Form 36

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Interested committees:

Title: BS EN 1995-1-1. Eurocode 5 - Design of timber structures

Part 1-1: General rules and rules for buildings

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx

1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex **(e.g. 3.1)**	Paragraph/Figure/ Table/Note	**Type of comment**	**Commend (justification for change) by the MB**	**Proposed change by the MB**	**Secretariat observations on each comment submitted**
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN 1995-1-1

September 2023

ICS 91.010.30; 91.080.20

Will supersede EN 1995-1-1:2004

English Version

Eurocode 5 - Design of timber structures - Part 1-1: General rules and rules for buildings

Eurocode 5 - Calcul des structures en bois - Part 1-1: Règles générales et règles pour les bâtiments

Eurocode 5 - Bemessung und Konstruktion von Holzbauten - Teil 1-1: Allgemeine Regeln und Regeln für den Hochbau

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 250.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

This draft European Standard was established by CEN in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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European foreword

This document (prEN 1995-1-1:2023) has been prepared by Technical Committee CEN/TC 250 “Structural Eurocodes”, the secretariat of which is held by BSI. CEN/TC 250 is responsible for all Structural Eurocodes and has been assigned responsibility for structural and geotechnical design matters by CEN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 1995-1-1:2004 and its amendments and corrigenda.

The first generation of EN Eurocodes was published between 2002 and 2007. This document forms part of the second generation of the Eurocodes, which have been prepared under Mandate M/515 issued to CEN by the European Commission and the European Free Trade Association.

The Eurocodes have been drafted to be used in conjunction with relevant execution, material, product and test standards, and to identify requirements for execution, materials, products and testing that are relied upon by the Eurocodes.

The Eurocodes recognize the responsibility of each Member State and have safeguarded their right to determine values related to regulatory safety matters at national level through the use of National Annexes.

The main changes compared to the previous edition are listed below:

— inclusions of main timber products, e.g. cross laminated timber (CLT);

— inclusion of product groups with similar material behaviour;

— inclusion of material parameters needed for the design according to this document;

— improved guidance on durability;

— inclusion of provisions on holes in beams;

— extension of compression perpendicular to grain verifications to serviceability limit state design;

— inclusion of provisions on reinforcements;

— improved guidance on vibration verification;

— inclusion on guidance on fatigue verification;

— inclusion of provisions on carpentry connections;

— inclusion of provisions on bonded-in rods;

— inclusion of provisions on foundations with timber piles;

— improved provisions on robustness.

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0 Introduction

0.1 Introduction to the Eurocodes

The Structural Eurocodes comprise the following standards generally consisting of a number of Parts:

— EN 1990 Eurocode — Basis of structural and geotechnical design

— EN 1991 Eurocode 1 — Actions on structures

— EN 1992 Eurocode 2 — Design of concrete structures

— EN 1993 Eurocode 3 — Design of steel structures

— EN 1994 Eurocode 4 — Design of composite steel and concrete structures

— EN 1995 Eurocode 5 — Design of timber structures

— EN 1996 Eurocode 6 — Design of masonry structures

— EN 1997 Eurocode 7 — Geotechnical design

— EN 1998 Eurocode 8 — Design of structures for earthquake resistance

— EN 1999 Eurocode 9 — Design of aluminium structures

— New parts are under development, e.g. Eurocode for design of structural glass

The Eurocodes are intended for use by designers, clients, manufacturers, constructors, relevant authorities (in exercising their duties in accordance with national or international regulations), educators, software developers, and committees drafting standards for related product, testing and execution standards.

NOTE Some aspects of design are most appropriately specified by relevant authorities or, where not specified, can be agreed on a project-specific basis between relevant parties such as designers and clients. The Eurocodes identify such aspects making explicit reference to relevant authorities and relevant parties.

0.2 Introduction to EN 1995 (all parts)

EN 1995 (all parts) applies to the design of timber structures and gives specific design rules for buildings and civil engineering timber works.

EN 1995 is subdivided in various parts:

EN 1995-2, *Eurocode 5 — Design of timber structures — Part 2: Bridges*

EN 1995-3, *Eurocode 5 — Design of timber structures — Part 3: Execution*

EN 1995-1 in itself does not exist as a physical document, but comprises the following three separate documents, the basic part being EN 1995-1-1:

EN 1995-1-1, *Eurocode 5 — Design of timber structures — Part 1-1: General rules and rules for buildings*

EN 1995-1-2, *Eurocode 5 — Design of timber structures — Part 1-2: Structural fire design*

CEN/TS 19103, *Design of timber structures — Structural design of timber-concrete composite structures – Common rules and rules for buildings*

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EN 1995-2 “Bridges” refers to the common rules in EN 1995-1-1. The Clauses in EN 1995-2 supplement, modify or supersede them, where relevant.

EN 1995-3 “Execution” refers to the common rules in EN 1995-1-1. The Clauses in EN 1995-3 supplement the Clauses in EN 1995-1 and 1995-2.

0.3 Introduction to EN 1995-1-1

EN 1995-1-1 gives general design rules for timber structures and civil engineering timber works.

0.4 Verbal forms used in the Eurocodes

The verb “shall" expresses a requirement strictly to be followed and from which no deviation is permitted in order to comply with the Eurocodes.

The verb “should” expresses a highly recommended choice or course of action. Subject to national regulation and/or any relevant contractual provisions, alternative approaches could be used/adopted where technically justified.

The verb “may" expresses a course of action permissible within the limits of the Eurocodes.

The verb “can" expresses possibility and capability; it is used for statements of fact and clarification of concepts.

0.5 National Annex for EN 1995-1-1

National choice is allowed in this document where explicitly stated within notes. National choice includes the selection of values for Nationally Determined Parameters (NDPs).

The national standard implementing EN 1995-1-1 can have a National Annex containing all national choices to be used for the design of buildings and civil engineering works to be constructed in the relevant country.

When no national choice is given, the default choice given in this document is to be used.

When no national choice is made and no default is given in this document, the choice can be specified by a relevant authority or, where not specified, agreed for a specific project by appropriate parties.

National choice is allowed in EN 1995-1-1 through notes to the following clauses:

4.3.1.3(2)	4.3.1.4(1)	4.5.1(1)	4.5.2(1)
9.3.8(5)	10.1(2)	10.2(6)	H.3(1)
L.3(1)	L.3(2)		

National choice is allowed in EN 1995-1-1 on the application of the following informative annexes:

Annex A	Annex B	Annex C	Annex E
Annex F	Annex G	Annex I	Annex J
Annex N	Annex O	Annex P	Annex Q
Annex R	Annex S		

The National Annex can contain, directly or by reference, non-contradictory complementary information for ease of implementation, provided it does not alter any provisions of the Eurocodes.

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1 Scope

1.1 Scope of prEN 1995-1-1

(1) prEN 1995-1-1 gives general design rules for timber structures.

(2) prEN 1995-1-1 also gives specific design rules for buildings and timber civil engineering works.

1.2 Assumptions

(1) The assumptions of EN 1990 apply to this document.

(2) prEN 1995-1-1 is intended to be used in conjunction with EN 1990, EN 1991 (all parts), EN 1998 (all parts) when timber structures are built in seismic regions.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE See the Bibliography for a list of other documents cited that are not normative references, including those referenced as recommendations (i.e. through 'should' clauses) and permissions (i.e. through 'may' clauses).

EN 1990:2023, *Eurocode - Basis of structural and geotechnical design*

EN 1991 (all parts), *Eurocode 1 - Actions on structures*

prEN 1991-1-1:2023, *Eurocode 1 - Actions on structures - Part 1-1: General actions - Specific weight of materials, self-weight of construction works and imposed loads for buildings*

prEN 1992-1-1, *Eurocode 2 - Design of concrete structures - Part 1-1: General rules and rules for buildings, bridges and civil engineering structures*

prEN 1993-1-9, *Eurocode 3 - Design of steel structures - Part 1-9: Fatigue*

prEN 1995-3, *Eurocode 5 - Design of timber structures - Part 3: Execution*

prEN 1997-3, *Eurocode 7 - Geotechnical design - Part 3: Geotechnical structures*

EN 1998 (all parts), *Eurocode 8 - Design of structures for earthquake resistance*

EN 1999-1-1, *Eurocode 9 - Design of aluminium structures - Part 1-1: General rules*

EN 10255:2004+A1:2007, *Non-alloy steel tubes suitable for welding and threading - Technical delivery conditions*

EN 14080:2013, *Timber structures - Glued laminated timber and glued solid timber - Requirements*

3 Terms, definitions and symbols

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1990 and the following apply.

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3D-connector
folded or welded metal coupling device between *components* (3.1.9) and/or *members* (3.1.43) to be connected and kept in place with *dowel-type fasteners* (3.1.17)

EXAMPLE Angle brackets, joist hangers, hold downs.

3.1.2
adhesive
non-metallic substance capable of joining materials by surface bonding (adhesion) with the *bond* (3.1.5) possessing adequate internal strength (cohesion)

[SOURCE: EN 923:2015, 2.1.1]

3.1.3
angle bracket
L-shaped metal *3D-connector* (3.1.1), with or without stiffening corrugation used to fasten together two elements using *nails* (3.1.47), screws or bolts

3.1.4
assembly
composition of elements

3.1.5
bond
adhesion of one surface to another, with the use of an *adhesive* (3.1.2)

3.1.6
bonded-in rod
fastener used in *connections* (3.1.10) or as reinforcement of wood-based elements established by interaction of *rod* (3.1.59), *adhesive* (3.1.2) and wood-based elements

3.1.7
bow imperfection
distance of the centroid line from the perfect centroid line

3.1.8
carpentry connection
connection (3.1.10), which relies on direct contact between the connected elements, the force transmission being ensured through compression and shear stresses in the contact areas, possibly complemented with transversal metallic parts to prevent disconnection

3.1.9
component
part of an *assembly* (3.1.4)

3.1.10
connection
area where two or more elements fastened together by mechanical means or bonded by *adhesives* (3.1.2)

3.1.11
connector
coupling device interposed between or on elements to be connected and kept in place with *dowel-type fasteners* (3.1.17)

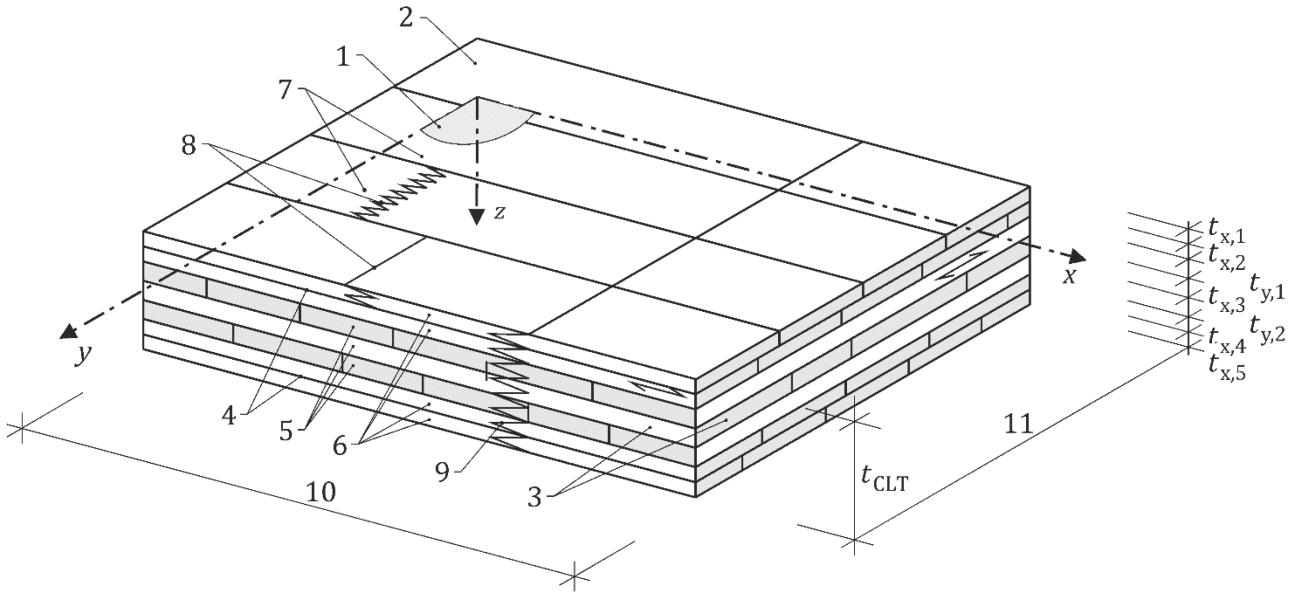
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EXAMPLE Shear connector, connector plate, metal 3D-connector.

3.1.12
creep
increase of deformation, the magnitude of which depends on the stress level, duration of loading, *moisture content* (3.1.45) and moisture content variations

3.1.13
cross laminated timber
CLT
glued structural timber product composed of at least three face-bonded layers which comprise structural lumber *lamination* (3.1.36) and can comprise *wood-based panels* (3.1.80), with at least one *layer* (3.1.38) orthogonally oriented to the two adjacent layers

Note 1 to entry: See Figure 3.1



Key

1	plane of the element	8	finger joint in a lamination
2	wide face	9	large finger joint
3	narrow face	10	usually the length
4	outer layer	11	usually the width b_{CLT} of a plate or height h_{CLT} of a beam
5	inner layer	t_{CLT}	overall thickness of the cross laminated timber
6	parallel outer laminations	$t_{x,i}$	thickness of layer i with fibres parallel to x-direction
7	lamination	$t_{y,i}$	thickness of layer i with fibres parallel to y-direction

Figure 3.1 — Cross laminated timber (CLT)

3.1.14
diaphragm action
in-plane forces resisted by a *planar element* (3.1.52)

3.1.15
double-step connection
carpentry connection (3.1.8) where two in-plane timber *members* (3.1.43) are connected at an angle to the grain using a front and a rear notch and where the load is being transferred predominantly by compression

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3.1.16
dowel-type connection
connection between two or more element formed by use of *dowel-type fasteners* (3.1.17)

3.1.17
dowel-type fastener
bar, with or without profiling, point and head, and with or without coating

3.1.18
dovetail connection
carpentry connection (3.1.8) where a secondary element having a dovetail end (tenon) that fits into a counter profiled notch (mortice) of a primary element that is self-locking and able to transfer forces

3.1.19
effective planar assembly
part of a planar *assembly* (3.1.4) resisting *diaphragm action* (3.1.14)

3.1.20
equilibrium moisture content
moisture content (3.1.45) at which wood neither gains nor loses moisture to the surrounding air

3.1.21
European technical product specification
European Standard (EN), European Technical Assessment (ETA) based on a European Assessment Document (EAD) or a transparent and reproducible assessment that complies with all requirements of the relevant EAD

[SOURCE: EN 1992-4:2018, 3.1.27]

3.1.22
expanded tube fastener
steel tube used as *dowel-type fastener* (3.1.17) which is expanded in diameter

3.1.23
fibre saturation point
moisture content (3.1.45) at which the wood cell walls are completely saturated

3.1.24
fitting panel
sheathing panel (3.1.62) of a smaller dimension than the standard panel for the sheathing

3.1.25
floating floor
floor layer, not connected to the load bearing structure

Note 1 to entry: Floating floors are usually set over an insulation layer.

3.1.26
framed planar assembly
assembly (3.1.4) composed of framing and one or more consecutive *sheathing panels* (3.1.62) connected to one or both sides of the framing

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3.1.27
framed wall assembly
end-to-end extent of a framed wall, comprising one or more framed wall sub-assemblies

3.1.28
free sheathing panel edge
edge of a *sheathing panel* (3.1.62) not transferring in-plane shear forces into adjacent sheathing panel or into the framing

3.1.29
glued laminated veneer lumber
GLVL
glued structural timber product composed of at least two *LVL* (3.1.40) panels or *laminations* (3.1.36) by face gluing

3.1.30
glued laminated timber
GL
glued structural timber product composed of at least two essentially parallel to grain *laminations* (3.1.36) which may comprise of one or two boards side by side having finished *thicknesses* (3.1.75) from 6 mm up to 45 mm (inclusive)

3.1.31
GLVL-C
GLVL (3.1.29) composed of *LVL* (3.1.40) panels or *laminations* (3.1.36) bonded parallel to the grain of the outermost veneers where at least one panel or *lamination* (3.1.36) consists of *LVL-C* (3.1.41)

3.1.32
GLVL-P
GLVL (3.1.29) composed of *LVL-P* (3.1.42) panels or *laminations* (3.1.36) bonded parallel to the grain of the outermost veneers

3.1.33
grain direction
direction parallel to the wood fibres or for layered products the direction parallel to the wood fibres of the outermost *layer* (3.1.38) or the outermost veneer

3.1.34
joisted floor
floor in which the deck is supported by closely and mainly equally spaced parallel joists

3.1.35
laminated timber deck
LTD
planar element (3.1.52) made of parallel mechanically fixed, pre-stressed or bonded timber elements comprising only parallel oriented fibres

3.1.36
lamination
part of a structural glued timber product composed of one board or two or more finger-jointed boards

3.1.37
large finger joint
finger joint through the full cross-sectional area of two layered timber element

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3.1.38
layer
part of a laminated structural timber product composed of adjacent *laminations* (3.1.36)

3.1.39
layup
cross-sectional arrangement of *laminations* (3.1.36) or *wood-based panels* (3.1.80)

3.1.40
laminated veneer lumber
LVL
glued structural timber product composed of wood veneers, glued together predominantly parallel to grain in adjacent *layers* (3.1.38) with wood fibres predominantly oriented in the same direction

3.1.41
LVL-C
symmetrically built up *laminated veneer lumber* (3.1.40) with some crossband veneers

3.1.42
LVL-P
symmetrically built up *laminated veneer lumber* (3.1.40) composed of veneers only with grain running essentially in one direction

3.1.43
member
physically distinguishable element of a load-bearing structure

3.1.44
metal plate connector
plane metal coupling device on elements to be connected and kept in place with *dowel-type fasteners* (3.1.17)

EXAMPLE Strap tie, nailing plate.

3.1.45
moisture content
mass of water in a material expressed as a proportion of its oven-dry mass

3.1.46
mortise and tenon connection
positive locking joint of two timber *members* (3.1.43) where the ashlar formed end of one *member* (3.1.43) fits into the cavity of another *member* (3.1.43)

3.1.47
nail
coated or uncoated, *dowel-type fastener* (3.1.17) with constant cross-section along its entire length, usually pointed and headed

3.1.48
natural durability
inherent resistance of wood species to attack by *wood-destroying fungi* (3.1.78) and *wood destroying insects* (3.1.79)

Note 1 to entry: Timber products can be made from species having different inherent resistances. Processing, particularly kiln-drying and layup, e.g. compositions from thin layers or veneers can also affect the inherent resistance.

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3.1.49
narrow face
surface of *cross laminated timber* (3.1.13), veneer based or solid wood panel perpendicular to the veneer or *layer* (3.1.38) planes

3.1.50
non-impregnated densified laminated wood
DLW
laminated wood made from *layers* (3.1.38) of wood veneer bonded together under controlled conditions of heat and pressure using a thermosetting synthetic resin *adhesive* (3.1.2)

[SOURCE: EN 61061-1:2007]

3.1.51
permitted geometrical deviation
permitted difference between a linear or angular dimension and the corresponding target dimension

3.1.52
planar element
structural element with two dominant dimensions

3.1.53
point length
length between last fully formed section or thread and the pointside end of a *dowel-type fastener* (3.1.17)

3.1.54
punched metal plate fastener
metal plate having integral projections punched out in one direction perpendicular to the base of the plate

Note 1 to entry: Field splice plates are a two part connector plate with one part being a punched metal plate fastener and the second part being a nailing plate.

3.1.55
rib
member (3.1.43) in a planar *assembly* (3.1.4)

EXAMPLE Studs and rails in framed walls and joists in framed floors.

3.1.56
ribbed rod
reinforcing bars with at least two rows of ribs uniformly distributed over the entire length

[SOURCE: prEN 1992-1-1:2021, 3.1.70]

3.1.57
rib type floors
composite floor comprising a slab structural connected with beams

EXAMPLE Timber-concrete composite floors, SWB or LVL ribbed floors.

3.1.58
ring shank nail
nail (3.1.47) containing a profiled shank of minimum length of 4,5 times the shaft diameter

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3.1.59
rod
threaded or ribbed steel bar

3.1.60
rod with metric thread
rod (3.1.59) with metric thread according to ISO 68-1

3.1.61
shear connector
coupling device interposed between two elements, kept in place with *dowel-type fasteners* (3.1.17) to transfer shear force across the joint plane

EXAMPLE Shear plate, split ring and toothed-plate connectors.

3.1.62
sheathing panel
structural construction product with two dominant dimensions such as wood-based panels, products of gypsum-based material, or other suitable products

3.1.63
single-step connection
carpentry connection (3.1.8) where two in-plane timber *members* (3.1.43) are connected at an angle to the grain using a front notch and where the load is being transferred predominantly by compression

3.1.64
slab type floors
floor deck comprising a plate structure

EXAMPLE CLT slab, LVL slab, nailed laminated slab or cross laminated timber-concrete composite slab.

3.1.65
slip
relative translation between two elements in a *connection* (3.1.10) in the direction of the force

3.1.66
slip modulus
ratio between load and *slip* (3.1.65)

3.1.67
smooth shank nail
coated or uncoated *nail* (3.1.47) with a constant cross-section along its entire shank length

3.1.68
softboard
wood fibre panel according to EN 13986 with EN 622-4 or according to a *European technical product specification* (3.1.21)

3.1.69
staple
coated or uncoated U-shaped round or flat wire fastener made of steel

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3.1.70
staple crown
part of a *staple* (6.1.69) that connects the legs

3.1.71
stiffness property
property used in the calculation of the deformation of the structure

EXAMPLE Modulus of elasticity, shear modulus, slip modulus.

3.1.72
sway imperfection of a member at a fork support
rigid body rotation of a *member* (3.1.43) from the perfect configuration expressed as z-axis inclination $\theta_{twist,1}$

3.1.73
sway imperfection of a member axis
rigid body rotation of a *member* (3.1.43) from the perfect configuration expressed as x-axis inclination Φ

3.1.74
thickness
cross-sectional dimension perpendicular to the *wide face* (3.1.76)

3.1.75
twist imperfection
difference between the rotation of the cross section at midspan and the rotation of the cross section at the support

3.1.76
wide face
surface of a panel parallel to the veneer or layer planes

3.1.77
width
cross-sectional dimension in plane of the *wide face* (3.1.76) perpendicular to the grain direction

3.1.78
wood-destroying fungi
fungi which can deteriorate the wood substance and thereby reduce the strength, stiffness and density of timber products

Note 1 to entry: Classifications of wood destroying fungi can be found in EN 335:2013, C.2.2.

Note 2 to entry: Blue stain and mould do not affect the mechanical properties but the surface appearance.

3.1.79
wood-destroying insects
insects which can deteriorate the wood substance and thereby reduce the strength, stiffness and density of timber products

Note 1 to entry: Classification of wood destroying insects can be found in EN 335:2013, C3.

3.1.80
wood-based panel
timber product according to EN 13986

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3.2 Symbols and abbreviations

3.2.1 Symbols

For the purposes of this document, the following symbols apply.

Latin upper case letters

A	cross-sectional area or contact area
A_i	cross-sectional area of i-numbered part of cross-section
A_{B}	area of dovetail
A_{chord}	cross-sectional area of edge rib
A_{D}	cross-sectional area of diagonal
A_{DLW}	area of non-impregnated densified laminated wood reinforcement
A_{ef}	effective area
$A_{\mathrm{ef,x/y}}$	effective net cross-section in x- or y-direction
A_{f}	area of flange
A_{head}	area of a fastener head
$\mathrm{A_m}$	parameter for the calculation of real and imaginary acceleration
A_{olap}	overlap area of punched metal plate fasteners
A_{rail}	cross-sectional area of a rail
A_{s}	nominal stressed area of fastener
A_{stud}	cross-sectional area of stud
A_{tim}	cross-sectional area of timber member
A_{tot}	total cross-sectional area
B	bending stiffness of bracing
B_{m}	parameter for the calculation of real and imaginary acceleration
C_{E}	category for corrosion resistance in atmosphere
D_0	stiffness parallel to grain
D_{90}	stiffness perpendicular to grain
D_{tor}	torsional stiffness
E	modulus of elasticity
EA	axial stiffness
$(EA)_{\mathrm{x}}$	axial stiffness in x-direction
$E_{\mathrm{c,0}}$	compressive modulus of elasticity parallel to grain
$E_{\mathrm{c,0,k}}$	characteristic compressive modulus of elasticity parallel to grain
$E_{\mathrm{c,0,k,sat}}$	characteristic compressive modulus of elasticity parallel to grain in fully saturated condition
$E_{\mathrm{c,0,mean}}$	mean compressive modulus of elasticity parallel to grain

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$E_{c,0,mean,sat}$	mean compressive modulus of elasticity parallel to grain in fully saturated condition
$E_{c,90}$	compressive modulus of elasticity perpendicular to grain
$E_{c,90,edge}$	edgewise compressive modulus of elasticity perpendicular to grain
$E_{c,90,edge,k}$	edgewise characteristic compressive modulus of elasticity perpendicular to grain
$E_{c,90,edge,mean}$	edgewise mean compressive modulus of elasticity perpendicular to grain
$E_{c,90,mean}$	mean compressive modulus of elasticity perpendicular to grain
$E_{c,mean}$	mean compressive modulus of elasticity
E_d	design effect of actions
$E_D A_D$	combined axial stiffness of diagonal and respective end connections
$E_{fuse,d}$	design effect of actions that a fuse element will carry in case of collapse
E_i	modulus of elasticity parallel to grain of i-numbered part of cross-section
EI	bending stiffness
$(EI)_{ef}$	effective bending stiffness
$(EI)_{ef,i}$	effective in-plane bending stiffness of shear wall at i^{th} storey
$(EI)_{ef,i-j}$	effective in-plane bending stiffness of shear wall at (i-j)th storey
$(EI)_L$	floor bending stiffness in direction of span
$(EI)_{ST}$	bending stiffness of discrete transverse bending member of floor
$(EI)_T$	floor bending stiffness transverse to the span
$(EI)_{y/z}$	bending stiffness about x- or y-axis
E_k	characteristic modulus of elasticity
E_{mean}	mean modulus of elasticity
$E_{mean,fin}$	final mean modulus of elasticity
$E_{m,mean}$	mean bending modulus of elasticity
$E_{m,0}$	bending modulus of elasticity parallel to grain
$E_{m,0,edge,k}$	edgewise characteristic bending modulus of elasticity parallel to grain
$E_{m,0,edge,mean}$	edgewise mean bending modulus of elasticity parallel to grain
$E_{m,0,flat,k}$	flatwise characteristic bending modulus of elasticity parallel to grain
$E_{m,0,flat,mean}$	flatwise mean bending modulus of elasticity parallel to grain
$E_{m,0,k}$	characteristic bending modulus of elasticity parallel to grain
$E_{m,0,mean}$	mean bending modulus of elasticity parallel to grain
$E_{m,90}$	bending modulus of elasticity perpendicular to grain
$E_{m,90,edge,k}$	edgewise characteristic bending modulus of elasticity perpendicular to grain
$E_{m,90,edge,mean}$	edgewise mean bending modulus of elasticity perpendicular to grain
$E_{m,90,flat,mean}$	flatwise mean bending modulus of elasticity perpendicular to grain
$E_{m,90,flat,k}$	flatwise characteristic bending modulus of elasticity perpendicular to grain
$E_{m,90,k}$	characteristic bending modulus of elasticity perpendicular to grain

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$E_{m,90,mean}$	mean bending modulus of elasticity perpendicular to grain
E_s	modulus of elasticity of fastener
E_sA_s	axial stiffness of fastener
E_T	transverse modulus of elasticity
$E_{t,mean}$	mean tensile modulus of elasticity
$E_{t,0}$	tensile modulus of elasticity parallel to grain
$E_{t,0,k}$	characteristic tensile modulus of elasticity parallel to grain
$E_{t,0,mean}$	mean tensile modulus of elasticity parallel to grain
$E_{t,90}$	tensile modulus of elasticity perpendicular to grain
$E_{t,90,edge,k}$	edgewise characteristic tensile modulus of elasticity perpendicular to grain
$E_{t,90,edge,mean}$	edgewise mean tensile modulus of elasticity perpendicular to grain
E_0	modulus of elasticity parallel to grain
$E_{0,D}$	modulus of elasticity of diagonal
$E_{0,k}$	characteristic modulus of elasticity parallel to grain
$E_{0,l,mean}$	mean modulus of elasticity of laminations parallel to grain
$E_{0,i}$	modulus of elasticity of an *i*-numbered part of cross-section
$E_{0,mean}$	mean modulus of elasticity parallel to grain
$E_{0,mean}A_{tim}$	axial stiffness of timber member
$E_{90,edge,k}$	edgewise characteristic modulus of elasticity perpendicular to grain
$E_{90,edge,mean}$	edgewise mean modulus of elasticity perpendicular to grain
$E_{90,mean}$	mean modulus of elasticity perpendicular to grain
$E_{90,k}$	characteristic modulus of elasticity perpendicular to grain
E_{90}	modulus of elasticity perpendicular to grain
F	force or load
$F_{A,Ed}$	design force acting on the centroid of an effective area
F_{ax}	axial force
$F_{ax,c,d}$	design axial compressive resistance
$F_{ax,d}$	design axial resistance
$F_{ax,Ed}$	design axial force
$F_{ax,Ek,i}$	characteristic axial force of *i*-numbered member
$F_{ax,t,Ed}$	design axial tensile force
$F_{ax,t,Rk}$	characteristic axial tensile capacity
$F_{ax,Rd}$	design axial capacity
$F_{ax,t,d}$	design axial tensile resistance
$F_{ax,t,d,i}$	design axial resistance in *i*-numbered member
$F_{ax,t,k}$	characteristic axial tensile resistance

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$F_{ax,t,Rd}$	design axial tensile capacity
$F_{ax,45,Rk}$	characteristic axial capacity at an angle of 45 degrees to grain
$F_{br,Rd}$	design brittle failure capacity
$F_{bs,Rd}$	design block shear capacity
$F_{b,i,d}$	design brittle failure resistance of *i*-numbered member
$F_{c,Ed}$	design compressive force
$F_{car,Ed}$	design compressive force
$F_{car,i,d}$	design compressive resistance of *i*-numbered part of member
$F_{c,k}$	characteristic compressive resistance
F_{crit}	critical load
$F_{c,90,d}$	design compressive force perpendicular to grain
$F_{c,90,k}$	characteristic compressive resistance perpendicular to grain
$F_{c,90,SLS}$	compressive force perpendicular to grain for serviceability verification
F_{d}	design action
F_{D}	dowel-effect contribution
$F_{d,accidental}$	design accidental action
$F_{D,k}$	characteristic dowel-effect contribution
F_{dyn}	vertical dynamic force
$F_{Di\text{-}j}$	dowel-effect contribution per shear plane between *i*- and *j*-numbered members
F_{Ed}	design force
$F_{Ed,i}$	design effect of action acting along *i*-direction
F_{h}	harmonic force
F_{i}	force in fasteners between cross-section 2 and an *i*-numbered cross-section
$F_{i,Ed}$	design force on *i*-numbered element
F_{la}	lateral force
$F_{la,i}$	lateral force on *i*-numbered element
$F_{M,Ed}$	design force from a moment
$F_{t,max}$	maximal tensile load
$F_{n,Ed}$	design force on *n*-numbered element
$F_{ps,Rd}$	design plug shear capacity
$F_{pull,k}$	characteristic head pull-through resistance
$F_{Rd,i}$	design capacity associated to *i*-direction
F_{Rk}	characteristic capacity
$F_{rp,d}$	design rope-effect contribution
$F_{rp,k}$	characteristic rope-effect contribution
$F_{rs,Rd}$	design row shear capacity

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F_{SLS}	maximum load at serviceability limit state
$F_{sp,Rd}$	design splitting capacity
$F_{sp,Rk}$	characteristic splitting capacity
$F_{t,Ed}$	design tensile force
$F_{t,d}$	design tensile force or resistance
$F_{t,k}$	characteristic tensile resistance
$F_{t,M,d}$	design tensile force component from the transfer of bending stresses
$F_{t,V,d}$	design tensile force component from the transfer of shear stresses
$F_{t,0,Rd}$	design tensile capacity parallel to grain
$F_{t,0.95}$	95^{h}-percentile of the tensile resistance
$F_{t,90}$	tensile force perpendicular to grain
$F_{t,90,d}$	design tensile force perpendicular to grain
$F_{t,90,Ed}$	design tensile force in reinforcement
$F_{t,90,Ek}$	characteristic tensile force in reinforcement
$F_{t,90,M,Ed}$	design tensile force component perpendicular to grain from the transfer of bending stresses
$F_{t,90,M,I/III,Ed}$	design tensile force component perpendicular to grain from the transfer of bending stresses located at the first and third quadrant
$F_{t,90,Rd}$	design tensile capacity of reinforcement
$F_{t,90,V,Ed}$	design tensile force component perpendicular to grain from the transfer of shear stresses
$F_{t,90,V,I/III,Ed}$	design tensile force component perpendicular to grain from the transfer of shear stresses located at the first and third quadrant
F_{v}	lateral force or characteristic lateral resistance per tube
$F_{v,A,0,Ed}$	design lateral force component parallel to grain in member *A*
$F_{v,A,90,Ed}$	design lateral force component perpendicular to grain in member *A*
$F_{v,b,d}$	design bottom shear plane resistance
$F_{v,B,0,Ed}$	design lateral force parallel to grain in member *B*
$F_{v,d}$	design lateral resistance
$F_{v,d,1}$	design horizontal force applied to the tension part of wall
$F_{v,d,2}$	design horizontal force applied to the shear part of wall
$F_{v,Ed}$	design lateral or horizontal force
$F_{v,Ed,1}$	design horizontal force in the tension part of wall
$F_{v,Ed,2}$	design horizontal force in the compression part of wall
$F_{v,H,d}$	design lateral capacity or design lateral resistance on hanger side
$F_{v,H,k}$	characteristic lateral resistance
$F_{v,J,k}$	characteristic lateral resistance on joist side

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$F_{v,k}$	characteristic lateral resistance
$F_{v,la,d}$	design side shear plane resistance
$F_{v,Rd}$	design lateral capacity
$F_{v,Rk}$	characteristic lateral capacity
$F_{v,y/z,k}$	characteristic lateral resistance in y- or z-direction
$F_{v,\alpha,k}$	characteristic resistance at an angle α to grain
$F_{v,0,k}$	characteristic resistance parallel to grain
$F_{v,90,k}$	characteristic resistance perpendicular to grain
$F_{web,v,Ed}$	design shear force acting on web
$F_{w,d}$	design withdrawal resistance
$F_{w,k}$	characteristic withdrawal resistance
F_x	force acting in x-direction
$F_{x/y,Ed}$	design force of member acting in x- or y-direction
$F_{x/y,Rk}$	design capacity in x- or y-direction
$F_{x/y,i}$	force acting in x- or y-direction at i-numbered member end
$F_{x/y,i,Ed}$	design forces of a member acting in x- or y-direction at i-numbered member end
$F_{x/y,i,Rd}$	design capacity in x- or y-direction at i-numbered member end
$F_{0,Ed}$	design force parallel to grain or vertical action at leading edge of a wall
F_i	i-numbered force or load
$F_{1,c/t}$	i-numbered compressive/tensile force
$F_{90,Ed}$	design force or load perpendicular to grain
$F_{90,Rd}$	design splitting capacity
$F_{90,Rk}$	characteristic splitting capacity
G	shear modulus
$(GA)_{xy}$	shear stiffness
G_k	characteristic shear modulus
$G_{k,i}$	characteristic permanent action i
G_{mean}	mean shear modulus
$G_{mean,fin}$	final mean shear modulus
G_p	shear modulus of sheathing panel
$G_{p,i}$	shear modulus of sheathing panel on i-numbered side of framing
$G_{r,mean}$	mean rolling shear modulus
$G_{v,mean}$	mean shear modulus (in-plane loading)
$G_{v,xy,mean}$	mean shear modulus (in-plane loading)
$G_{xy,mean,i}$	mean in-plane shear modulus of wall at i^{th} storey
G_0	shear modulus parallel to grain

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$G_{0,edge,k}$	edgewise characteristic shear modulus parallel to grain
$G_{0,edge,mean}$	edgewise mean shear modulus parallel to grain
$G_{0,flat,k}$	flatwise characteristic shear modulus parallel to grain
$G_{0,flat,mean}$	flatwise mean shear modulus parallel to grain
$G_{0,k}$	characteristic shear modulus parallel to grain
$G_{0,l,mean}$	mean shear modulus of lamination parallel to grain
$G_{0,mean}$	mean shear modulus parallel to grain
$G_{0,T}$	transverse shear modulus parallel to grain
$G_{0,90}$	shear modulus in-plane of an element
$G_{0,90,mean}$	mean shear modulus in-plane of an element
$G_{90,edge,k}$	edgewise characteristic shear modulus perpendicular to grain
$G_{90,edge,mean}$	edgewise mean shear modulus perpendicular to grain
$G_{90,flat,k}$	flatwise characteristic shear modulus perpendicular to grain
$G_{90,flat,mean}$	flatwise mean shear modulus perpendicular to grain
$G_{90,mean}$	mean shear modulus perpendicular to grain
$G_{90,T}$	transverse shear modulus perpendicular to grain
H_i	inter-storey height of i^{th} storey
$H_{i\text{-}1}$	inter-storey height of $(i\text{-}1)^{th}$ storey
I_{ef}	effective moment of inertia
I_f	moment of inertia of flange
I_i	second moment of inertia of i-numbered part of cross-section
$I_{mod,mean}$	mean modal impulse
$I_{mod,ef}$	effective footfall impulse
I_p	polar moment of inertia
$I_{p,H,ax}$	polar moment of inertia of hanger fasteners group
I_{tot}	total moment of inertia
I_x	torsional moment of inertia
$I_{y/z}$	second moment of inertia about y- or z-axis
$I_{y/z,ef}$	effective second moment of inertia about y- or z-axis
J	torsion constant
K	stiffness
$K_{A,i}$	sliding stiffness of shear wall at i^{th} storey
$K_{a,z,j}$	vertical-tensile stiffness of j^{th} mechanical connection parts
K_f	fastener stiffness
$K_{f,D}$	fastener stiffness in diagonal
K_i	stiffness of i-numbered member

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$K_{R,i}$	rocking stiffness of shear wall at i^{th} storey
$K_{R,1,CP}$	rocking stiffness of shear wall in coupled-panel kinematic mode
$K_{R,i,SW}$	rocking stiffness of shear wall in single-wall kinematic mode
$K_{SLS,anc}$	mean stiffness of shear wall anchor for serviceability limit state verifications
$K_{SLS,con}$	mean stiffness of vertical joint in shear wall for serviceability limit state verifications
K_{SLS}	mean stiffness or slip modulus for serviceability limit state verifications
$K_{SLS,A}$	stiffness of anchorage system against overturning for serviceability limit state verifications
$K_{SLS,ax}$	mean axial slip modulus for serviceability limit state verifications
$K_{SLS,fin}$	final mean stiffness value for serviceability limit state verifications
$K_{SLS,ref}$	mean slip modulus at a reference mean density for serviceability limit state verifications
$K_{SLS,rot}$	mean rotational slip modulus for serviceability limit state verifications
$K_{SLS,v}$	mean lateral slip modulus for serviceability limit state verifications
$K_{SLS,v,y}$	mean lateral slip modulus perpendicular to insertion direction of a dovetail for serviceability limit state verifications
$K_{SLS,v,z}$	mean lateral slip modulus in insertion direction of a dovetail for serviceability limit state verifications
$K_{SLS,i}$	mean slip modulus for serviceability limit state verifications at i-numbered side of framing
K_{ULS}	mean slip modulus for ultimate limit state verifications
$K_{ULS,fin}$	final mean slip modulus for ultimate limit state verifications
K_i	slip modulus of connection between cross-section 2 and i-numbered cross-section
L_{sea}	distance from sea
L_{street}	distance from roads with heavy traffic and with de-icing salt
M	bending moment
$M_{A/B/C}$	bending moment at ¼; ½ and ¾ span
$M_{A,Ed}$	design bending moment acting on single plate
$M_{ap,d}$	design bending moment at apex
M_{beam}	bending moment in beam
$M_{beam,max}$	maximum bending moment in beam
M_{Ed}	design bending moment or complementary overturning moment
$M_{i,Ed}$	design moment acting at the bottom of a shear wall at i^{th} storey
$M_{i,Top,Ed}$	design moment acting at the top of a shear wall at i^{th} storey
$M_{i\text{-}1,Top,Ed}$	design moment acting at the top of a shear wall at $(i\text{-}1)^{th}$ storey
M_m	modal mass of mode m
M_{max}	maximum bending moment
M_{Rd}	design bending moment capacity

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$M_{\mathrm{res,d}}$	design bending moment from frame action around hole
$M_{\mathrm{x,d}}^{\mathrm{nl}}$	design non-linear torsional moment
$M_{\mathrm{y/z}}$	linear moment about *y*- or *z*-axis
$M_{\mathrm{y/z,crit}}$	critical bending moment about *y*- or *z*-axis
$M_{\mathrm{y/z,d}}$	design bending moment about *y*- or *z*-axis
$M_{\mathrm{y/z,Ed}}$	design bending moment about *y*- or *z*-axis
$M_{\mathrm{y/z,d}}^{\mathrm{nl}}$	design non-linear bending moment about *y*- or *z*-axis
$M_{\mathrm{y,k}}$	characteristic yield moment
$M_{\mathrm{y/z\ ,Quasi,SLS}}$	moment due to quasi-permanent combination of loads for serviceability limit state verifications about *y*- or *z*-axis
$M_{\mathrm{y,0.95}}$	95$^{\mathrm{th}}$ percentile of the yield moment
M*	modal mass
N_{crit}	critical force
$N_{\mathrm{cr,T}}$	mean torsional critical moment
$N_{\mathrm{cr,T,d}}$	characteristic torsional critical moment
$N_{\mathrm{cr,y/z}}$	mean critical load for buckling about *y*- or *z*-axis
$N_{\mathrm{cr,y/z,d}}$	characteristic critical load for buckling about *y*- or *z*-axis
$N_{\mathrm{c/t,0}}$	axial compressive/tensile force parallel to grain
$N_{\mathrm{c/t,0,d}}$	design axial compressive/tensile force parallel to grain
$N_{\mathrm{c,0,Quasi,SLS}}$	axial compressive force due to quasi-permanent combination of loads for serviceability limit state verification parallel to grain
N_{Ed}	design axial force
$N_{i,\mathrm{Ed}}$	design axial force in i^{th} storey
$\widetilde{N_{\iota}}$	dimensionless vertical load on shear wall
$N_{\mathrm{pl,k}}$	characteristic yield capacity of screw
N_{Rd}	design shear resistance or design normal force capacity of a connection transmitted by bondline area
$\overline{N_{\mathrm{T}}}$	spread between torsional critical moment and axial force
$\overline{N_{\mathrm{T,d}}}$	spread between design torsional critical moment and design axial force
$\overline{N_{\mathrm{y/z}}}$	spread between axial critical load and axial force
$\overline{N_{\mathrm{y/z,d}}}$	spread between design axial critical load and design axial force
$N_{\mathrm{y/z,crit}}$	critical force about *y*- or *z*-axis
P	load
Q	variable action or force
Q_i	force for design of intermediate restraints
Q_{inst}	short-term (instantaneous) part of variable action

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Q_j	accompanying variable action
$Q_{j,\text{inst}}$	short-term (instantaneous) part of accompanying variable action
$Q_{j,\text{qper}}$	long-term (quasi-permanent) part of accompanying variable action
$Q_{\text{k},j}$	characteristic accompanying variable action
$Q_{\text{k},1}$	characteristic leading variable action
Q_{qper}	long-term (quasi-permanent) part of variable action
$Q_{\text{S-R}}$	force in connection between stiffened member and restraint
Q_1	leading variable action
$Q_{1,\text{inst}}$	short-term (instantaneous) part of leading variable action
$Q_{1,\text{qper}}$	long-term (quasi-permanent) part of leading variable action
R	response factor
R_d	design resistance (load-carrying capacity)
R_h	response factor for specific harmonic
R_k	characteristic resistance (load-carrying capacity)
$R_{0.95}$	95$^{\text{th}}$-percentile value of resistance
$R_{\text{sup,d}}$	upper design resistance (load-carrying capacity) of a fuse element
R_T	stress ratio in timber structures
R_i	response factor for i-numbered harmonic
$S_{i,j}$	centre of gravity of screw i in member j
T	period of one footfall or time
T_d	design shear force
T_E	corrosion resistance category in timber
T_Lf	design service life
V	section force
V_d	design shear force or load
V_Ed	design shear force
$V_{i,\text{Ed}}$	design lateral force or shear load acting at i^{th} storey
$V_{i\text{-}1,\text{Ed}}$	design lateral force or shear load acting at $(i\text{-}1)^{\text{th}}$ storey
V_Rd	design shear force capacity of connection transmitted by bondline area
$V_{\text{r,Ed}}$	design shear force perpendicular to grain
$V_{\text{r,Rd}}$	design shear force capacity
$V_{\text{ef}}(F)$	reduced shear force induced by concentrated load F
V_ref	reference volume
V_z	shear force
W_net	section modulus of net cross-section
W_pl	plastic rotation of section modulus

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W_{res}	section modulus of residual cross-section above and below hole
$W_{y/z}$	section modulus about *y*- or *z*-axis

Latin lower case letters

a	distance or load deformation parameter per tube per shear plane
a_c	distance between sections where lateral deflection of a compressive flange is prevented
a_h	acceleration
$a_{imag,h}$	total imaginary acceleration
$a_{imag,h,m}$	imaginary responses in mode *m*
$a_{1/2}$	spacing parallel/perpendicular to grain
$a_{1,i}$	spacing of the sheathing-to-framing fasteners on the *i*-numbered side of the framing
$a_{1,m}$	spacing on circle
$a_{1,s}$	staggered spacing parallel to grain
$a_{2,c}$	unloaded distance perpendicular to grain
$a_{2,m}$	spacing between circles
$a_{2,s}$	staggered spacing perpendicular to grain
a_3	spacing from the end grain to nearest fastener parallel to grain
$a_{3,t/c}$	loaded/unloaded end distance parallel to grain
$a_{3,CG}$	end distance parallel to grain of the centre of gravity
a_4	edge distance perpendicular to grain
$a_{4,t/c}$	loaded/unloaded edge distance perpendicular to grain
$a_{4,CG}$	edge distance perpendicular to grain of the centre of gravity
a_{4c}	unloaded edge distance perpendicular to grain
$a_{ef,2}$	effective spacing of the screws
a_{fat}	coefficient representing the type of fatigue action
a_i	distance between the centroid of the composite cross-section and the centroid of the *i*-numbered part of the cross-section
$a_{net,rib}$	clear distance between ribs
a_R	distance between restraints
$a_{R=1,h}$	baseline peak acceleration for a response factor of 1 at a harmonic frequency
$a_{real,h}$	total real acceleration
$a_{real,h,m}$	real acceleration responses in mode *m*
a_{rib}	spacing of ribs
a_{rms}	root mean square value of acceleration
a_z	distance between the centroid of the cross-section to the point of load application
$a_{z,B}$	lever arm of the bracing along *z*-axis

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$a_{z,p}$	lever arm of load p along z-axis
$a_{z,y}$	distance from the centroid of the stiffened member to the bracing plan
b	width or load deformation parameter per tube per shear plane
$b_{A/B}$	width of member A/B
$b_{A,x/y}$	contact width in x- or y-direction
$b_{Ai/Bi}$	i-numbered width of member A/B
$b_{c,middle}$	width of the loaded area at the middle plane of the laminated timber deck
$b_{c,middle,x/y}$	width of the loaded area at the middle plane of the laminated timber deck in x- or y-direction
$b_{c/t,ef}$	effective width of the compressive/tensile zone
$b_{c,system}$	effective width depending on the type of connection between the components of the laminated timber deck
b_{CLT}	cross laminated timber member width
b_{con}	connector width
b_{crn}	staple crown width
$b_{c,90}$	contact area width perpendicular to grain
b_{DLW}	densified laminated wood dimension parallel to grain
b_{ef}	effective width
$b_{ef,i}$	i-numbered width of a dispersed load at mid height or effective width at an i-numbered side of a rib
$b_{ef,x/y}$	effective width in x- or y-direction
b_f	flange width
$b_{f,i}$	i-numbered flange width
$b_{f,c/t,ef}$	effective flange width of the compressive/tensile zone
$b_{f,ef}$	effective flange width
b_{fat}	coefficient representing the type of fatigue action
b_i'	i-numbered width of the load introduction at the bottom of a wall
b_i	i-numbered width of the load introduction or i-numbered clear distance between ribs or width of an i-numbered part of a cross-section
b_l	lamination width
b_{min}	minimum width
b_{mrt}	mortise width
b_{net}	net width
b_p	panel width
$b_{PMPF,0}$	punched metal plate width parallel to grain
b_r	plane reinforcement width
b_{rib}	rib width

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b_{ten}	tenon width
b_{web}	web width
c	allowed geometrical deviation due to misalignment of punched metal plate fasteners or load deformation parameter per tube per shear plane
c_{lower}	exponent according to EN ISO 8970
d	diameter
d_1	inner thread diameter
$d_{1,2}$	inner secondary thread diameter
d_2	washer or secondary thread diameter
dA	segmental area of punched metal plate fastener
d_{con}	connector diameter
$d_{con,1}$	centre hole diameter of the shear connector
d_{drill}	drill hole diameter
d_e	equivalent tensile stress diameter
d_{exp}	expanded diameter tube
d_{head}	head diameter
d_{hole}	hole diameter
$d_{hole,max}$	largest hole diameter
d_r	dowel-type reinforcement diameter
d_s	shank diameter
e	bow or equivalent bow imperfection or eccentricity
e_c	eccentricity of a load introduction in the compressive zone
e_{Fi}	eccentricity of *i*-numbered force
e_i	bow of a member corresponding to an *i*-numbered equivalent length
$e_{twist,1}$	eccentricity of a member due to sway at the fork support
$e_{twist,2}$	bow of a member due to twist
$e_{y/z}$	equivalent bow imperfection in *y*- or *z*-direction
$e_{y/z}^{nl}$	non-linear deflection in *y*- or *z*-direction
$e_{y/z,inst,Quasi,SLS}^{nl}$	non-linear deflection in *y*- or *z*-direction due to forces and moments arising from the serviceability limit state quasi-permanent load combination calculated using instantaneous modulus of elasticity and shear
$e_{y/z,fin,Quasi,SLS}^{nl}$	non-linear deflection in *y*- or *z*-direction due to forces and moments arising from the serviceability limit state quasi-permanent load combination calculated using final modulus of elasticity and shear
e_0	initial bow imperfection
$e_{0,y/z}$	initial bow imperfection in *y*- or *z*-direction
$e_{0+c,y/z}$	creep amplified bow imperfection in *y*- or *z*-direction

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$f_{ax,k}$	characteristic withdrawal strength or parameter
$f_{a,\alpha,\beta,k,ref}$	characteristic reference anchorage strength per unit area of plate for angle α between x-direction and force and angle β between grain direction and force
$f_{a,\alpha,\beta,d}$	design anchorage strength per unit area of plate for angle α between x-direction and force and angle β between grain direction and force
$f_{a,\alpha,\beta,k}$	characteristic anchorage strength per unit area of plate for angle α between x-direction and force and angle β between grain direction and force
$f_{b,2,d}$	design bondline strength
$f_{b,2,k}$	characteristic bondline strength
$f_{c,head,k}$	characteristic compressive strength below head
$f_{c/t,p,\alpha,k}$	characteristic compressive/tensile strength per unit width of the plate for angle α
$f_{c,\alpha,d}$	design compressive strength at an angle α to the grain
$f_{c,0,d}$	design compressive strength parallel to grain
$f_{c,0,k}$	characteristic compressive strength parallel to grain
$f_{c,0,k,sat}$	characteristic compressive strength parallel to the grain in fully saturated condition
$f_{c,90,d}$	design compressive strength perpendicular to grain
$f_{c,90,edge,k}$	edgewise characteristic compressive strength perpendicular to grain
$f_{c,90,flat,k}$	flatwise characteristic compressive strength perpendicular to grain
$f_{c,90,flat,k,pine}$	flatwise characteristic compressive strength perpendicular to grain of pine
$f_{c,90,k}$	characteristic compressive strength perpendicular to grain
f_{d}	design strength property (stress-carrying capacity)
$f_{fat,d}$	design fatigue strength
$f_{f,c/t,d}$	design flange compressive/tensile strength
f_{h}	harmonic forcing frequency
$f_{head,k}$	characteristic head pull-through strength or parameter
$f_{head,k}^{EN1383}$	characteristic head pull-through parameter according to EN 1383
$f_{head,0.95}$	95th percentile head pull-through strength
$f_{h,k}$	characteristic embedment strength
$f_{h,i,k}$	characteristic embedment strength of interlayer between timber members 1 and 2
$f_{h,\alpha,k}$	characteristic embedment strength at an angle α
$f_{h,\alpha,\beta,k}$	characteristic embedment strength at an angle α and β
$f_{h,\beta,\varepsilon,k}$	characteristic embedment strength at an angle β and ε
$f_{h,\varepsilon,k}$	characteristic embedment strength at an angle ε
$f_{h,0,k}$	characteristic embedment strength of the timber parallel to grain
$f_{h,1,k}$	characteristic embedment strength of timber member 1
$f_{h,1/2,k}$	characteristic embedment strength of timber member 1 or 2
f_{k}	characteristic strength property

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$f_{m,d}$	design bending strength
$f_{m,edge,k}$	edgewise characteristic bending strength
$f_{m,k}$	characteristic bending strength
$f_{m,l,d}$	design bending strength of lamination
$f_{m,y/z,d}$	design bending strength about *y*- or *z*-axis
$f_{m,y/z,k}$	characteristic bending strength about *y*- or *z*-axis
$f_{m,0,d}$	design bending strength parallel to grain
$f_{m,0,edge,k}$	edgewise characteristic design bending strength parallel to grain
$f_{m,0,flat,k}$	flatwise characteristic design bending strength parallel to grain
$f_{m,0,k}$	characteristic bending strength parallel to grain
$f_{m,90,d}$	design bending strength perpendicular to grain
$f_{m,90,flat,k}$	flatwise characteristic bending strength perpendicular to grain
$f_{m,90,k}$	characteristic bending strength perpendicular to grain
$f_{n,m}$	natural frequency of mode *m*
$f_{n,p,\alpha,k}$	characteristic normal strength per unit width of the plate for an angle α
$f_{p,v,d}$	design shear strength of the sheathing panel
$f_{p,c,\alpha,d}$	design compressive strength of the sheathing panel for an angle α
$f_{p,t,\alpha,d}$	design tensile strength of the sheathing panel for an angle α
$f_{p,t,\alpha,k}$	characteristic tensile strength of the sheathing panel for an angle α
$f_{p,v,k}$	characteristic shear strength of the sheathing panel
$f_{r,d}$	design rolling shear strength
$f_{r,k}$	characteristic rolling shear strength
$f_{s,d}$	design shear strength of the sheathing-to-framing fasteners per unit length
$f_{s,d,i}$	design shear strength of sheathing-to-framing fasteners of the *i*-numbered sheathing layer per unit length
$f_{t,d}$	design tensile strength
$f_{tens,d}$	design tension capacity
$f_{t,k}$	characteristic tensile strength
$f_{tor,node,d}$	design torsional shear strength of bondlines between laminations of adjacent orthogonal layers
$f_{tor,node,k}$	characteristic torsional shear strength of bondlines between laminations of adjacent orthogonal layers
$f_{t,0,k}$	characteristic tensile strength parallel to grain
$f_{t,0,d}$	design tensile strength parallel to grain
$f_{t,90,d}$	design tensile strength perpendicular to grain
$f_{t,90,edge,k}$	edgewise characteristic tensile strength perpendicular to grain
$f_{t,90,k}$	characteristic tensile strength perpendicular to grain

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$f_{u,k}$	characteristic tensile strength of dowel-type fasteners
$f_{u,min}$	minimum wire strength
$f_{u,0.95}$	95th percentile of tensile strength
$f_{v,d}$	design shear strength
$f_{v,k}$	characteristic shear strength
$f_{v,k,ref}$	characteristic reference shear strength
$f_{v,l,d}$	design shear strength of lamination
$f_{v,p,0,k}$	characteristic shear strength per unit width of the plate in the x-direction
$f_{v,p,90,k}$	characteristic shear strength per unit width of the plate in the y-direction
$f_{v,xy,k}$	characteristic shear strength perpendicular to plane loading
$f_{v,y/z,d}$	design shear strength in y- or z-direction
$f_{v,0,d}$	design shear strength parallel to grain
$f_{v,0,edge,k}$	edgewise characteristic shear strength parallel to grain
$f_{v,0,flat,k}$	flatwise characteristic shear strength parallel to grain
$f_{v,90,d}$	design rolling shear strength
$f_{v,90,edge,k}$	edgewise characteristic shear strength perpendicular to grain
$f_{v,90,flat,k}$	flatwise characteristic shear strength perpendicular to grain
f_{w}	walking frequency
$f_{w,c/t,d}$	design compressive/tensile bending strength of web
$f_{w,d}$	design withdrawal strength
$f_{w,k}$	characteristic withdrawal strength
$f_{w,k,ref}$	characteristic reference withdrawal strength
$f_{w,0.95}$	95th percentile of withdrawal strength
f_{y}	nominal yield strength
$f_{y,d}$	design yield strength
$f_{y,k}$	characteristic yield strength
$f_{y,mean}$	mean yield strength
$f_{y,0.95}$	95th percentile of yield strength
f_{1}	fundamental frequency
$f_{1,beam,i}$	fundamental frequency of the supporting beam on i-named side span end
$f_{1,lim}$	fundamental frequency limit
$f_{1,rigid}$	fundamental frequency on rigid supports
h	height or depth
$h_{A/B}$	height of the member A/B
$h_{Ai/Bi}$	i-numbered height of the member A/B
h_{ap}	apex height

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h_{CLT}	cross laminated timber member height
h_{DLW}	densified laminated wood dimension perpendicular to grain
h_e	distance from loaded edge to the location where the full connection force is transmitted
$h_{e,A/B}$	distance from loaded edge to the location where the full connection force is transmitted in member A/B
$h_{e,net}$	distance from loaded edge to the location where the full connection force is transmitted reduced by the allowed geometrical deviation due to misalignment
h_{ef}	effective height or depth
h_{eq}	equivalent depth
h_f	flange depth
$h_{f,c/t}$	flange depth in the compressive/tensile zone
$h_{f,c/t,ef}$	effective flange depth in the compressive/tensile zone
h_{hole}	hole height
h_i	i-numbered height or depth
h_{i-1}	(i-1) numbered height
$h_{l,bj}$	height of laminations in a butt-joint
h_o	height of opening
$h_{o,i}$	height of i-numbered opening
h_p	sheathing panel height
h_{pi}	sheathing panel height with i-numbered free edges
$h_{r,ef}$	effective reinforcement depth
h_{raf}	rafter depth
h_{red}	reduced depth
h_{ref}	reference depth
$h_{ref,flat}$	reference height for flatwise bending
h_{res}	residual depth
h_{rib}	rib height
h_{rl}	residual depth at the lower edge
h_{rp}	plane reinforcement height
h_{ru}	residual depth at the upper edge
h_s	member depth at support
h_{ten}	tenon depth
h_{web}	clear distance between flanges
i	notch inclination or polar radius of gyration
i_{bow}	global equivalent bow imperfection
i_{sway}	global equivalent sway imperfection

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i_{twist}	twist imperfection
k	kink point or stiffness per metre
k_{bj}	butt-joint factor
k_{br}	increase factor for spacings in brittle failure calculation
k_c	reduction factor accounting for stability effects due to compressive stresses
$k_{c,90}$	stress spreading factor
$k_{c,90,CLT}$	stress spreading factor for cross laminated timber
$k_{c,y/z}$	reduction factor accounting for stability effects about the y- or z- axis due to compressive stresses
k_{comb}	sheathing combination factor
$k_{con,0}$	factor for the number of columns of fasteners parallel to the grain within a connection
$k_{con,90}$	factor for the number of columns of fasteners perpendicular to the grain within a connection
k_{couple}	factor for the reduced lever arm between stabilizing forces
k_{def}	creep deformation factor
$k_{def,i}$	creep deformation factor for *i*-numbered wood-based material
k_{dens}	reference density factor
k_{diam}	factor for the stress distribution and the location of crack onset
k_{dis}	factor accounting for effects of the stress distribution in the apex zone
k_{DLF}	dynamic load factor
k_{dyn}	dynamic amplification factor
$k_{e,2}$	frequency factor for the transverse floor stiffness
k_{E90}	transverse system modulus of elasticity factor
k_{ecc}	factor for the eccentric position of a load
$k_{ecc,b}$	factor for the eccentric position of a load for the braced member
$k_{ecc,I/III}$	factor for the effect of an eccentricity on the transfer of shear stresses for the first and third quadrant
k_{fat}	fatigue reduction factor
k_{fb}	factor for the influence of boundary conditions
k_G	fracture parameter
k_{G05}	adjustment factor for the shear modulus
k_{G90}	transverse system shear modulus factor
k_h	depth modification factor
k_H	factor for the influence of the end-grain wood
$k_{h,max}$	maximum depth modification factor
$k_{h,v}$	depth modification factor for shear strength
k_i	*i*-numbered modification factor

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k_{imp}	factor for higher modes in the transient response
k_k	factor for non-uniform distribution of stresses in the plane reinforcement
k_{ka}	factor for the distribution of tensile stresses perpendicular to grain along the beam axis
k_l	length modification factor
$k_{l,ap}$	factor for increased bending stresses in the apex zone
$k_{l,max}$	maximum length modification factor
k_m	reduction factor accounting for stability effects due to bending stresses
$k_{m,\alpha}$	factor for a stress combination at the tapered edge
k_{mat}	factor for the material behaviour or material parameter for the number of laminations or reduction factor for the distance of the punched metal plate fastener connection from either end of a member
k_{mod}	strength modification factor for the effect of load duration and moisture content
$k_{mod,i}$	strength modification factor for the effect of load duration and moisture content for *i*-numbered wood-based material
$k_{mod,sat}$	strength modification factor for the effect of load duration and moisture content in fully saturated condition
k_n	material constant factor
$k_{n,1}$	splitting capacity modification factor
$k_{p,ap}$	factor for effects of tensile stresses perpendicular to grain resulting from a deviation of bending stresses in an apex zone
$k_{p,c}$	factor for buckling of a panel in compression
$k_{p,model}$	model factor for the sheathing panel capacity
$k_{p,v}$	factor for buckling of a panel in shear
k_{pl}	sheathing interaction factor for the plastic behaviour of sheathing-to-framing fasteners
k_{pos}	factor accounting for a timber member position
k_q	load position factor
k_r	strength reduction factor for the effects of bending of laminations during production
$k_{r,pu}$	factor for non-linear behaviour and the strength combination
k_{rad}	factor for the effect of the corner radius on the shear stress
$k_{r,red}$	load-carrying resistance reduction factor accounting for a reduced spacing of shear connectors
k_{red}	reduction factor for the low probability of having the lowest strength over the width at the point of the maximum stress or reduction factor accounting for the fact that the exciting source is usually at same distance from the person sensing the vibration or reduction factor to account for the uneven shear stress distribution over the length of the bondline parallel to grain
$k_{red,b}$	factor for reduced width
k_{res}	factor accounting for higher modes of vibrations

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$k_{rp,1}$	rope effect factor
$k_{rp,2}$	rope effect factor limitation
$k_{s,red}$	shear connector spacing reduction factor
k_{screw}	factor for the characteristic withdrawal strength
k_{shape}	factor for the effect of the shape
$k_{sigx/sigy}$	factor for the calculation of forces acting in the *x*- or *y*-direction of punched metal plate fasteners
k_{sim}	probability factor for constellations of identical imperfections
$k_{SLS,ref}$	mean stiffness or slip modulus for serviceability limit state verifications per metre
$k_{SLS,rot}$	mean rotational slip modulus for serviceability limit state verifications per metre
$k_{SLS,rot,ref}$	mean reference rotational slip modulus for serviceability limit state verifications per metre
k_{space}	factor for the possibility of placing up to 3 circular holes at closer spacing
k_{sys}	system strength factor
k_t	increase factor for tension
k_v	adjustment factor for shear strength or plate steel property constant
$k_{v,n}$	factor for the effect of a notch
$k_{v,y/z}$	adjustment factor for shear strength in *y*- or *z*-direction
k_{var}	factor for effects of service conditions
k_{vol}	factor for the volume effect
k_w	modification factor for width of punched metal plate fastener
k_z	coefficient determined by the tenon geometry
$k_{\alpha/\beta}$	factors for the notch geometry
k_ρ	reference density exponent in the determination of a withdrawal strength
k_τ	factor for increased shear stresses or shear distribution factor for sheathing interaction
$k_{\tau,c/t}$	factor for the effect of compressive/tensile stresses perpendicular to grain on the shear strength
k_{90}	factor for the calculation of the characteristic embedment strength
l	length or span
l_i	*i*-numbered length
$l_{1,bot/top}$	partial length of the tensile zone at the bottom/top of a wall
$l_{2,bot}$	partial length of the shear zone at the bottom of the wall
l_A	length between support and edge of the hole
$l_{a,1/2}$	screw length on *i*-numbered side of the axis of the decisive layer
l_c	distance between the centre of rotation and the end of the wall or distance between sections where lateral deflection of the compressive flange is prevented
$l_{c,ef}$	effective length for flexural buckling

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$l_{c,y/z,ef}$	effective length for flexural buckling about *y*- or *z*-axis
l_{can}	distance between load and bondline
$l_{c,90}$	contact area length
l_D	bracing diagonal length
l_{drill}	drill hole length
l_e	clear spacing parallel to grain between the end of the member and the contact area
l_{ef}	effective spreading length or effective penetration length of the threaded part of a screw
$l_{ef,1}$	effective contact length parallel to grain in the plane defined by the contact area
$l_{ef,2}$	effective distribution length parallel to grain in the plane defined by the screw or rod tips
l_G	overall length parallel to grain of a group of holes
l_g	profiled/threaded length
$l_{g,2}$	secondary thread length
l_{g1}	length of the second profiled part
l_h	embedment depth
l_{head}	length of a screw head without fully developed thread
l_{hole}	hole length
l_i	length of a shear wall at i^{th} storey
l_j	*j*-numbered panel length
$l_{m,ef}$	effective length for lateral torsional buckling
$l_{MB,ef}$	effective length of the restraint accounting for the increasing normal force along the length
l_{nb}	not bonded length
l_o	maximum opening length
$l_{o,i}$	*i*-numbered opening length
l_p	point length or sheathing panel length
$l_{p,j}$	*j*-numbered varying panel width
$l_{p,std}$	standard sheathing panel length
$l_{p1/2}$	length of the sheathing or fitting panel with one or two free edges
l_{per}	perimeter length of the sheathing panels
$l_{per,i}$	perimeter lengths of sheathing panels fixed to *i*-numbered side of the framing
$l_{per,j}$	*j*-numbered varying panel width
l_r	reinforced length
$l_{r,l/u}$	reinforced length above/below the axis prone to splitting
l_{ref}	reference length
l_s	clear spacing parallel to grain between a contact area and a concentrated load

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$l_{s,w}$	length of the punched metal plate fastener along the connection line reduced, where applicable, by an edge distance of 5 mm
l_{screw}	screw length
$l_{t,90}$	distribution length for tensile stresses perpendicular to grain
$l_{t,90,M}$	distribution length for tensile stresses perpendicular to grain from the transfer of bending stresses
$l_{t,90,M,I/III}$	distribution length for tensile stresses perpendicular to grain from the transfer of bending stresses in the first and third quadrant
$l_{t,90,V}$	distribution length for tensile stresses perpendicular to grain from the transfer of shear stresses
$l_{t,90,V,I/III}$	distribution length for tensile stresses perpendicular to grain from the transfer of shear stresses in the first and third quadrant
l_{ten}	tenon length
$l_{ten,ef}$	effective tenon length
l_v	clear spacing parallel to grain between the edge of a support and a concentrated load or distance between the end of a beam and the nearest edge of a hole
$l_{v,1/2}$	end grain distance for single/double step connection
$l_{v,ef}$	effective shear length parallel to grain
l_w	withdrawal length
$l_{w,i}$	withdrawal length in *i*-numbered member
$l_{w,ef}$	effective withdrawal length
l_z	spacing parallel to grain between holes
m	mass or number
mc	average yearly moisture content
m_{plate}	plate bending moment
$m_{plate,max}$	maximum plate bending moment
m_w	walker weight
n	number
n_0	number of fasteners parallel to grain
$n_{1/2}$	number of inner/outer timber members
n_{90}	number of fasteners perpendicular to grain
n_{con}	number of shear connector units in a connection
n_{ef}	effective number of fasteners
n_f	number of dowel-type fasteners in a hanger joint
$n_{f,B}$	number of fasteners in the connections of the restraint members to a bracing
$n_{f,C}$	number of fasteners in the connections of the stiffened member to restraints
$n_{f,D}$	number of fasteners in the connections at each end of the diagonals of a bracing
$n_{f,h}$	number of rows of fasteners along a height

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$n_{f,l,mean}$	average number of rows of fasteners along a sheathing panel length
$n_{f,l,p}$	number of rows of fasteners along the sheathing panel length
n_h	number of the harmonic
$n_{l,bj}$	number of laminations between two adjacent butt joints
n_{min}	minimum number of fasteners
n_{obs}	number of constant amplitude stress cycles per year
n_p	number of penetrated layers
$n_{p,h}$	number of consecutive sheathing panels along a height
$n_{p,l}$	number of consecutive sheathing panels along a length
n_{perp}	number of screw lines perpendicular to the direction of the considered load transfer
n_r	number of reinforcing elements
n_R	number of intermediate restraints
$n_{R,sp}$	number of restraining springs (excluding end restraints)
n_v	number of wall base connections with respect to horizontal translation
p	load or exponent accounting for the probabilistic effects on combined bending and compressive strength of the cross-section
pH	pH-value of wood species
q	force
q_i	i-numbered concentrated load at the top of a wall
q_i'	i-numbered concentrated load at the bottom of a wall
q_{Ed}	design action/distributed load
q_z	distributed load in z-direction
r	radius or distance from the centre of gravity of the effective plate area to the segmental plate area
r_{in}	inner radius
s	size effect parameter or spacing
$s_{0,d}$	design shear stress on sheathing-to-framing fasteners per unit length acting parallel to the ribs
$s_{0,d,1}$	design shear stress on sheathing-to-framing fasteners per unit length acting parallel to the ribs in the tension zone
$s_{0,d,2}$	design shear stress on sheathing-to-framing fasteners per unit length acting parallel to the ribs in the shear zone
s_1	spacing of fasteners between cross-section 1 and 2
s_2	spacing of fasteners between cross-section 2 and 3
$s_{90,d}$	design shear stress on sheathing-to-framing fasteners per unit length acting perpendicular to the ribs
$s_{90,d,1}$	design shear stress on sheathing-to-framing fasteners per unit length acting perpendicular to the ribs in the tension zone

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$s_{90,min}$	minimum vertical shear capacity on the sheathing-to-framing fasteners per unit length acting perpendicular to the ribs in the tension zone
$s_{a,j}$	distance of the j^{th} mechanical anchor from the shear wall edge
s_B	bracing truss width
s_{ef}	effective spacing
s_i	spacings between connectors for i = 1 and i = 3
$s_{m,flat}$	size effect parameter for flatwise bending
s_{max}	maximum spacing
s_{min}	minimum spacing
$s_{res,d}$	resulting design shear stress on the sheathing-to-framing fasteners per unit length
s_t	size effect parameter for tension
$s_{v,flat}$	size effect parameter for flatwise shear
t	thickness or notch length or time
t_b	bondline thickness
t_{CLT}	cross laminated timber member thickness
t_{ef}	effective thickness
$t_{ef,el}$	elastic effective thickness
$t_{ef,el,2}$	remaining elastic effective thickness
$t_{ef,pl}$	plastic effective thickness
$t_{ef,ps}$	effective thickness of failure planes for partially penetrated timber members
t_h	embedment depth
$t_{h,1/2/3}$	embedment depth in member 1 or 2 or 3
$t_{h,i}$	embedment depth in interlayer
$t_{h,pl}$	plastic penetration length
$t_{h,req}$	required minimum embedment depth of timber members
$t_{h,1/2,req}$	required minimum embedment depths in member 1 or 2
$t_{h2\text{-}1}$	embedment depth in member 2 on member 1 side
$t_{h2\text{-}3}$	embedment depth in member 2 on member 3 side
t_{h3}	embedment depth in member 3
t_i	interlayer thickness
t_i	thickness of or embedment depth in i-numbered member
t_l	lamination thickness
$t_{l,max}$	maximum lamination thickness
$t_{l,min}$	minimum lamination thickness
t_{layer}	layer thickness
t_{min}	minimum thickness

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t_p	sheathing panel or steel plate thickness
$t_{p,i}$	thickness of sheathing panel fixed to the i-numbered side of a framing
t_r	plane reinforcement thickness
t_s	washer thickness
t_v	notch depth
$t_{v1/2}$	front/rear notch depth of a single or double-step connection
$t_{w,1}$	withdrawal thickness
$t_{x/y}$	sum of layer thicknesses in x- or y-direction
$t_{x/y,i}$	i-numbered layer thickness in x- or y-direction
$t_{z,i}$	total thickness of the vertical layers for CLT or the overall thickness for GLVL-C shear walls used at the i^{th} storey
$u_{\theta,i}$	storey lateral displacement due to the rotation at the top of (i-1)-numbered shear wall underneath
u	deformation
$u_{A,i}$	inter-storey lateral displacement due to the rigid body sliding of the wall
$u_{B,i}$	inter-storey lateral displacement due to the in-plane bending deformation
$u_{B,V,i}$	inter-storey lateral displacement contribution of the in-plane bending deformation due to the lateral force $V_{i,Ed}$
$u_{C,i}$	inter-storey lateral displacement from the deformation of the bottom rail perpendicular to the grain in light frame timber walls
$u_{C,i\text{-}1}$	storey lateral displacement due to the rocking kinematic mode of the shear wall at the (i-1)th storey
u_i	inter-storey lateral displacement
u_{inst}	overall in-plane displacement
$u_{inst,C}$	displacement from the deformation of the bottom rail perpendicular to grain
$u_{inst,G}$	displacement from the sheathing panel shear deformation
$u_{inst,KSLS,0}$	displacement from the deformation of the sheathing-to-framing connection parallel to the primary ribs
$u_{inst,KSLS,90}$	displacement from the deformation of the sheathing-to-framing connection perpendicular to the primary ribs
$u_{inst,M}$	displacement from the elongation in a wall anchorage system (rigid body rotation)
$u_{inst,N}$	displacement from the axial deformation of the framing
$u_{inst,V}$	displacement from the rigid body translation
$u_{N,i}$	inter-storey lateral displacement from the deformation of the fasteners connecting sheathing to frame in light frame timber walls
$u_{R,1}$	storey lateral displacement due to the rocking kinematic mode of the shear wall
$u_{R,i}$	inter-storey lateral displacement due to the rocking kinematic mode of the shear wall
$u_{R,i\text{-}1}$	storey lateral displacement rotation contribution due to the rocking of the shear wall at the (i-1)th storey

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$u_{S,1}$	storey lateral displacement due to the panel shear deformation
$u_{S,i}$	inter-storey lateral displacement due to the in-plane shear deformation
$u_{sum,j}$	total lateral displacement of a shear wall at the top of the j^{th} storey
$u_{y/z,nl,lim}$	maximum non-linear deformation in *y*- or *z*-direction
$u_{y/z,1st,lim}$	maximum 1st order deformation in *y*- or *z*-direction
$u_{z,A}$	vertical elongation of the wall anchorage system
v	deformation
$v(t)$	total velocity at time t
$v_{1,peak}$	peak velocity response for the fundamental mode
$v_m(t)$	velocity in each mode at time t
$v_{m,peak}$	peak velocity in each mode
v^{nl}	non-linear deflection
$v_{R=1}$	baseline velocity
v_{rms}	root mean square velocity response
$v_{tot,peak}$	total peak velocity response
w	deformation or steel plate width
w_0	precamber in the unloaded structural member
w_1	initial part of the deformation under permanent (including quasi-permanent) loads of the relevant combination of actions
w_{1kN}	maximum deflection due to a vertical static point load of 1 kN
w_2	long-term part of the deformation under permanent loads including the quasi-permanent part of variable actions
w_3	instantaneous deformation due to variable actions excluding their quasi-permanent part
$w_{beam,1/2}$	deflection of the supporting beam 1 or 2 caused by a vertical static point load of 0,5 kN
w_{lim}	limit of maximum deflection due to a vertical static point load of 1 kN
$w_{lim,max}$	upper deflection limit
w_{max}	remaining total deformation accounting for precamber
w^{nl}	non-linear deflection
w_{pl}	effective punched metal plate fastener width
w_{rigid}	deflection of a floor between rigid supports caused by a vertical static point load of 1 kN
w_{SLS}	compressive deformation perpendicular to grain
$w_{SLS,z}$	compressive deformation of the bottom rail perpendicular to grain
w_{sys}	deflection of a single span floor (including the effect of any supporting beams, shear and connections in composite structures) under the load induced by the floor mass m
w_{tot}	total deformation

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x	distance parallel to grain from the line of action of the support reaction to the corner of the notch
z_i	distance of the i-numbered fastener from the centre of rotation of the joist hanger
z_{max}	distance of the uppermost fastener from the centre of rotation of the joist hanger

Greek upper case letters

Δh	variation of depth or height
$\Delta_{nl,lim}$	upper limit for deflection share induced by geometrical non-linear amplification
ΔQ	bracing reaction force
Δw	relative deformation of member from rotation at edge of contact
$\Delta\omega_1$	variation of average moisture to calculate dimensional changes of section
$\Delta\omega_2$	moisture difference to estimate drying cracks in the zone of a member close its surface
$\Delta\omega_3$	moisture variation at surface
$\Delta_{y/z}$	deflection of bracing system
$\Delta_{1st,lim}$	maximum admissible deflection from first order analysis superimposing to initial imperfection e_0
Πk_i	product of applicable modification factors
$\Sigma F_{d,accidental}$	sum of accidental design forces
Σt_{pen}	sum of penetration depths
ϕ	sway or equivalent sway imperfection
ϕ_0	initial sway
$\phi_{c,y/z}$	intermediate parameter for the calculation of $k_{c,y/z}$
ϕ_m	intermediate parameter for the calculation of k_m
ϕ_S	sway at ridge kink point, including imperfection and deformation

Greek lower case letters

α	angle, ratio or factor
α_{ap}	angle of taper
$\alpha_{c,y/z}$	amplification factor for critical normal forces for y- or z-direction
α_{cl}	factor related to the clamping condition of fastener
α_m	amplification factor for critical bending moments
α_n	angle of a notch
β	ratio, factor or angle
$\beta_{c,y/z}$	imperfection factor for flexural buckling about y- or z-axis
β_m	bow imperfection factor for lateral torsional buckling
β_θ	twist imperfection factor for lateral torsional buckling
γ	angle

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γ_i	factor for efficiency of mechanical connections in i-numbered part of cross-section
γ_M, γ_{M1}, γ_{M2}	partial factor for material property
$\gamma_{M,con}$	partial factor for connection
$\gamma_{M,fat}$	partial factor for fatigue resistance
$\gamma_{M,NA}$	partial factor in the National Annex
$\gamma_{M,s}$	partial factor for prestressing steel elements
$\gamma_{M,tim}$	partial factor for timber
γ_P	partial factor for prestressing forces
γ_R	partial factor for resistance
γ_0	plate steel property constant
δ	angle
$\delta_{y/z}$	Dischinger-coefficient taking into account the distribution of M_y or M_z
ε	(insertion) angle
$\varepsilon_{u,tim}$	failure strain of timber parallel to grain
ε_0	non-dimensional bow imperfection
ζ	modal damping ratio
η	parameter or factor
θ	angle
$\theta_{i\text{-}1}$	rotation at top of the shear wall at (i-1)th storey
$\theta_{i\text{-}2}$	rotation at top of the shear wall at (i-2)th storey
$\theta^{nl}_{inf,Quasi,SLS}$	non-linear twist deformation from quasi-permanent load combination using final modulus of elasticity and shear
$\theta^{nl}_{inst,Quasi,SLS}$	non-linear twist deformation from serviceability limit state quasi-permanent load combination using instantaneous modulus of elasticity and shear
$\theta_{load,i}$	angle of load dispersion in i-numbered material
θ^{nl}	non-linear twist deformation
θ_{twist}	equivalent twist imperfection
$\theta_{twist,1}$	equivalent sway imperfection at a fork support
$\theta_{twist,2}$	equivalent rotation at midspan
θ_0	initial twist imperfection
θ_{0+c}	creep amplified twist imperfection
κ	shear correction factor
λ	slenderness ratio for a solid column
$\lambda_{c,y/z,rel}$	relative slenderness ratio for flexural buckling about y- or z-axis
λ_{ef}	effective slenderness ratio
$\lambda_{m,rel}$	relative slenderness ratio for lateral torsional buckling
λ_{tot}	total slenderness ratio

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$\lambda_{z,rel}$	relative slenderness ratio about *z*-axis
λ_1	slenderness ratio for shaft
μ	friction coefficient
μ_B	notch depth ratio
$\mu_{e,m}$	mode shape at excitation point
μ_{res}	resonant build-up factor
$\mu_{r,m}$	mode shape at response point
μ_t	modification factor for plate moment in tension splices
μ_0	friction coefficient parallel to grain
μ_{90}	friction coefficient perpendicular to grain
μ_λ	value in the calculation of lattice columns with glued or nailed joints
v_2	deflection of compressive members
ρ_{dowel}	density of wooden dowel
ρ_k	characteristic density
$\rho_{k,ref}$	characteristic reference density
ρ_{mean}	mean density
$\rho_{mean,i}$	mean density of *i*-numbered member
$\rho_{mean,ref}$	mean reference density
$\rho_{SB,mean}$	mean density of softboard
$\sigma_{c,0}$	compressive stress parallel to grain
$\sigma_{c,0,d}$	design compressive stress parallel to grain
$\sigma_{c,90,d}$	design compressive stress perpendicular to grain
$\sigma_{c,\alpha,d}$	design compressive stress at angle to grain
$\sigma_{d,min/max}$	design minimum/maximum fatigue stress
$\sigma_{f,c/t,d}$	axial compressive/tensile stress at extreme fibres of flange
$\sigma_{f,c/t,max,d}$	design axial compressive/tensile stress at extreme fibres of flange
σ_i	axial stress in *i*-numbered part of cross-section
σ_m	bending stress
$\sigma_{m,0,d}$	design bending stress parallel to grain
$\sigma_{m,crit}$	critical bending stress
$\sigma_{m,d}$	design bending stress
$\sigma_{m,i}$	bending stress in *i*-numbered part of cross-section
$\sigma_{m,y}$	bending stress about *y*-axis
$\sigma_{m,y,crit}$	critical stress for bending about *y*-axis
$\sigma_{m,y/z,d}$	design bending stress about *y*- or *z*-axis
$\sigma_{m,\alpha,d}$	design bending stress at an angle to grain

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