European Technical Assessment

ETA-13/0193
of 12 September 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 - flat string stair made of HPL strings
Product family to which the construction product belongs	Prefabricated stair with strings made of flat laminate and steps made of solid wood or wood-based products 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

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Specific Part

1 Technical description of the product

The Kenngott - flat string stair made of HPL strings is a prefabricated stair system, which consists of steps, strings and system fasteners. The steps are connected with the strings by system fasteners on both sides.

The steps are made of solid wood or wood-based products, the strings are made of high-pressure laminates (HPL) and the system fasteners 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 documentation[1].

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.

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[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 stair
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	No pentachlorophenol treated materials are used
Radioactive emission	Not relevant

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 made of solid wood and wood-based products No dangerous by components made of HPL when accidentally broken
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 12 September 2016 by Deutsches Institut für Bautechnik

Andreas Kummerow
p.p. Head of Department

beglaubigt:
Stiller

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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
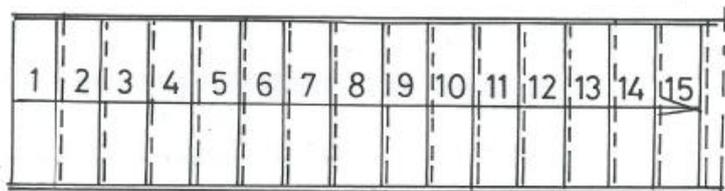
Type 16G
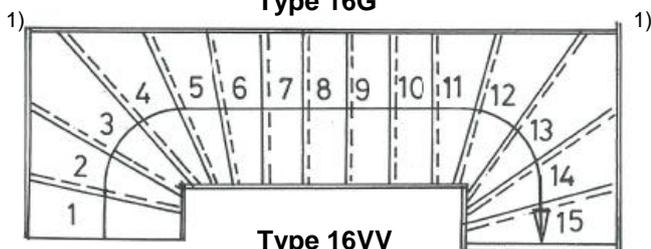
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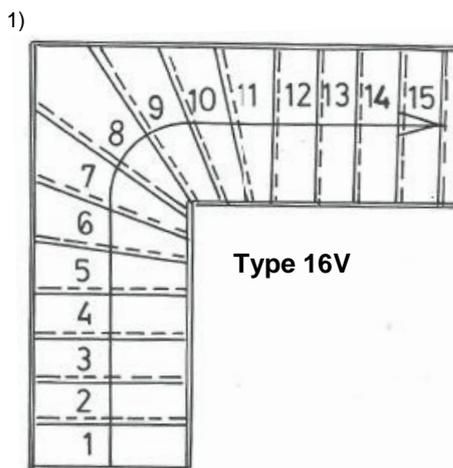
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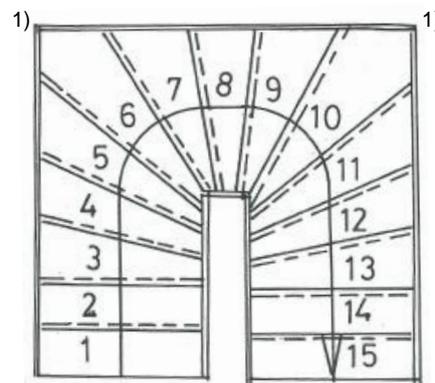
Type 16V
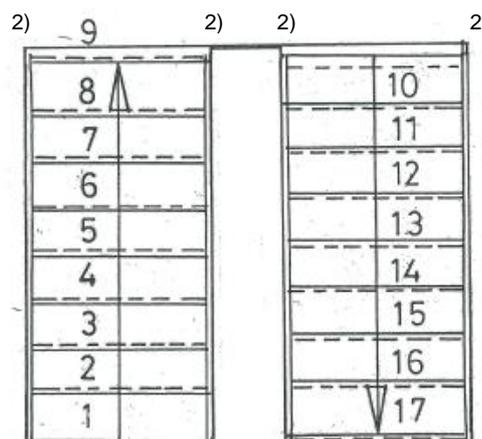
Type 18P

1) Additional support for vertical loads

2) Support at landing

horizontal wall connections according to technical documentation

Construction

Kenngott – flat string stair made of HPL strings	**Annex A1**
Product and intended use	

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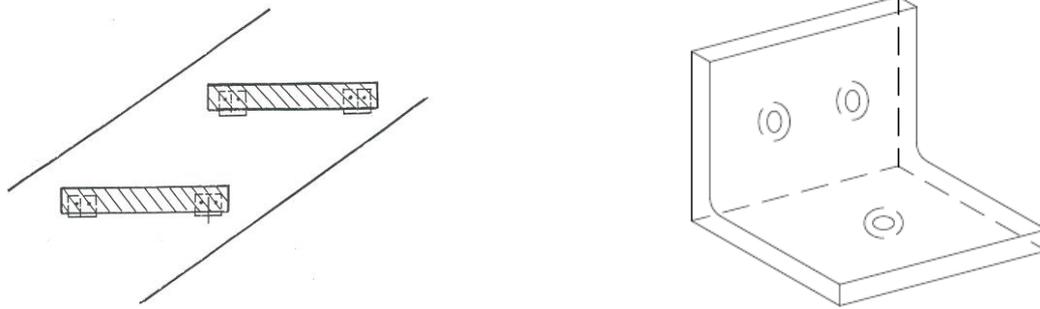
Step string joint

String corner joint (HPL)
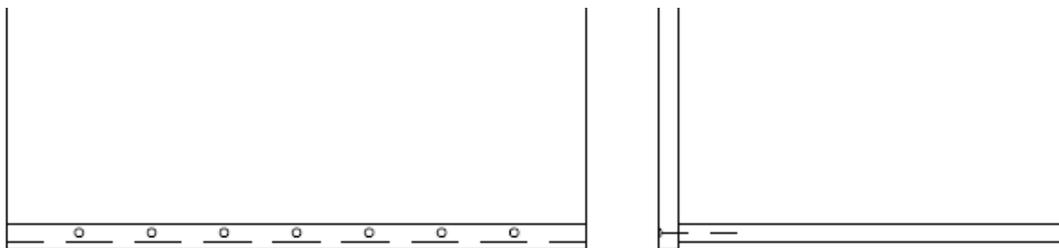
String corner joint wall-free side
(additional angle)
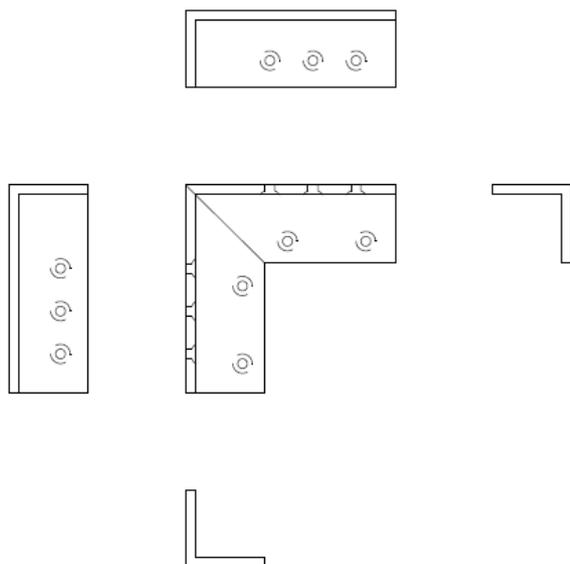
String corner joint wall side
(additional angle)
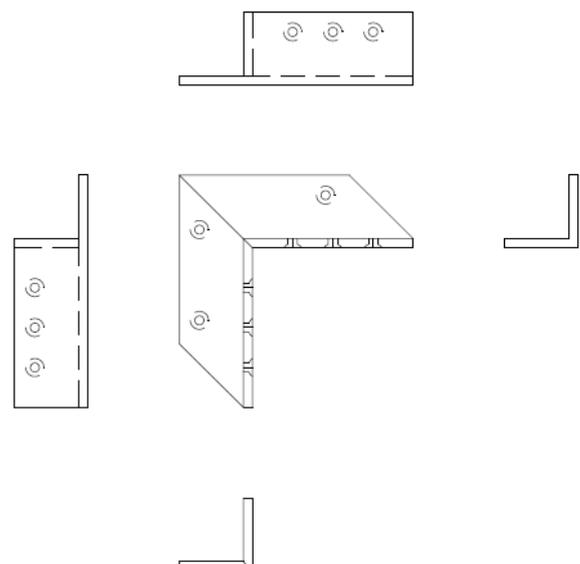
more details according to the technical documentation

Kenngott – flat string stair made of HPL strings

Step-string joint, string corner joint

Annex A2

Joint at bottom
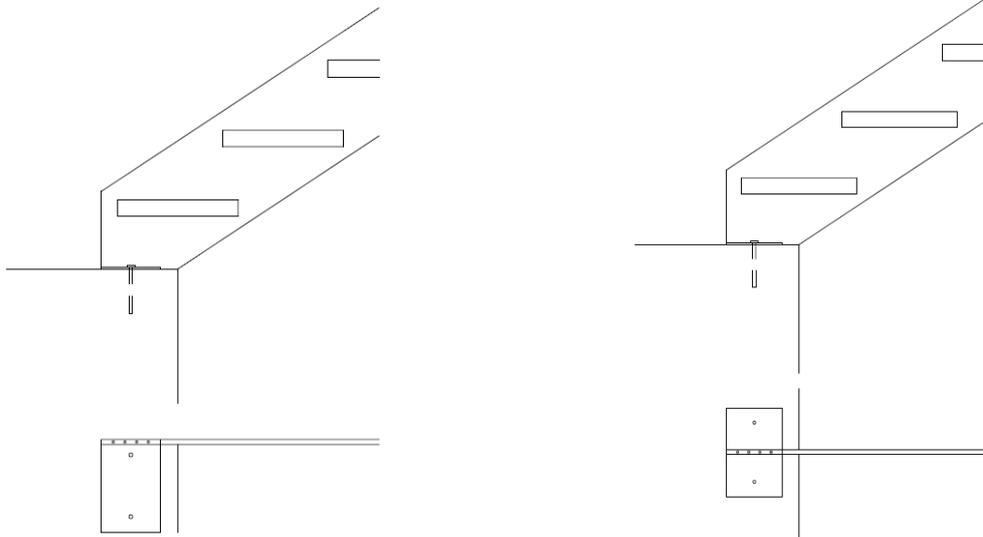
Joint at the top
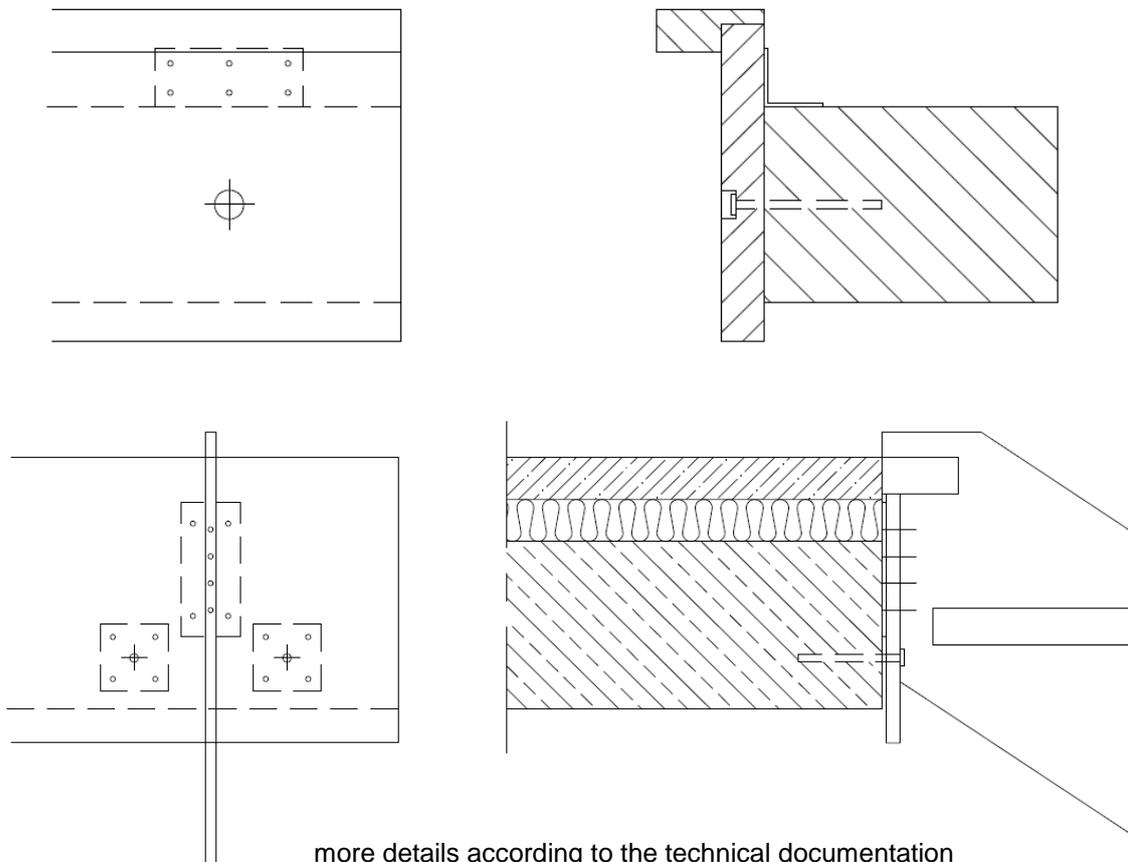
more details according to the technical documentation

Kenngott – flat string stair made of HPL strings

Joint at bottom, Joint at the top

Annex A3

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Support at the corner

Concrete wall
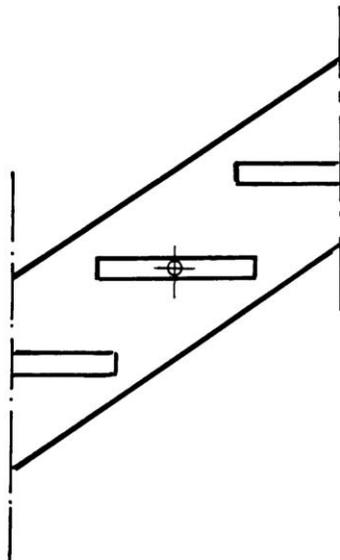
Masonry wall
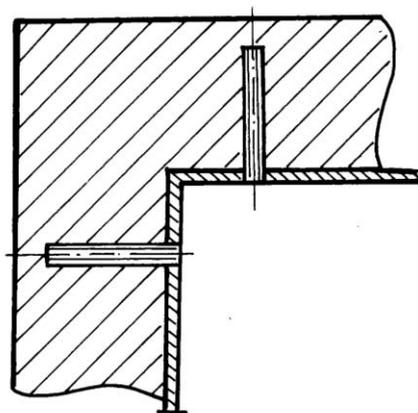
Table 1: Minimum dimensions of components of stair and reaction to fire

Component of stair	Material [1]	Dimension		Value	Reaction to fire
Step	Solid wood [2]	thickness	[mm]	44	D-s2, d0
	Wood-based product [3]	thickness	[mm]	45	No performance assessed
String	HPL	width x height	[mm]	13.5 x 300	D-s2, d0
Angle	Steel	- [4]			A1
System fastener	Steel	- [4]			A1

[1] characteristic values of material according to technical documentation
[2] only wood of following species: beech, oak, maple, sapeli, ash, nut tree, cherry tree, mutenye, bete mansonia
[3] wood-based product bamboo type I and type II, layer composition according to technical documentation
[4] according to technical documentation

Kenngott – flat string stair made of HPL strings	
Support at the corner, Minimum dimensions of components of stair 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 ≤ 0.10 kN/m

    Height ≤ 1.00 m

    Distance of baluster ≤ 0.81 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:

$$q_k \cdot \gamma_Q \quad \leq \quad q_{Rk} / \gamma_M$$
$$Q_k \cdot \gamma_Q \quad \leq \quad Q_{Rk} / \gamma_M$$
$$h_k \cdot \gamma_Q \cdot \psi_0 \quad \leq \quad h_{Rk} / \gamma_M$$

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 – flat string stair made of HPL strings	
Specification of intended use (Part 1)	**Annex B1**

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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 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 ± 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 the information on the relationship between moisture content of timber components, air temperature and relative air humidity

Kenngott – flat string stair made of HPL strings	**Annex B2**
Specification of intended use (Part 2)	

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Table 2: Geometry

Designation			Dimension	
			Minimum	**Maximum**
going	step on walking line [1]	[mm]	210	370 [2]
	tapered step	[mm]	60 [2] [3]	550 [2] [4]
rise of the stairs [1]		[mm]	140 [2]	210
pitch of the walking line [1]		[°]	21	45
overlap of the steps		[mm]	40	- [5]
number of rises		[-]	3	16
openings	between stair and wall	[mm]	0	0
	between consecutive steps	[mm]	- [5]	166
clear width of stairs		[mm]	500	1000
minimum headroom		[mm]	- [5]	
length of the flight		[mm]	- [5]	4050
thickness of steps		[mm]	44	- [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

1   **going**
2   **rise**
3   **overlap**
4   **opening between
      consecutive steps**
5   **length of the flight**
6   **thickness of steps**
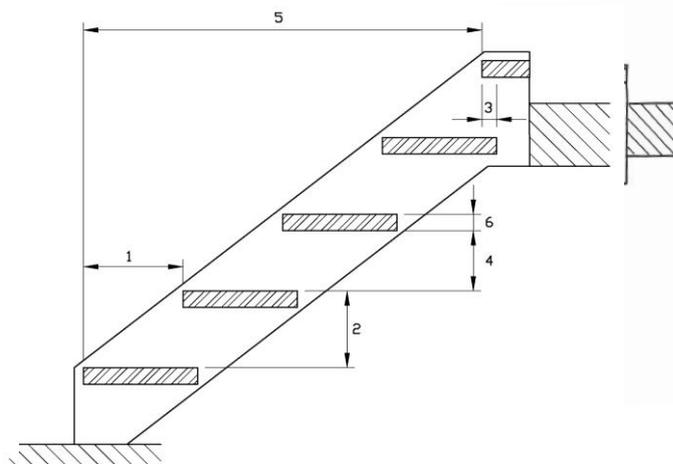
Kenngott – flat string stair made of HPL strings	
Geometry of the stair	**Annex C1**

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

Type of loading	Characteristic values of resistance			γ_M [1]
vertical variable uniformly distributed load	$q_{R,k}$	[kN/m²]	6.8	
vertical variable single load	$Q_{R,k}$	[kN]	4.,5	1,5
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

Deflection of the flight under uniformly distributed load			
uniformly distributed load	q_k	[kN/m²]	3.0
length of the median line of the flight	L	[mm]	4050
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	[-]	$\leq L/200$

Table 5: Imposed loads

Type of loading	Imposed loads		
vertical variable uniformly distributed load	q	[kN/m²]	3.0
vertical variable single load	Q	[kN]	2.0
horizontal variable uniformly distributed load on barrier	h	[kN/m]	0.5

Kenngott – flat string stair made of HPL strings

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

Annex C2