

Table 3: Load-bearing capacity – Characteristic values of resistance

Component	Type of loading	Characteristic values of resistance			γ_M
Stair flight	vertical variable uniformly distributed load	$q_{R,k}$	[kN/m ²]	6.8	1.5 ¹⁾
	vertical variable single load	$Q_{R,k}$	[kN]	4.5	
	horizontal variable uniformly distributed load acting on barrier	$h_{R,k}$	[kN/m]	1.1	
Landing beam	vertical variable uniformly distributed load	$q_{R,k}$	[kN/m ²]	5.0	1.1 ²⁾
	vertical variable single load	$Q_{R,k}$	[kN]	3.3	

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

²⁾ Recommended partial safety factor (decisive steel), in absence of other national regulations

Table 4: 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]	3900 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⁾ for straight flights: l = reference length = distance between supports (additional support see Annex A4)

Table 5: 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

Kenngott WF2 – Timber stair

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

Annex C2