

Approval body for construction products  
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and  
Laender Governments



## European Technical Assessment

**ETA-09/0252**  
**of 12 September 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

Krieger HPL-small string stair

Product family  
to which the construction product belongs

Prefabricated stair with strings made of flat laminate and  
steps made of solid wood for use as an indoor stair in  
buildings

Manufacturer

Treppenbau  
"System Krieger" GmbH  
Gewerbegebiet Wolf  
56841 Traben-Trarbach  
DEUTSCHLAND

Manufacturing plant

Krieger Treppen GmbH Werk 1-99

This European Technical Assessment  
contains

14 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.

**European Technical Assessment**  
**ETA-09/0252**

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## Specific Part

### 1 Technical description of the product

The Krieger small string stair is a prefabricated stair system, which consists of steps, strings and system fasteners. The steps are connected with the strings by four system fasteners. The steps and are made of solid wood (only hardwood), 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.

### 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:<br>$f_1 \geq 5$ Hz (inclusive a single mass of 100 kg)<br>Deflection under a single load $F = 1$ kN:<br>$w \leq 5$ 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  |

English translation prepared by DIBt

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

| Essential characteristic | Performance                     |
|--------------------------|---------------------------------|
| Reaction to fire         | See Annex A5                    |
| Fire resistance          | No performance determined (NPD) |

### 3.3 Hygiene, health and the environment (BWR 3)

The HPL products used fulfil the class E1 according to EN 438-7.

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 made of wood<br>No danger to the users of the stair at break of stair components made of HPL |
| 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 |

English translation prepared by DIBt

**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 A5 | 4      |

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

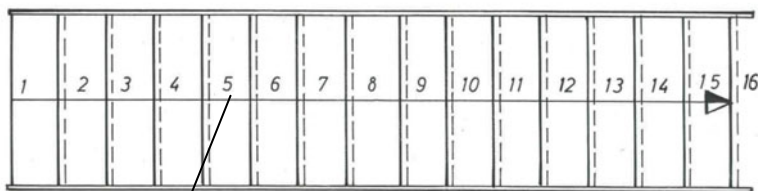
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 19 September 2014 by Deutsches Institut für Bautechnik

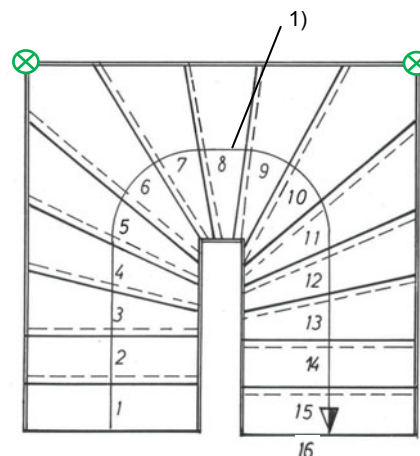
Andreas Kummerow  
p. p. Head of Department

*beglaubigt:*  
Wittstock

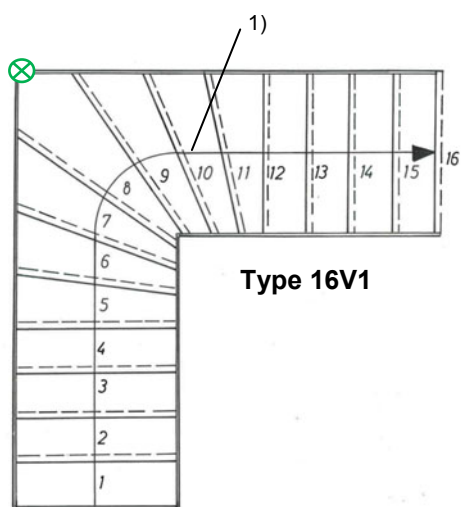
### Types of plan with 16 rises



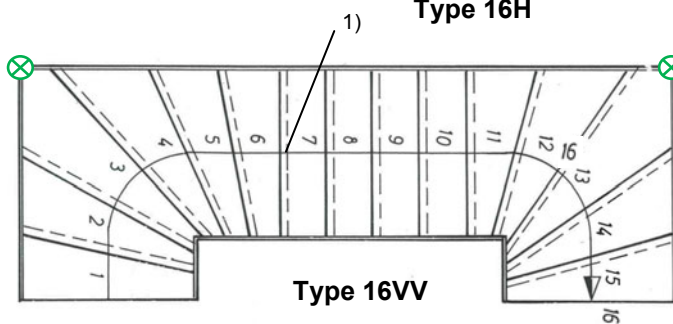
1) **Type 16G**



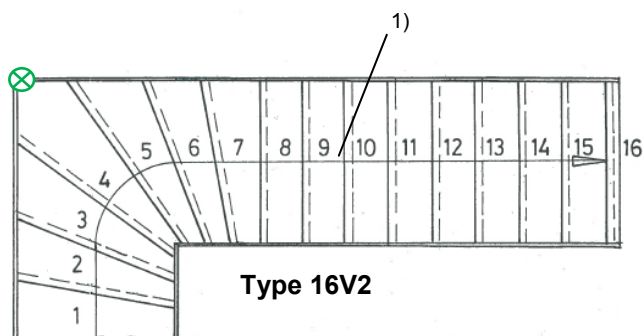
1) **Type 16H**



1) **Type 16V1**



1) **Type 16VV**



1) **Type 16V2**

- ⊗ Additional support for vertical loads at maximum number of steps (supports for less steps according to technical documentation)

Horizontal fixings to the wall according to technical documentation

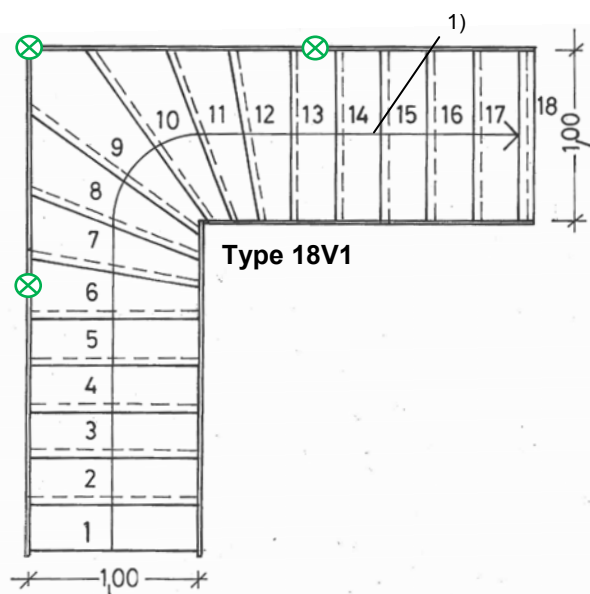
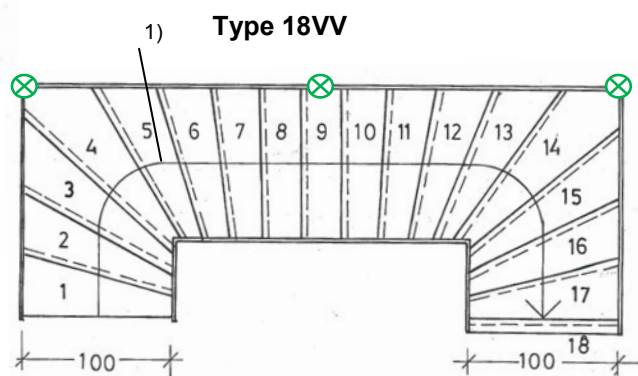
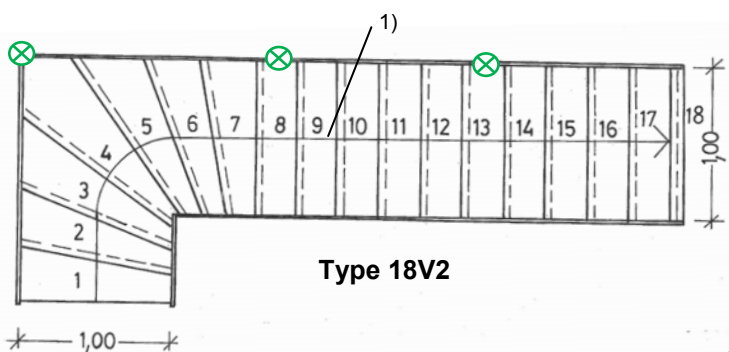
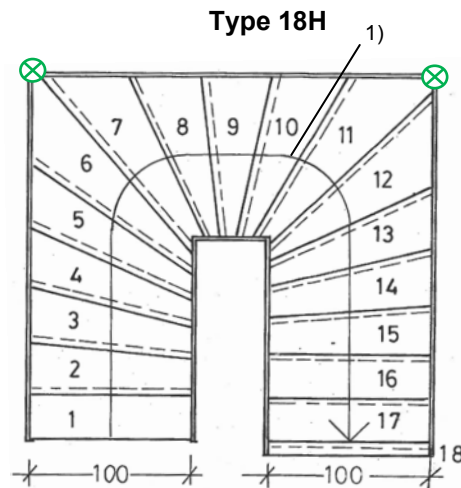
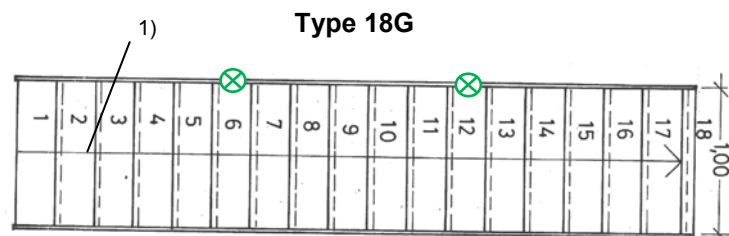
- 1) Walking line is exemplified, position may be chosen freely within the walking zone, walking zone is 20 % of the clear width of the stair in the middle of the stair

**Krieger HPL - small string stair**

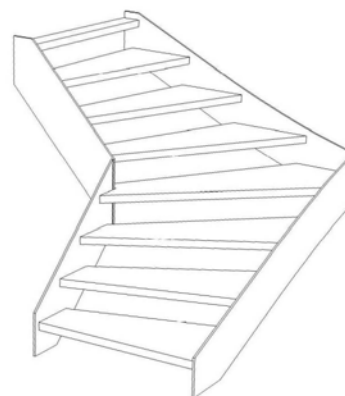
Product and intended use  
(Types of plan with 16 rises)

**Annex A1**

### Types of plan with 18 rises



### Construction



⊗ Additional support for vertical loads at maximum number of steps (supports for less steps according to technical documentation)

Horizontal fixings to the wall according to technical documentation

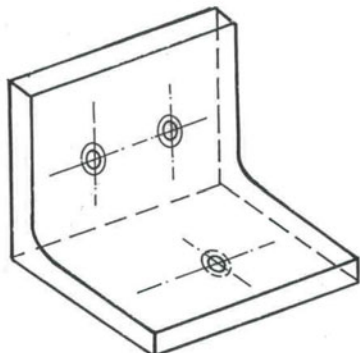
1) Walking line is exemplified, position may be chosen freely within the walking zone, walking zone is 20 % of the clear width of the stair in the middle of the stair

**Krieger HPL - small string stair**

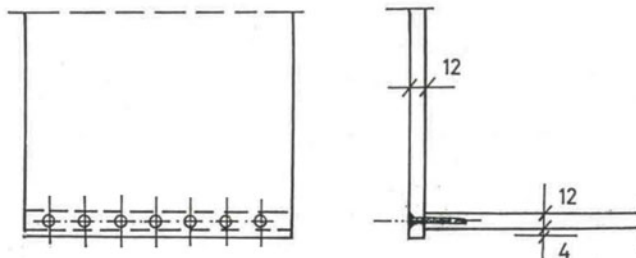
Product and intended use  
(Types of plan with 18 rises, Construction)

**Annex A2**

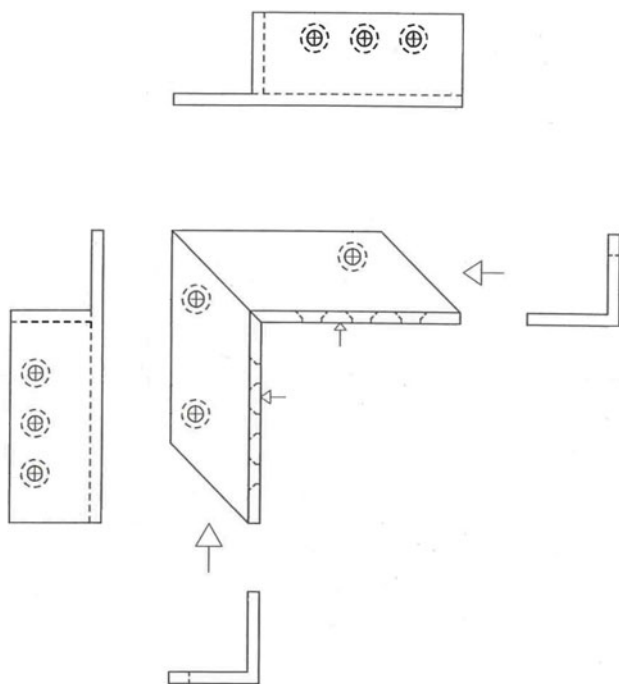
**Step-string-joint**



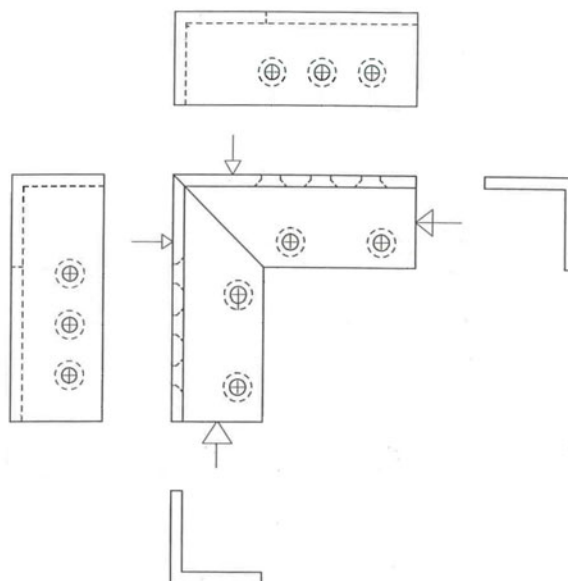
**Corner of strings**



**String-corner joint wall-free side**



**String-corner joint wall side**



more details according to the technical documentation

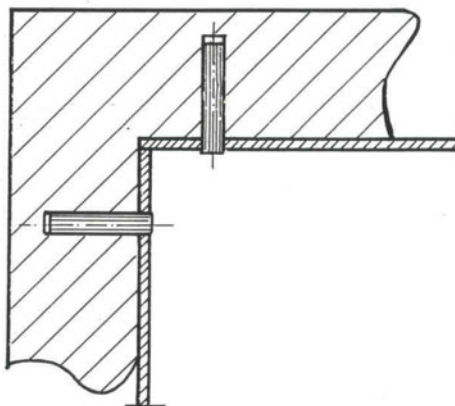
**Krieger HPL - small string stair**

Step-string joint, corner of strings,  
string-corner joint

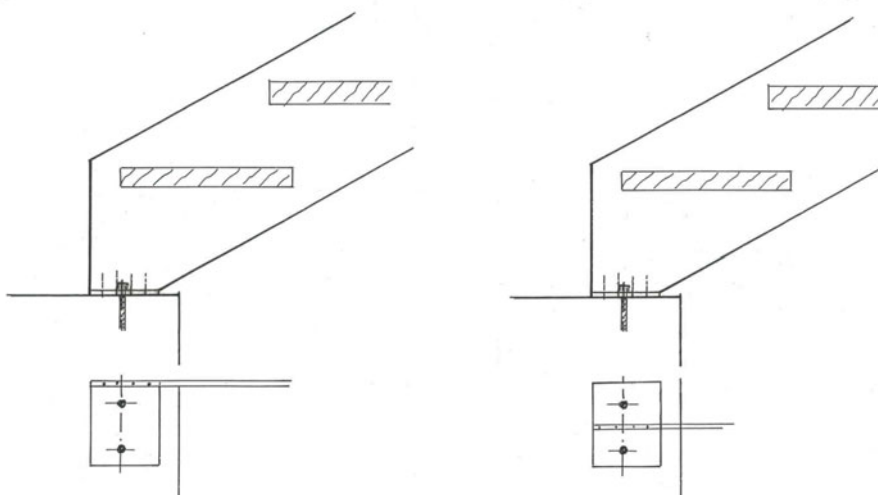
**Annex A3**



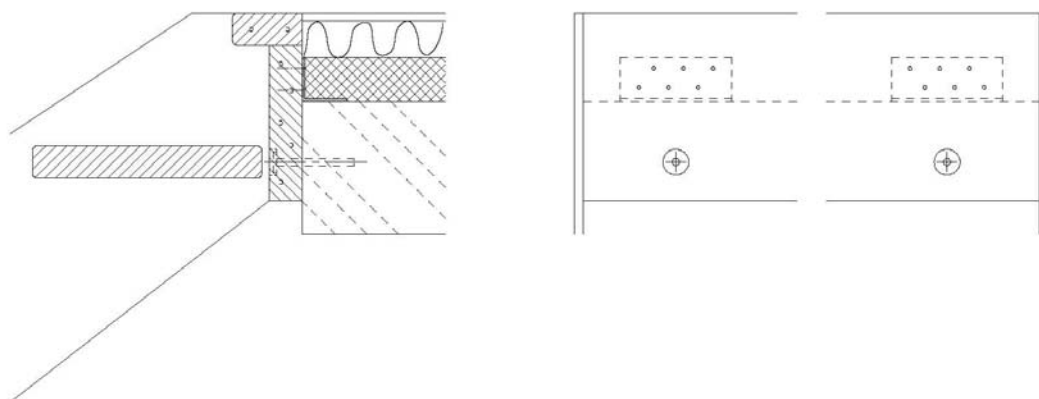
**Wall fixing**



**Joint at bottom**



**Joint at the top**



more details according to the technical documentation

**Krieger HPL - small string stair**

Wall fixing, joint at bottom, joint at the top

**Annex A4**

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

| Component                              | Material <sup>1)</sup>        | Dimension             |      | Value    | Reaction to fire <sup>3)</sup> |
|--|-------------------------------|-----------------------|------|----------|--------------------------------|
| Steps                                  | Solid wood <sup>2)</sup>      | Thickness             | [mm] | 44       | D-s2, d0 (2003/593/EC)         |
| Strings Type 16                        | High-pressure laminate<br>HPL | Thickness /<br>Height | [mm] | 12 / 300 | D-s2, d0 (2003/593/EC)         |
| Strings Type 18V1                      |                               |                       |      | 12 / 320 |                                |
| Strings Type 18<br>other types of plan |                               |                       |      | 12 / 300 |                                |
| Wall tie                               | Steel                         | Diameter              | [mm] | 25       | A1 (96/603/EC)                 |
| Angle joint,<br>System fastener        | Steel                         | - <sup>4)</sup>       |      |          | A1 (96/603/EC)                 |

- 1) characteristic values of material according to technical documentation
- 2) only hardwood of the following species: beech, oak, maple, acacia, ash, nut tree, birch, cheery tree, elm, doussie, merbau,
- 3) according to the provisions of EC decisions
- 4) characteristic values according to technical documentation

**Krieger HPL - small string stair**

Minimum dimensions of relevant stair components and reaction to fire

**Annex A5**

## 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 ≤ 0.85 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 3

$\gamma_M$ : 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

**Krieger HPL - small string 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

**Krieger HPL - small string stair**

Specification of intended use (Part 2)

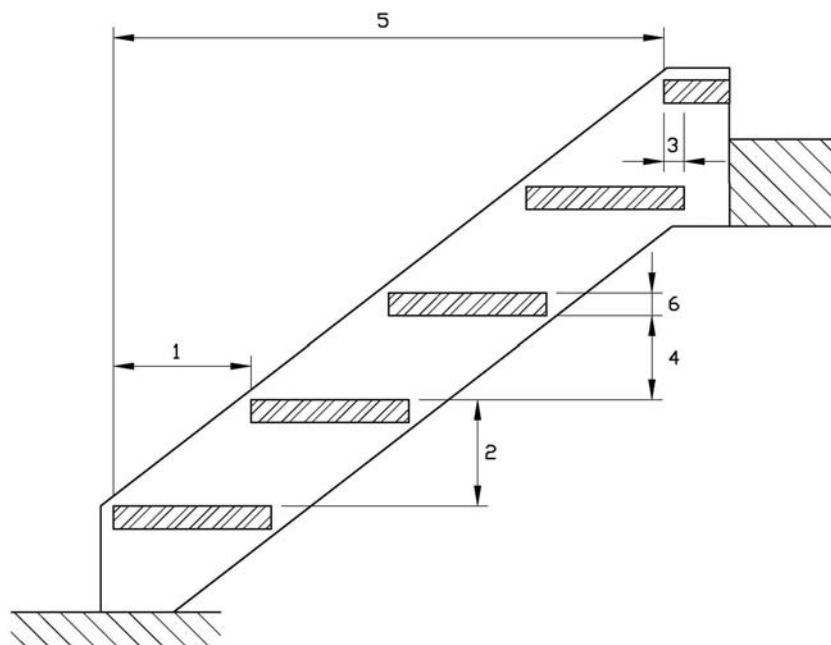
**Annex B2**

**Table 2: Geometry**

| Designation                             |                                    |      | Dimension            |                      |
|---|------------------------------------|------|----------------------|----------------------|
|   |                                    |      | Minimum              | Maximum              |
| Going                                   | Step on walking line <sup>1)</sup> | [mm] | 210                  | 370 <sup>2)</sup>    |
|   | Tapered step                       | [mm] | 100 <sup>2) 3)</sup> | 550 <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                    |                                    | [mm] | 30                   | - <sup>5)</sup>      |
| Number of rises                         |                                    | [-]  | 3                    | 18                   |
| Openings                                | Between stairs and wall            | [mm] | - <sup>5)</sup>      | 60 <sup>6)</sup>     |
|   | Between consecutive steps          | [mm] | - <sup>5)</sup>      | 166                  |
| Clear width of stairs                   |                                    | [mm] | 500                  | 1000                 |
| Minimum headroom                        |                                    | [mm] | - <sup>5)</sup>      |                      |
| Length of the flight                    |                                    | [mm] | - <sup>5)</sup>      | 4590                 |
| Thickness of steps                      |                                    | [mm] | 44                   | - <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) at the wall tie 5 mm

- 1 **Going**
- 2 **Rise**
- 3 **Overlap**
- 4 **Opening between consecutive steps**
- 5 **Length of the flight**
- 6 **Thickness of steps**



**Krieger HPL - small string stair**

Geometry of the stair

**Annex C1**

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

| Type of loading   | Characteristic values of resistance |                      |      | $\gamma_M$        |
|---|-------------------------------------|----------------------|------|-------------------|
|   |                                     |                      |      |                   |
| Vertical variable uniformly distributed load              | $q_{R,k}$                           | [kN/m <sup>2</sup> ] | 6.75 | 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  |                   |

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

**Table 4: Deflections under loading**

| Durchbiegung des Treppenlaufs unter gleichmäßig verteilte Last |       |                      |         |
|--|-------|----------------------|---------|
| Uniformly distributed load                                     | $q_k$ | [kN/m <sup>2</sup> ] | 3.0     |
| Length of the median line of the flight Type 16                | L     | [mm]                 | 4050    |
| Length of the median line of the flight Type 18                |       |                      | 4590    |
| Deflection related to the median line of flight                | w     | [-]                  | ≤ L/200 |
| Deflection under single load                                   |       |                      |         |
| Single load  | $Q_k$ | [kN]                 | 2.0     |
| Clear width of the stair                                       | L     | [mm]                 | 1000    |
| Deflection related to the clear width of stair                 | w     | [-]                  | ≤ L/200 |

**Table 5: Imposed loads**

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

**Krieger HPL - small string stair**

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

**Annex C2**