Deutsches Institut für Bautechnik

DIBt

Member of EOTA

www.eota.eu

Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

European Technical Assessment

ETA-11/0338 of 31 January 2017

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	NUR-HOLZ Vollholzelemente Elements jointed with "wooden screws" made of beech
Product family to which the construction product belongs	Solid wood slab element - element of dowel jointed timber boards to be used as a structural element in buildings
Manufacturer	Rombach Bauholz+Abbund GmbH Holdersbach 7 77784 Oberharmersbach DEUTSCHLAND
Manufacturing plant	Rombach Bauholz+Abbund GmbH Obertal 22 77784 Oberharmersbach DEUTSCHLAND
This European Technical Assessment contains	16 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) 130002-00-0304

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This European Technical Assessment may be withdrawn by the issuing Technical Assessment Body, in particular pursuant to information by the Commission in accordance with Article 25(3) of Regulation (EU) No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

NUR-Holz Solid Timber Elements are solid wood slab elements made of several layers of boards. The outer layers of floor and roof elements are always arranged in longitudinal direction where the longitudinal direction is the span direction. For wall elements one outer layer may also be arranged in horizontal direction.

Between the load-carrying layers in longitudinal direction intermediate layers are arranged under an angle of 45° or 90° to the outer layers.

The single board layers are between 18 mm and 100 mm thick. The boards have a width between 140 mm and 210 mm. The boards are not butt jointed. They are made from European spruce or equivalent softwood (fir, pine, larch, douglas fir). At least 90 % of the load-carrying boards of one layer correspond at least to strength class C24. The remaining 10% of the boards correspond at least to strength class C16.

Between two single boards a gap up to 10 mm may exist. Elements may be built-up asymmetrically (e.g. with only one diagonal layer or with different layer thicknesses).

The single layers are connected by wooden screw fasteners made from beech wood. The screws have an inner thread diameter of 20 mm and an outer diameter of 22 mm. They are driven into a predrilled hole of 20 mm where a thread is formed using a special device.

The beech wood screws are arranged at all four edges of the elements in each inter-section of the boards arranged in longitudinal and crosswise direction. In the intermediate area they are staggered and arranged evenly distributed over the element surface.

Wall elements consist of at least one longitudinal, one cross and one diagonal layer. For these elements the maximum distance between two beech wood screws is 640 mm in each direction.

Materials, dimensions and tolerances as well as example drawings are given in Annex 1.

When delivered, the product does not contain any biocides. When relevant, the products may later be treated for better durability e.g. against wood attacking insects, or surface treatments may be used for esthetical purposes. The suitability of these treatments shall be checked with the manufacturer of it. This ETA does not cover any effects of surface treatments, timber preservatives or flame retardants.

2 Specification of the intended use in accordance with the applicable European Assessment Document

2.1 General assumptions

This European Technical Assessment is based on the assumption that structural design and any other plans needed will be made correctly according to the regulations valid on the building site and that all necessary information on design and installation is available at the building site.

Verification of the stability of works, including application of loads on the products described here, is not part of this European Technical Assessment. It is assumed, that the following conditions are met:

- Design of the solid wood slab elements is carried out under the responsibility of an engineer experienced with such products

- Design of the works takes the protection of the solid wood slab elements into account
- The products are installed correctly by qualified personnel following an installation plan with relevant construction details worked out for each individual building project.

It is assumed that all necessary information on design and installation is submitted by the manufacturer to those responsible for design and execution of the works constructed with the solid wood slab elements.

It is assumed that the product is protected during transport and storage against any damage and detrimental moisture effects. The manufacturer's instruction for packaging, transport and storage shall be observed.

As fasteners only nails, screws, staples, bolts, dowels and connectors are assumed to be used. The respective provisions for spacing, penetration depths etc. of the fasteners are assumed to be considered.

2.2 Intended use

NUR-Holz Solid Timber Elements are intended to be used as structural or non structural wall, roof or floor elements in buildings and timber structures. NUR-Holz Solid Timber Elements can be subjected to static and quasi static actions perpendicular as well as in the plane of the slab.

It is assumed, that design and execution of wall, floor, roof or special elements of the NUR-Holz Solid Timber Elements is performed according to EN 1995-1-1[1] with actions applied according to EN 1991-1-1[2].

NUR-Holz Solid Timber Elements are intended to be used in service classes 1 and 2 according to EN 1995-1-1. It is assumed, that shear deformation between the layers are considered for actions perpendicular to the plane of the element, e.g. according to EN 1995-1-1, sections 9.1.3 and 9.1.4.

2.3 Working life / Durability

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the solid wood slab 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	EN 1995-1-1:2004 + AC:2006 + A1: 2008	Design of timber structures – Part 1-1: General –Common rules and rules for buildings
2	EN 1991-1-1:2002 + AC:2009	Actions on structures – Part 1-1: General actions – Densities, self-weight, imposed loads for buildings

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
Resistance and Stiffness regarding mechanical actions perpendicular to the solid wood slab element	See Annex 2
Resistance and Stiffness regarding mechanical actions in plane of the solid wood slab element	See Annex 2
Embedment and withdrawal strength	See Annex 2
Creep and duration of load	See Annex 2
Dimensional stability	See Annex 2
Aspects of durability	See Annex 2

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire (without floor)	D-s2,d0*
Reaction to fire - floor	D_{FL}-s1*
Resistance to fire	No performance assessed**
* Classification according to EN 13501-1[3] in accordance with Commission Decision 2003/43/EC[4]. The boundary conditions stated in the commission decision have to be attended for this classification. ** For the timber members the charring rates given in EN 1995-1-2[5] can be assumed.	

Note: A European reference fire scenario for façades has not been laid down. In some Member States, the classification of the product according to EN 13501-1 might not be sufficient for the use in façades. An additional assessment of the product according to national provisions (e.g. on the basis of a large scale test) might be necessary to comply with Member State regulations, until the existing European classification system has been completed.

3.3 Hygiene, health and the environment (BWR 3)

Essential characteristic	Performance
Vapour permeability	No performance assessed

The product does not contain adhesives. it is made of softwood and beech wood.

3 EN 13501 1:2007+A1:2009 Fire classification of construction products and building elements – Part 1: Classification using data from reaction to fire tests

4 Official Journal of the European Communities L 13/35, 18. January 2003

5 EN 1995-1-2:2004 +AC2009 Eurocode 5: Design of timber structures – Part 1-2: General – Structural fire design

3.4 Safety and accessibility in use (BWR 4)

Essential characteristic	Performance
Impact resistance	No performance assessed

3.5 Protection against noise (BWR 5)

Essential characteristic	Performance
Airborne sound insulation	No performance assessed
Impact sound insulation	No performance assessed
Acoustic absorption	No performance assessed

3.6 Energy economy and heat retention (BWR 6)

Essential characteristic	Performance
Thermal resistance	See below
Thermal inertia	See below
Air tightness	No performance assessed

Design values for thermal conductivity and thermal inertia of the timber elements (softwood) are given in EN ISO 10456[6]. Calculation can be performed according to EN ISO 6946[7] for example.

3.7 Sustainable use of natural resources (BWR 7)

No performance assessed.

4 Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base

In accordance with EAD No. 13-0002-00-03.04 the applicable European legal act is: Commission Decision 97/176/EC[8], amended by Commission Decision 2001/596/EC[9] of 8 January 2001.

The system to be applied is: 2+.

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

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

6 EN ISO 10456:2007 + AC:2009 Building materials and products – Hygrothermal properties – Tabulated design values and procedures for determining declared and design thermal values

7 EN ISO 6946:2007 Building components and building elements – Thermal resistance and thermal transmittance – Calculation method

8 Official Journal of the European Communities L 73 of 17.02.1997

9 Official Journal of the European Communities L 209/33 of 08.01.2001

5.1 Tasks for the manufacturer

5.1.1 Factory production control

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall insure that the product is in conformity with this European technical assessment.

The manufacturer may only use raw materials with the relevant inspection documents as stated in the technical documentation of this European technical approval.

The factory production control shall be in accordance with the control plan which is part of the technical documentation of this European technical approval. The control plan is laid down in the context of the factory production control system operated by the manufacturer and deposited with Deutsches Institut für Bautechnik.[10]

The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

The manufacturer shall, on the basis of a contract, involve a body which is approved as a notified body according to EAD No. 13-0002-00-03.04. The control plan shall be handed over by the manufacturer to the notified body involved.

5.1.2 Declaration of performance

The manufacturer is responsible for preparing the declaration of performance. When all the criteria of the assessment and verification of constancy of performance are met, including the certificate of constancy of performance issued by the notified body, the manufacturer shall draw up a declaration of performance.

5.2 Tasks for the notified bodies

The notified body shall perform the

- initial inspection of factory and of factory production control,
- continuous surveillance, assessment and approval of factory production control,

in accordance with the provisions laid down in the control plan.

The notified body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in a written report.

The notified body involved by the manufacturer shall issue an EC certificate of conformity of the factory production control stating the conformity with the provisions of this European technical approval.

In cases where the provisions of the European technical approval and its control plan are no longer fulfilled the notified body shall withdraw the certificate of conformity and inform Deutsches Institut für Bautechnik without delay.

Issued in Berlin on 31. Januar 2017 by Deutsches Institut für Bautechnik

Uwe Bender
Head of Department

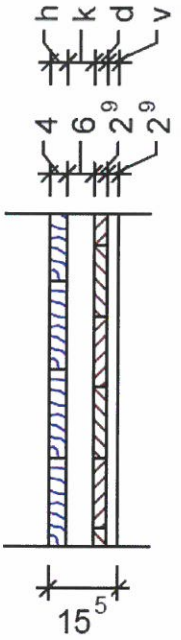
beglaubigt:
Warns

[10] The control plan is a confidential part of the European technical approval and only handed over to the notified body/bodies involved in the procedure of attestation of conformity.

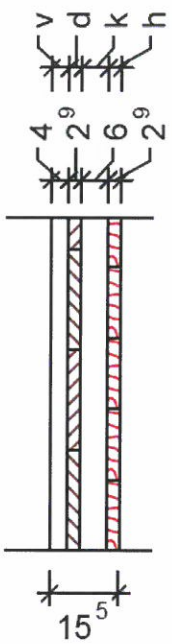
Deutsches Institut für Bautechnik DIBt

Examples for wall elements

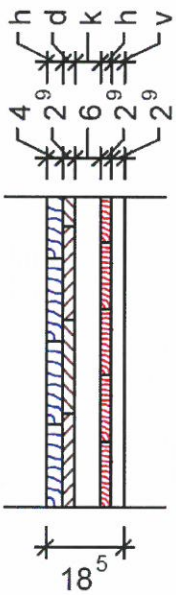
Wall type 15,5 horizontal



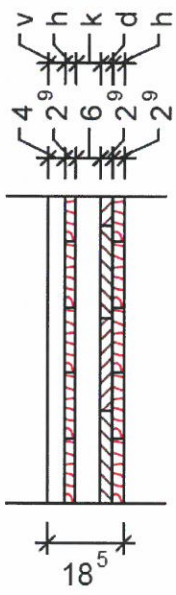
Wall type 15,5 vertical



Wall type 18,5 horizontal



Wall type 18,5 vertical

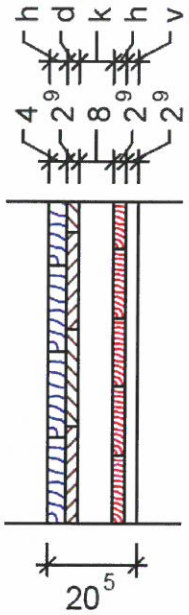


v = vertical
h = horizontal
d = diagonal
k = core layer vertical
All dimensions in cm
The left side is the visual side

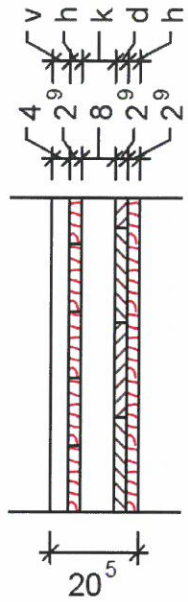
NUR-HOLZ Vollholzelemente Elements jointed with "wooden screws" made of beech	Annex 1 Page 1
Technical description and examples	

Deutsches Institut für Bautechnik DIBt

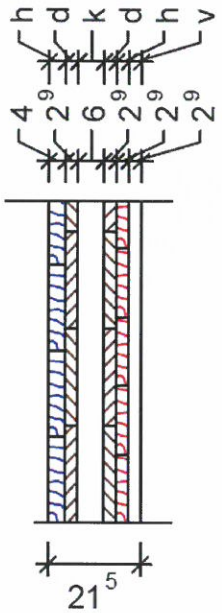
Wall type 20,5 horizontal



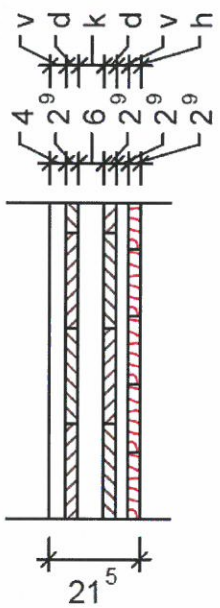
Wall type 20,5 vertical



Wall type 21,5 horizontal



Wall type 21,5 vertical

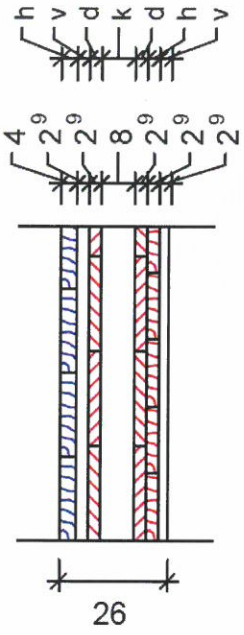


v = vertical
h = horizontal
d = diagonal
k = core layer vertical
All dimensions in cm
The left side is the visual side

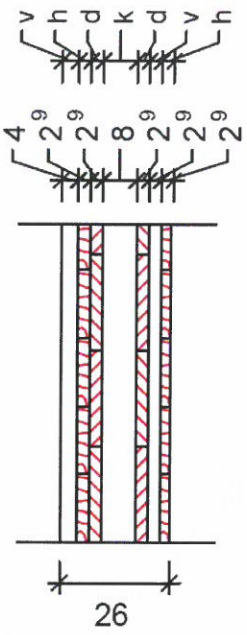
NUR-HOLZ Vollholzelemente Elements jointed with "wooden screws" made of beech	Annex 1 Page 2
Technical description and examples	

Deutsches Institut für Bautechnik DIBt

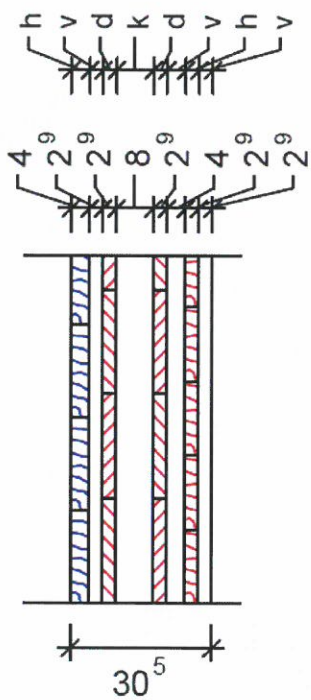
Wall type 26 horizontal



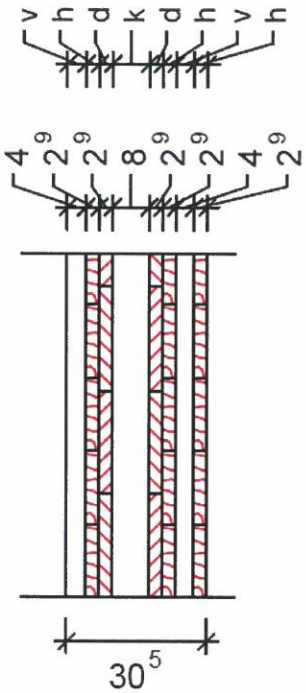
Wall type 26 vertical



Wall type 30,5 horizontal



Wall type 30,5 vertical

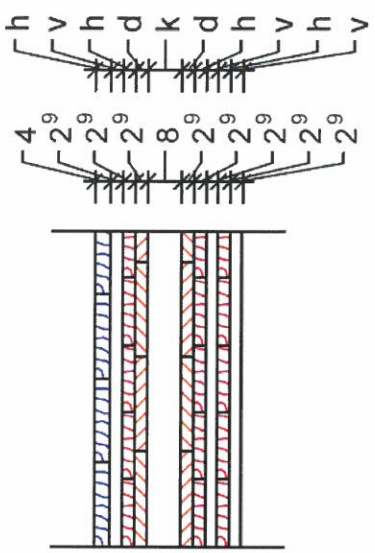


v = vertical
h = horizontal
d = diagonal
k = core layer vertical
All dimensions in cm
The left side is the visual side

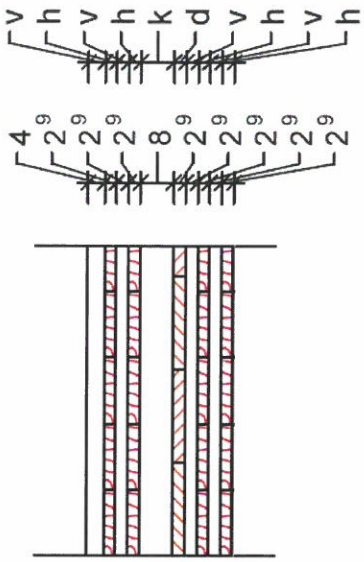
NUR-HOLZ Vollholzelemente Elements jointed with "wooden screws" made of beech	Annex 1 Page 3
Technical description and examples	

Deutsches Institut für Bautechnik DIBt

Wall type 35 horizontal



Wall type 35 vertical



v = vertical
h = horizontal
d = diagonal
k = core layer vertical
All dimensions in cm
The left side is the visual side

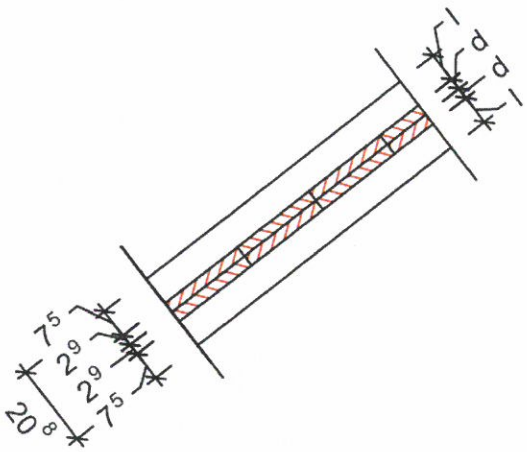
NUR-HOLZ Vollholzelemente Elements jointed with "wooden screws" made of beech	Annex 1 Page 4
Technical description and examples	

Deutsches Institut für Bautechnik DIBt

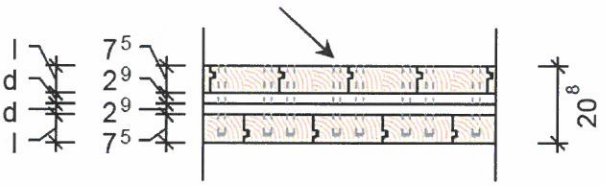
Examples for roof and floor elements

Roof and floor type 20,8

longitudinal section 1

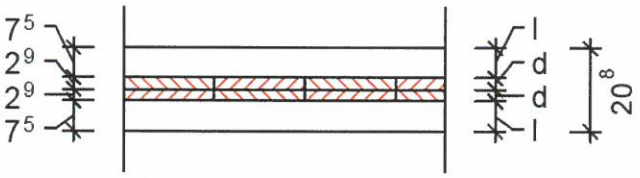


cross section



l = in longitudinal direction
q = perpendicular to the direction of span
d = diagonal
All dimensions in cm

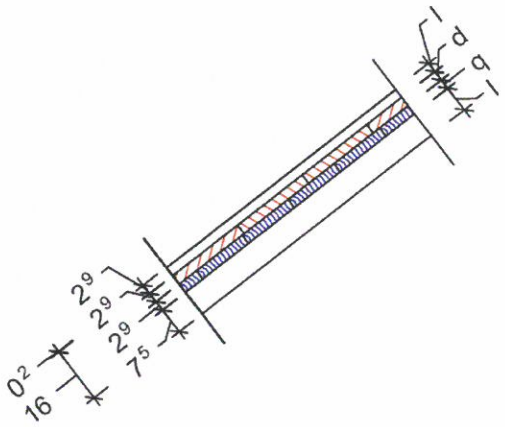
longitudinal section 2



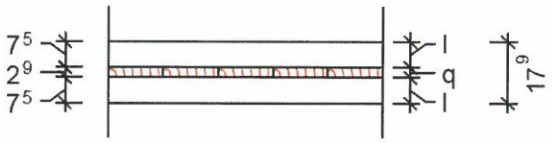
NUR-HOLZ Vollholzelemente Elements jointed with "wooden screws" made of beech	Annex 1 Page 5
Technical description and examples	

Deutsches Institut für Bautechnik DIBt

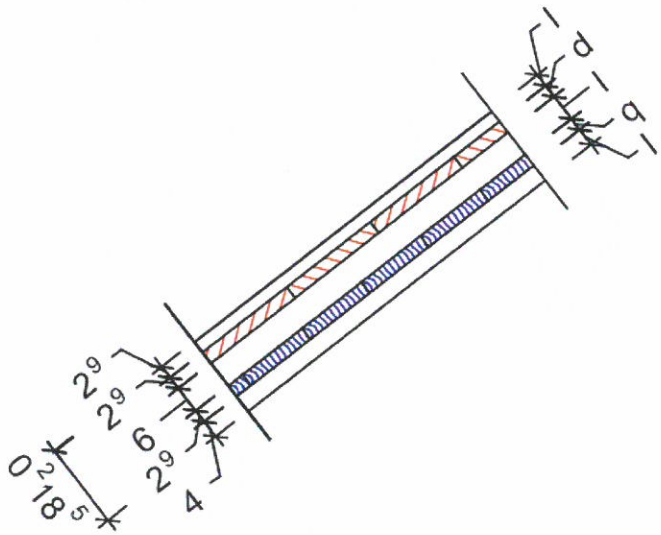
Roof and floor type 16,0



Roof and floor type 17,9



Roof type 18,5



l = in longitudinal direction
q = perpendicular to the direction of span
d = diagonal
All dimensions in cm

NUR-HOLZ Vollholzelemente Elements jointed with "wooden screws" made of beech	Annex 1 Page 6
Technical description and examples	

Table 1: product characteristics with regard to mechanical resistance and stability

Essential characteristic	Assessment Method	Level / Class / Description
Mechanical actions in plane and perpendicular to the solid wood slab		
Strength class of boards	EN 338	C24
Other mechanical Actions		
Creep and duration of load	k_{mod} according to EN 1995-1-1 for solid timber k_{def} according to EN 1995-1-1 for solid timber. The factor k_{def} is multiplied by 2.5 as long as at least one layer is crosswise to another.	
Dimensional stability Moisture content during service shall not change to such an extent that adverse deformation may occur. It is recommended, that the product is used in conditions where the equilibrium moisture content of the elements does not increase by more than 6 %.		
Embedment and withdrawal strength	According to EN 1995-1-1. The direction of the grain of the cover board is usually taken as reference. It is assumed, that only nails, screws, staples, bolts, dowels and connectors are used and that the gaps between the boards are considered as edges of the structural component. For axially loaded self-tapping screws with a diameter of $d_1 \geq 8$ mm the gaps between the boards may, however, be disregarded.	
Durability The properties of the timber elements shall not adversely be affected by the action of moisture. Depending on the application, the timber elements shall be protected from moisture.		

Table 2: Tolerances

Thickness (depth)	h	± 1 mm
Length	l	± 3 mm
Width	b	± 3 mm
Camber		1:500

Deutsches Institut für Bautechnik DIBt

Notes for the design calculation

General

Design and execution of wall, floor, roof or special elements of the NUR-Holz Solid Timber Elements is assumed to be performed according to EN 1995-1-1 with actions applied according to EN 1991-1-1.

Actions in plane

For NUR-Holz wall elements loaded as shear walls an effective shear stiffness value of GA = $6{,}0 \cdot 10^6$ N per m wall length may be used for the serviceability state design.

If at least two longitudinal, two cross and two diagonal layers are present, an effective shear stiffness $(GA)_{ef} = 8{,}0 \cdot 10^6$ N per m of wall length may be assumed.

A maximum displacement of 1/500 of the height of the wall should not be exceeded in the serviceability state. This limit value will in general be governing.

The characteristic load bearing capacity of a wall under horizontal load may be assumed with $F_{H,Rk}$ = 50 kN/m.

For elements with at least two longitudinal, two cross and two diagonal layers $F_{H,Rk}$ = 100 kN/m may be assumed.

If NUR-Holz elements are used as beams, the boards of the longitudinal layers shall be assumed as independent. The bending capacity hence is the sum of the bending capacities of the single boards of the longitudinal layers.

If NUR-Holz elements are used as columns, only the cross-sectional area of the boards of the longitudinal layers without cross- or diagonal layers shall be considered.

When calculating the effective bending stiffness, the slip between the longitudinal layers due to the deformation of the beech screw connection shall be taken into account.

Initial deflections taking into account geometrical and structural imperfections may be assumed as for glulam members.

Buckling may be calculated according to EN 1995-1-1 taking into account the slip in the wooden screw connections. Furthermore an effective width for concentrated forces may be assumed.

Under concentrated forces the buckling load may be calculated with an effective width of up to b_{ef} = 5 b up to a maximum of H/2 (b = width of the contact area of a concentrated load; b and b_{ef} in longitudinal direction of the wall; H = Height of the element).

Deutsches Institut für Bautechnik DIBt

Actions perpendicular to the plane

The verification of the stress distribution and the internal forces and moments in the NURHolz Solid Timber Elements in case of actions perpendicular to the plane of the element is assumed to be calculated in accordance with the theory for composite structures.

Elements with two or three longitudinal layers may be calculated using the method of mechanically jointed beams given in EN 1995-1-1. For an element with more than three longitudinal layers other calculation methods such as the "shear analogy method" are applicable.

For the ultimate limit state design a slip modulus per screw and shear plane between two adjacent board layers of K_u = 2400 N/mm shall be used.

The characteristic lateral load-carrying capacity of a wooden screw d = 22 mm for cross layers consisting of one or two single board layers with a thickness of at not more than 29 mm each is assumed to be 5800 N.

For the serviceability limit state design a slip modulus of K_{ser} = 3600 N/mm should be used.

NUR Holz solid timber elements are only used as floor and roof elements where the span is parallel to the direction of the cover(outer)-layers. However, for concentrated forces a load distribution perpendicular to the cover layers may be assumed. From the tests an effective width of 70 % of the total width, but not more than 700 mm was determined.