

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-11/0212
of 12 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

Timber load-bearing bolt stair system THUMM

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

Thumm & Co. Maschinenbau GmbH
In der Au 14
72622 Nürtingen
DEUTSCHLAND

Manufacturing plant

Thumm & Co., Werk 1-50

This European Technical Assessment
contains

12 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

European Technical Assessment

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Specific Part

1 Technical description of the product

The Timber load-bearing bolt stair system Thumm is a prefabricated stair system, which consists of steps, load-bearing bolts and wall ties. The stair can also be formed as a folded plate stair by additional risers.

The steps are connected with each other by one load-bearing bolt on the wall-free side and one load-bearing bolt on the wall side. On the wall side each step is equipped with one wall tie, which is anchored in the staircase wall. Alternatively, the staircase wall may also be replaced by a stringer.

The steps and risers are either made of solid wood or wood-based products. The load-bearing bolts, the fasteners and wall ties 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 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 A3 |
| Fire resistance | No performance assessed |

3.3 Hygiene, health and the environment (BWR 3)

| Essential characteristic | Performance |
|------------------------------|-------------------------|
| Release of formaldehyde | No performance assessed |
| Release of pentachlorophenol | No performance assessed |
| Radioactive emission | Not relevant |

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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 12 October 2016 by Deutsches Institut für Bautechnik

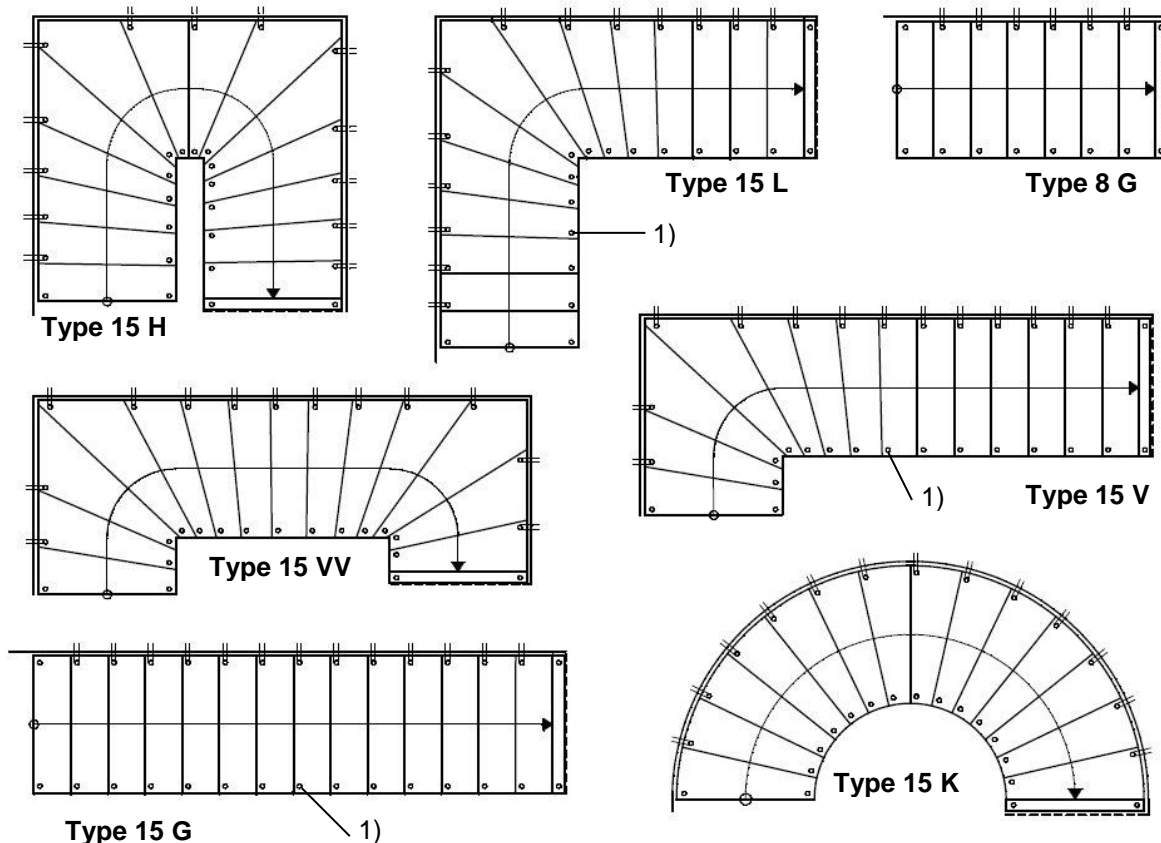
Uwe Bender
Head of Department

beglaubigt:
Stiller

Types of plan

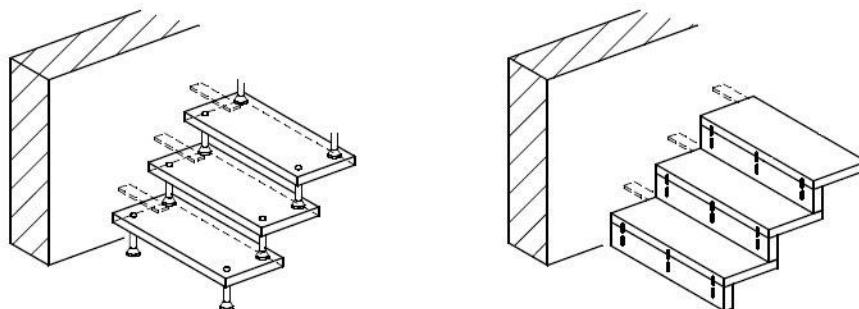
Walking line exemplified, position may be chosen freely within the walking zone, walking zone is 20 % of the clear width of the stair in the middle of the stair

1) Additional support according to Annex A3



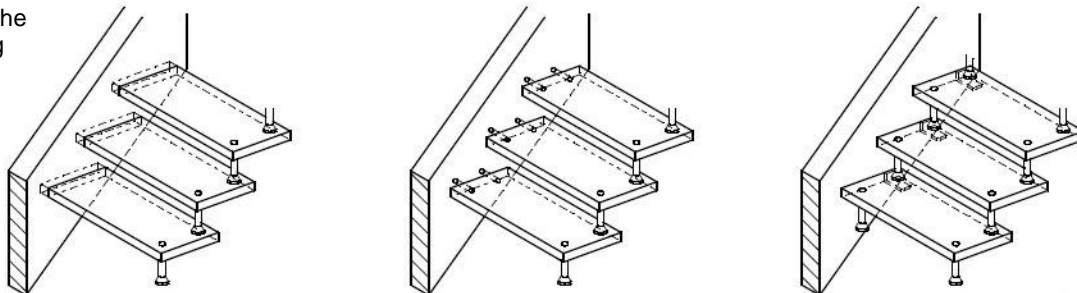
Types of construction

With wall ties



With stringer on the wall side (only solid wood), support of the stringers according to technical documentation

Type 15 V-W
Type 15 VV-W
Type 15 H-W
Type 15 L-W



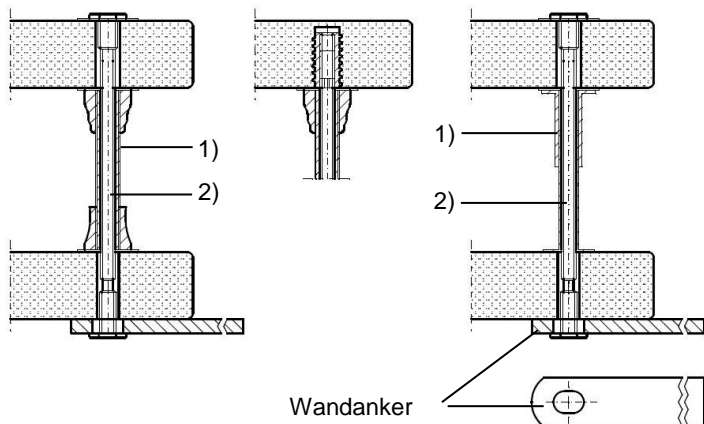
Timber load-bearing bolt stair system THUMM

Product and intended use

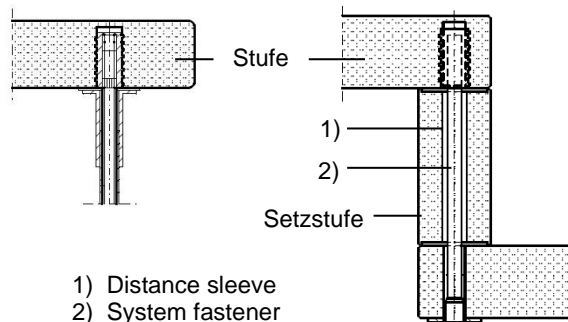
Annex A1

Load-bearing bolts

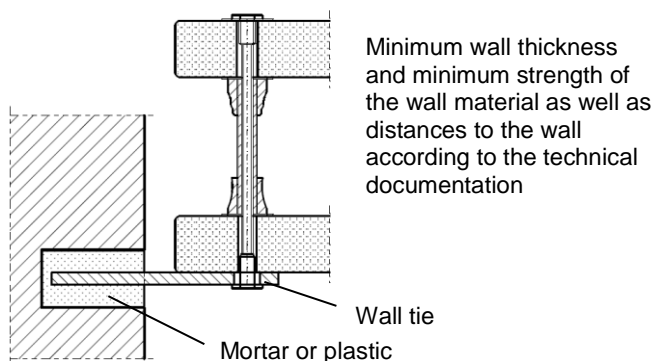
Load-bearing bolt style



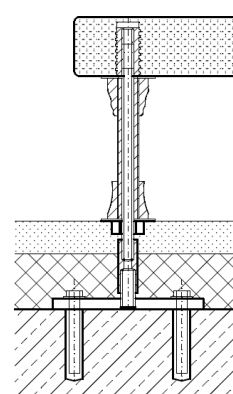
Folded plate style



Wall tie

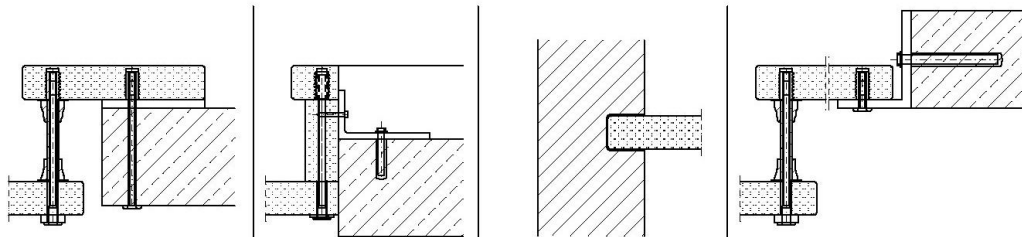


Support bottom

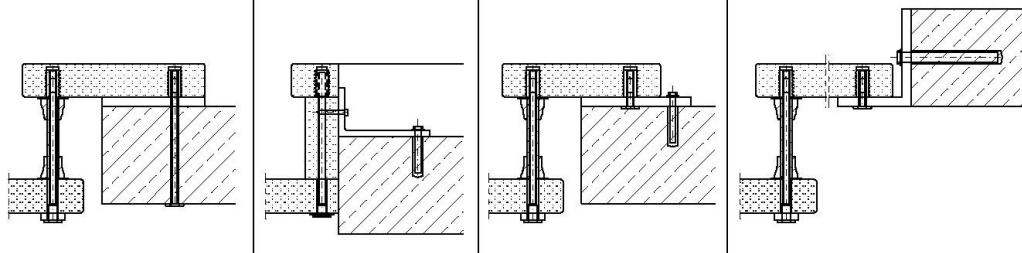


Support on the top

Wall side



Wall-free side



More details according to the technical documentation

Timber load-bearing bolt stair system THUMM

Load-bearing bolts, wall tie and support at bottom and at the top

Annex A2

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

| Component | | Material ¹⁾ | Dimension | | Value | Reaction to fire |
|-----------------------------------|---------------------------|--------------------------------|----------------|---------|------------------|------------------|
| Step, riser | all Typs | Solid wood ²⁾ | Thickness | [mm] | 55 ⁶⁾ | D-s2, d0 |
| | Type 15L, 15V | Solid wood ²⁾ | Thickness | [mm] | 64 ⁷⁾ | |
| | Type 15-K, 15-H, 15-VV | Solid wood ^{2) 3)} | Thickness | [mm] | 55 | |
| steps | | Wood-based panel ⁴⁾ | Thickness | [mm] | 70 ⁶⁾ | D-s2, d0 |
| Load-bearing bolt rod | | Steel | Diameter | [mm] | 12 | A1 |
| Load bearing bolt distance sleeve | | Round steel | Diameter | [mm] | 18 ⁵⁾ | |
| Wall tie | Flat steel | Width x thickness | [mm] | 40 x 12 | A1 | |
| | | Embedment depth Wall | [mm] | 100 | | |
| Bearing | | Plastics | Diameter | [mm] | 56 | not relevant |
| Stringer | | Solid wood ²⁾ | Width x height | [mm] | 50 x 350 | D-s2, d0 |

1) Characteristic values of material according to technical documentation

2) Only hardwood of the species beech and oak

3) Only hardwood of the species mahogany

4) Particle board with veneer (layer composition and characteristic values according to technical documentation)

5) With contact area on the step d = 50 mm, more details according to technical documentation

6) With support
 Type 15L: Step 3 (l = 2860 mm),
 Type 15V und Type 15G: Step 7 (l = 1820 mm),
 Type 15V-W (only solid wood): Step 6 (l = 2080 mm)

7) Without additional support

Timber load-bearing bolt stair system THUMM

Minimum dimensions of relevant stair components
and reaction to fire

Annex A3

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

Timber load-bearing bolt stair system THUMM

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

Timber load-bearing bolt stair system THUMM

Specification of intended use (Part 2)

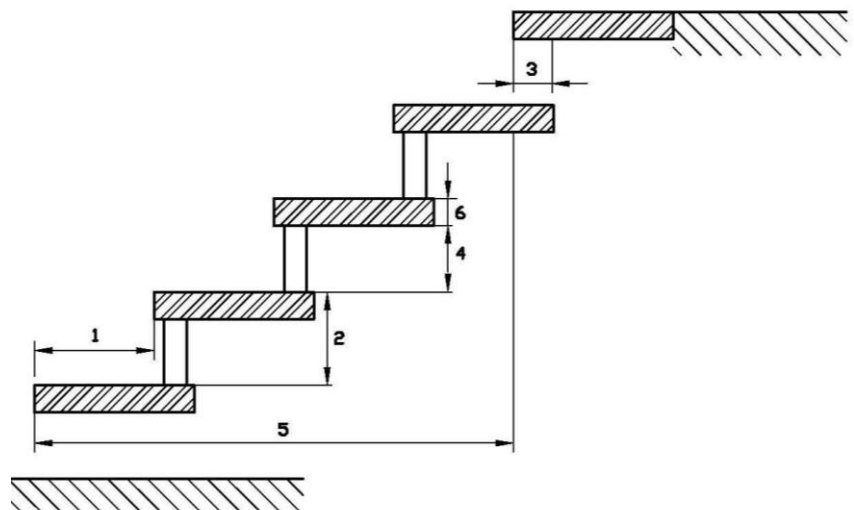
Annex B2

Table 2: Geometry

| Designation | | | Dimension | |
|---|------------------------------------|------|---------------------|----------------------|
| | | | minimum | maximum |
| Going | step on walking line ¹⁾ | [mm] | 210 | 370 ²⁾ |
| | tapered step | [mm] | 70 ^{2) 3)} | 600 ^{2) 4)} |
| Rise of the stairs ¹⁾ | | [mm] | 140 ²⁾ | 210 |
| Pitch of the walking line ¹⁾ | | [°] | 21 | 45 |
| Overlap of the steps | | [mm] | 100 ⁶⁾ | - ⁵⁾ |
| Number of rises | | [-] | 3 | 15 |
| Openings | between stairs and wall | [mm] | - ⁵⁾ | 30 |
| | between consecutive steps | [mm] | - ⁵⁾ | 155 |
| Clear width of stairs | | [mm] | 500 | 1000 |
| Minimum headroom | | [mm] | - ⁵⁾ | |
| Length of the flight | | [mm] | - ⁵⁾ | 3640 |
| Thickness of steps | | [mm] | 55 | - 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
- 6) with riser overlap 0 mm

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



Timber load-bearing bolt stair system THUMM

Geometry of the stair

Annex C1

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

| Part of stair | Type of loading | Characteristic values of resistance | | | γ_M |
|------------------------------|---|-------------------------------------|----------------------|------|-------------------|
| 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 on barrier | $h_{R,k}$ | [kN/m] | 0.8 | |
| Wall tie, support on the top | 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 (timber 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] | 3640 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⁾ L = reference length = distance between supports, (additional support according to Annex A1 and A3)

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 |

Timber load-bearing bolt stair system THUMM

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

Annex C2