

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-14/0385
of 15 December 2014

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

Zeitform-Hanging stair

Product family
to which the construction product belongs

Prefabricated stair with steps made of solid wood, strings
and suspensions made of steel for use as an indoor stair
in buildings

Manufacturer

Zeitform Möbeldesign GmbH
Neuenreuth am Sand 13
95336 Mainleus
DEUTSCHLAND

Manufacturing plant

Zeitform Möbeldesign GmbH
Werk 1 - 10

This European Technical Assessment
contains

13 pages including 8 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 Zeitform-Hanging stair is a prefabricated stair system, which consists of steps, strings, suspensions and system fasteners. The steps are connected with the strings by system fasteners on both sides. The strings are fixed on the ceiling by suspensions. The steps are made of solid wood and the strings, suspensions and system fasteners 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 A4 |
| 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 A4, Table 1 | 4 |

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

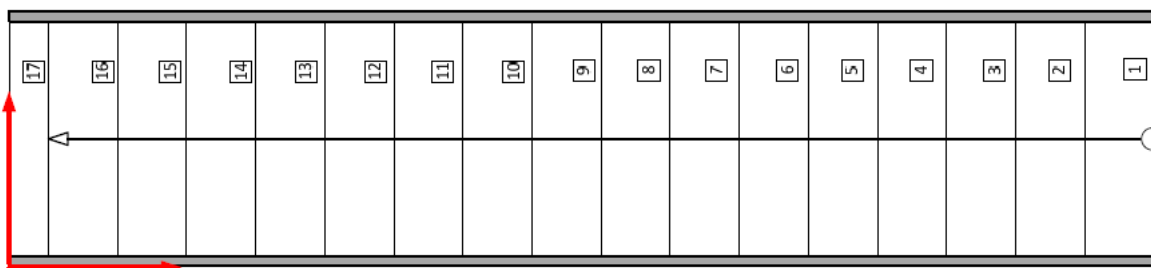
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 15 December 2014 by Deutsches Institut für Bautechnik

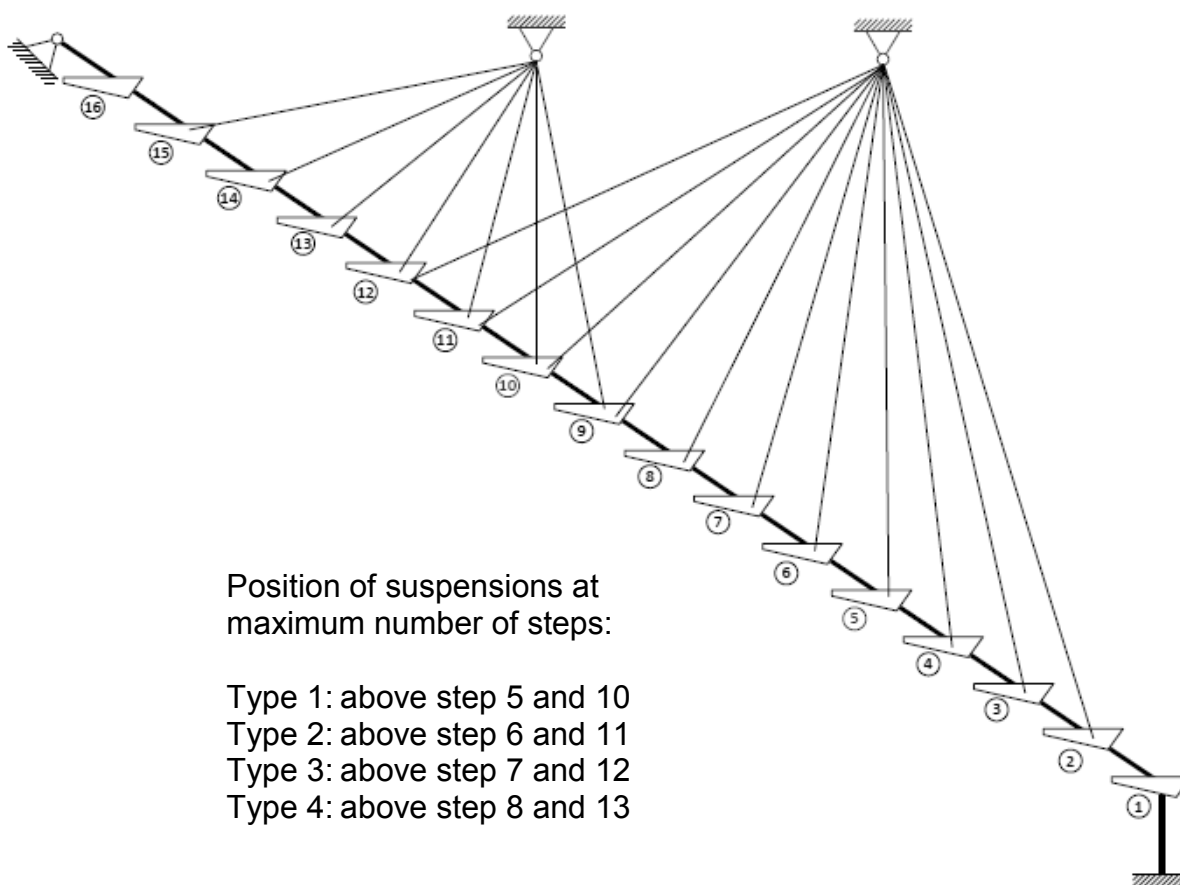
Uwe Bender
 Head of Department

beglaubigt:
 Wittstock

Plan



View



Position of suspensions at
maximum number of steps:

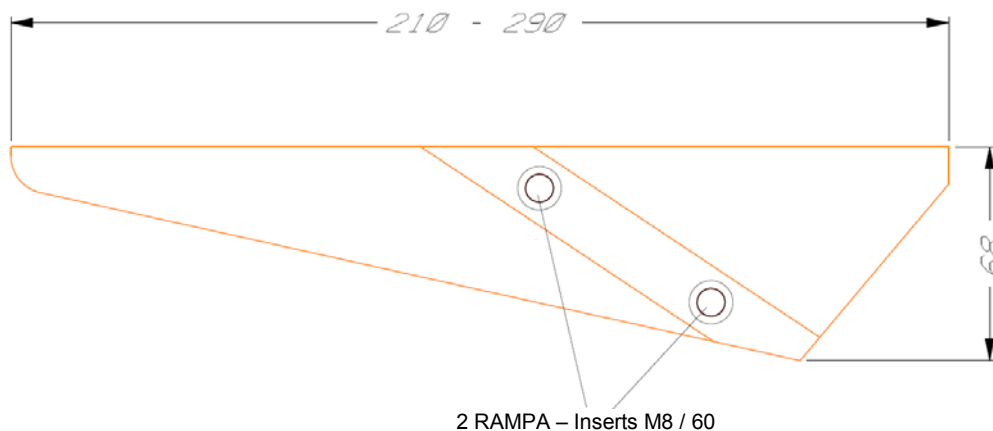
- Type 1: above step 5 and 10
- Type 2: above step 6 and 11
- Type 3: above step 7 and 12
- Type 4: above step 8 and 13

Zeitform-Hanging stair

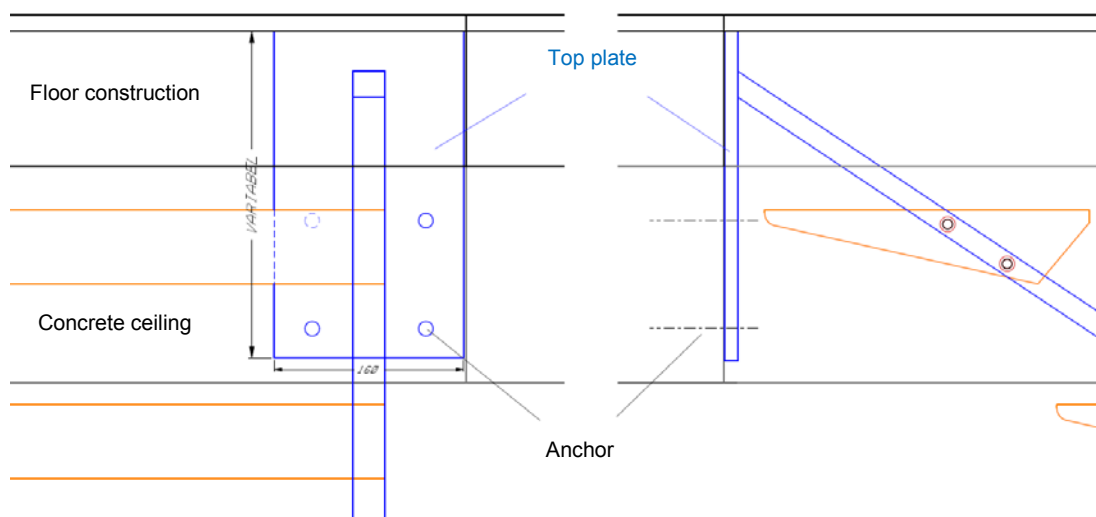
Product and intended use

Annex A1

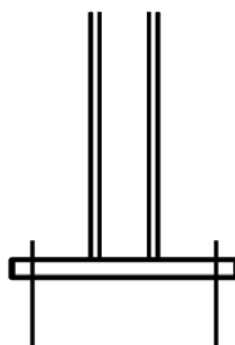
Cross section of step



Joint at top



Joint at bottom



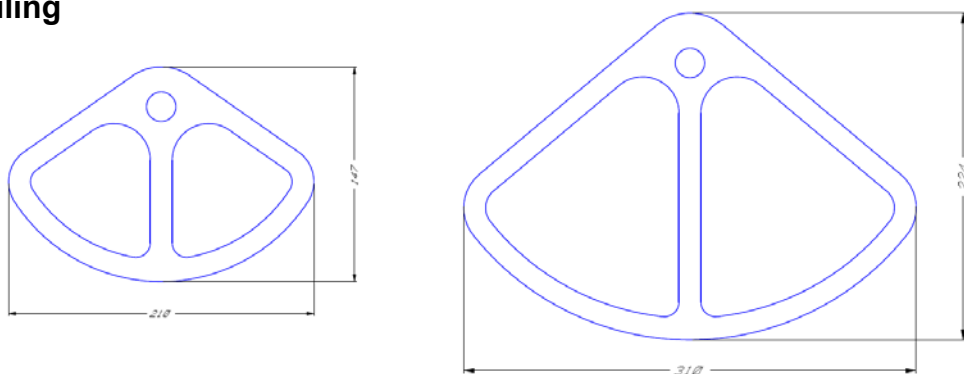
More details according to the technical documentation

Zeitform-Hanging stair

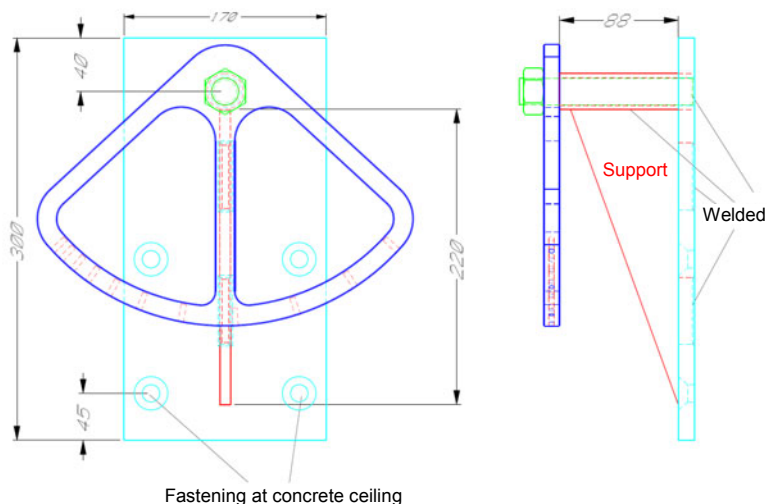
Cross section of step, Joint at top, Joint at bottom

Annex A2

Joint at ceiling

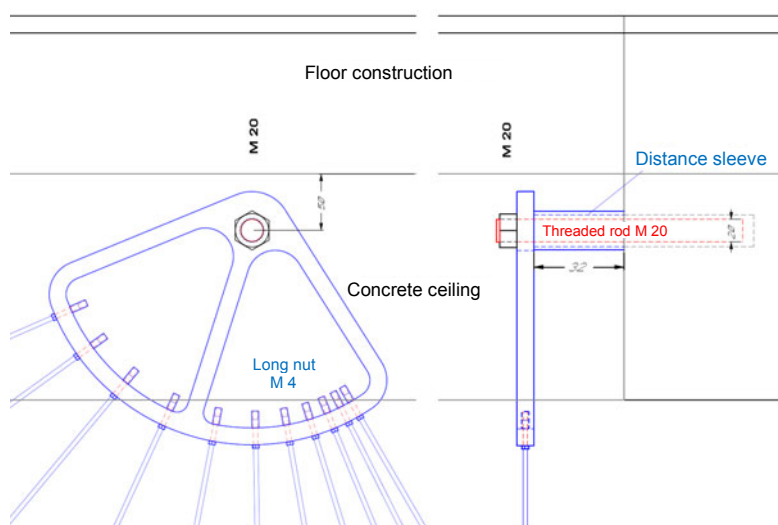


Joint 1



Fastening at concrete ceiling

Joint 2



More details according to the technical documentation

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Zeitform-Hanging stair

Joint at ceiling

Annex A3

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

| Component of stair | Material ¹⁾ | Dimension | Value | Reaction to fire |
|--------------------|--------------------------|-----------------------|--------------|-------------------------------|
| Steps | Solid wood ²⁾ | Geometry see Annex A2 | | F (no performance determined) |
| String | Steel | Width x Height | [mm] 30 x 20 | A1 (96/603/EC) ³⁾ |
| Suspensions | Steel | Diameter | [mm] 4 | |
| System fasteners | Steel | - ⁴⁾ | | |

¹⁾ Characteristic value of material according to technical documentation

²⁾ Only wood of following species: Beech, Oak, Maple

³⁾ According to the EC decisions

⁴⁾ According to technical documentation

Zeitform-Hanging stair

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 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 ≤ 1.35 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 of the partial factors mentioned above; see Table 5

Zeitform-Hanging 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 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

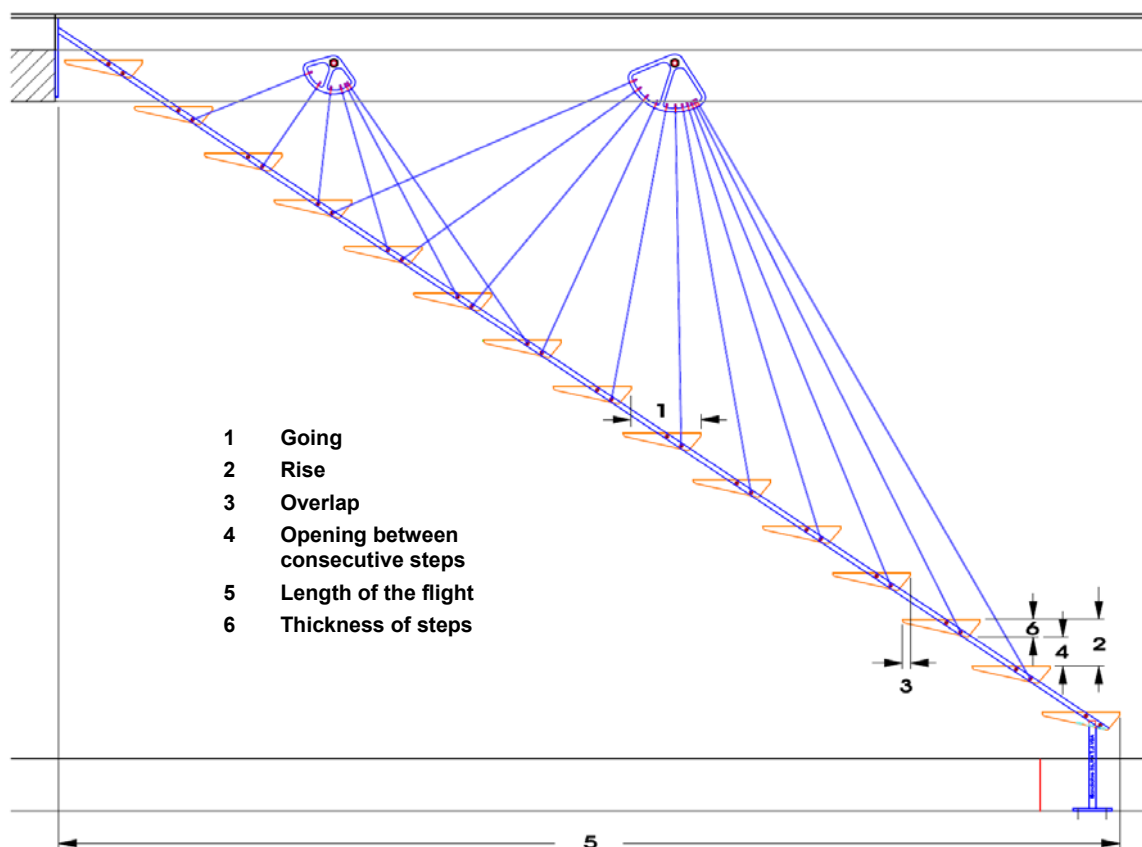
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| | |
|--|-----------------|
| Zeitform-Hanging stair | Annex B2 |
| Specification of intended use (Part 2) | |

Table 2: Geometry

| Designation | | | Dimension | |
|---|---------------------------|------|-------------------|-------------------|
| | | | Minimum | Maximum |
| Going | | [mm] | 210 | 270 ²⁾ |
| Rise of the stair ¹⁾ | | [mm] | 140 ²⁾ | 210 |
| Pitch of the walking line ¹⁾ | | [°] | 21 | 45 |
| Overlap of steps | | [mm] | 0 | 60 |
| Number of rises | | [-] | 3 | 17 |
| Openings | Between consecutive steps | [mm] | - ³⁾ | 168 |
| Clear width of stairs | Type 1 to Type 3 | [mm] | 500 | 1050 |
| | Type 4 | [mm] | 500 | 900 |
| Length of the flight | | [mm] | - ³⁾ | 4320 |
| Thickness of steps | | [mm] | See Annex A2 | - ³⁾ |

- 1) Values are constant within one flight
- 2) Tolerance between nominal value and actual value = ± 5 mm
- 3) Not relevant



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| | |
|-------------------------------|-----------------|
| Zeitform-Hanging stair | Annex C1 |
| Geometry | |

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

| Component | Type of loading | Characteristic values of resistance | | | γ_M |
|-------------------------|---|-------------------------------------|----------------------|------|-------------------|
| | | | | | |
| Steps | Vertical variable uniformly distributed load | $q_{R,k}$ | [kN/m ²] | 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 | |
| Strings, Suspensions | 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 | |
| | Horizontal variable uniformly distributed load on barrier | $h_{R,k}$ | [kN/m] | 0.6 | |

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

2) Recommended partial safety factor (steel decisive), 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] | 4320 |
| Deflection 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] | 1050 |
| Deflection related to the median line of the flight | w | [-] | ≤ L/200 |

Table 5: Imposed loads

| Type of loading | Imposed loads | | |
|---|---------------|----------------------|-----|
| Vertical variable uniformly distributed load | q_k | [kN/m ²] | 3.0 |
| Vertical variable single load | Q_k | [kN] | 2.0 |
| Horizontal variable uniformly distributed load on barrier | h_k | [kN/m] | 0.5 |

Zeitform-Hanging stair

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

Annex C2