THE FUTURE OF STEEL CONSTRUCTION

Eurocode Second Generation Updates
EN 1990 Basis of Design and EN 1991 Actions on Structures

Mungo Stacy

WSP

THE FUTURE OF STEEL CONSTRUCTION

30 March 2028

Eurocode Second Generation Updates

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Verification of adequacy

Why design standards matter

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New societal demands

Why design standards matter

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Research to application

Why design standards matter

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Feedback

Why design standards matter

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Impact

Why design standards matter

Eurocode Second Generation Updates EN 1990 Basis of Design and EN 1991 Actions on Structures

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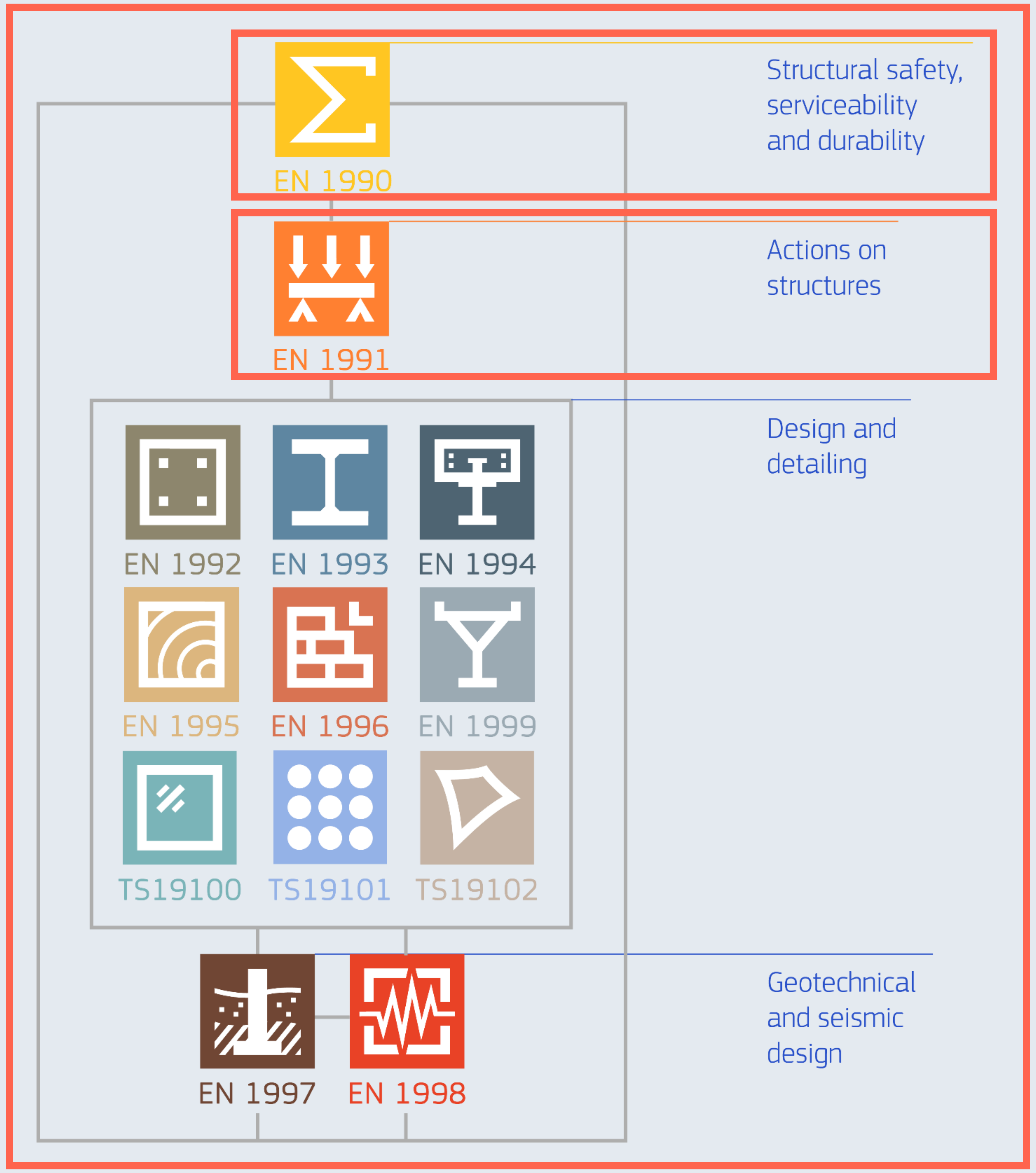


Aims for the evolution of Structural Eurocodes

✓ Enhanced Ease of Use

✓ Exemplary levels of international consensus

Aims for the evolution of Structural Eurocodes

✓ Enhanced Ease of Use

✓ Exemplary levels of international consensus

Statements of intent to meet our user's needs (1 of 2)

CATEGORIES OF EUROCODES' USERS	CEN/TC 250 STATEMENTS OF INTENT
Practitioners – Competent engineers [Primary target audience]	We will aim to produce Standards that are suitable and clear for all common design cases without demanding disproportionate levels of effort to apply them
Practioners – Graduates	We will aim to produce Eurocodes that can be used by Graduates where necessary supplemented by suitable guidance documents and textbooks and under the supervision of an experienced practitioner when appropriate
Expert specialists	We will aim not to restrict innovation by providing freedom to experts to apply their specialist knowledge and expertise
Product Manufacturers	Working with other CEN/TCs we will aim to eliminate incompatibilities or ambiguities between the Eurocodes and Product Standards

THE FUTURE OF STEEL CONSTRUCTION

Statements of intent to meet our user's needs (2 of 2)

CATEGORIES OF EUROCODES' USERS	CEN/TC 250 STATEMENTS OF INTENT
Software developers	We will aim to provide unambiguous and complete design procedures. Accompanying formulae will be provided for charts and tables where possible
Educators	We will aim to use consistent underlying technical principles irrespective of the intended use of a structure (e.g. bridge, building, etc.) and that facilitate the linkage between physical behaviour and design rules
National regulator	We will endeavour to produce standards that can be referenced or quoted by National Regulations
Private sectors businesses	We will continue to promote technical harmonization across European markets in order to reduce barriers to trade
Clients	We will produce Eurocodes that enable the design of safe, serviceable, robust and durable structures, aiming to promoting cost effectiveness throughout their whole life cycle, including design, construction and maintenance
Other CEN/TCs	We will engage proactively to promote effective collaboration with those other CEN/TCs that have shared interests

Principles and priorities

General principles (primary)	
1	Improving clarity and understandability of technical provisions of the Eurocodes
2	Improving accessibility to technical provisions and ease of navigation between them
3	Improving consistency within and between the Eurocodes
4	Including state-of the-art material the use of which is based on commonly accepted results of research and has been validated through sufficient practical experience
5	Considering the second generation of the Eurocodes as an “evolution” avoiding fundamental changes to the approach to design and to the structure of the Eurocodes unless adequately justified
Specific principles (secondary)	
6	Providing clear guidance for all common design cases encountered by typical competent practitioners in the relevant field
7	Omitting or providing only general and basic technical provisions for special cases that will be very rarely encountered by typical competent practitioners in the relevant field
8	Not inhibiting the freedom of experts to work from first principles and providing adequate freedom for innovation
9	Limiting the inclusion of alternative application rules
10	Including simplified methods only where they are of general application, address commonly encountered situations, are technically justified and give more conservative results than the rigorous methods they are intended to simplify
11	Improving consistency with product standards and standards for execution
12	Providing technical provisions that are not excessive sensitive to execution tolerances beyond what can be practically achieved on site

Aims for the evolution of Structural Eurocodes

✓ Enhanced Ease of Use

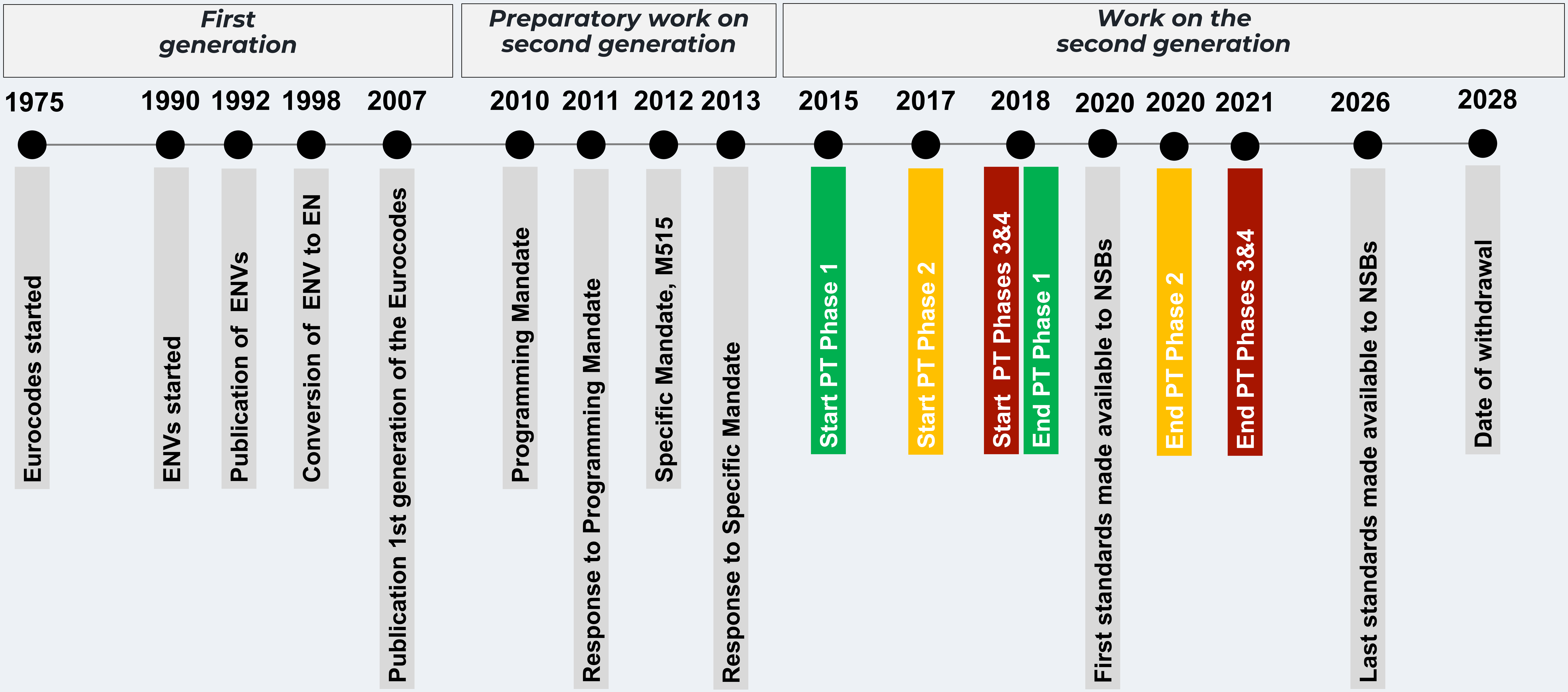
✓ Exemplary levels of international consensus

Achieving exemplary levels of international consensus

Over 480 formal decisions taken by CEN/TC 250 in last 11 years

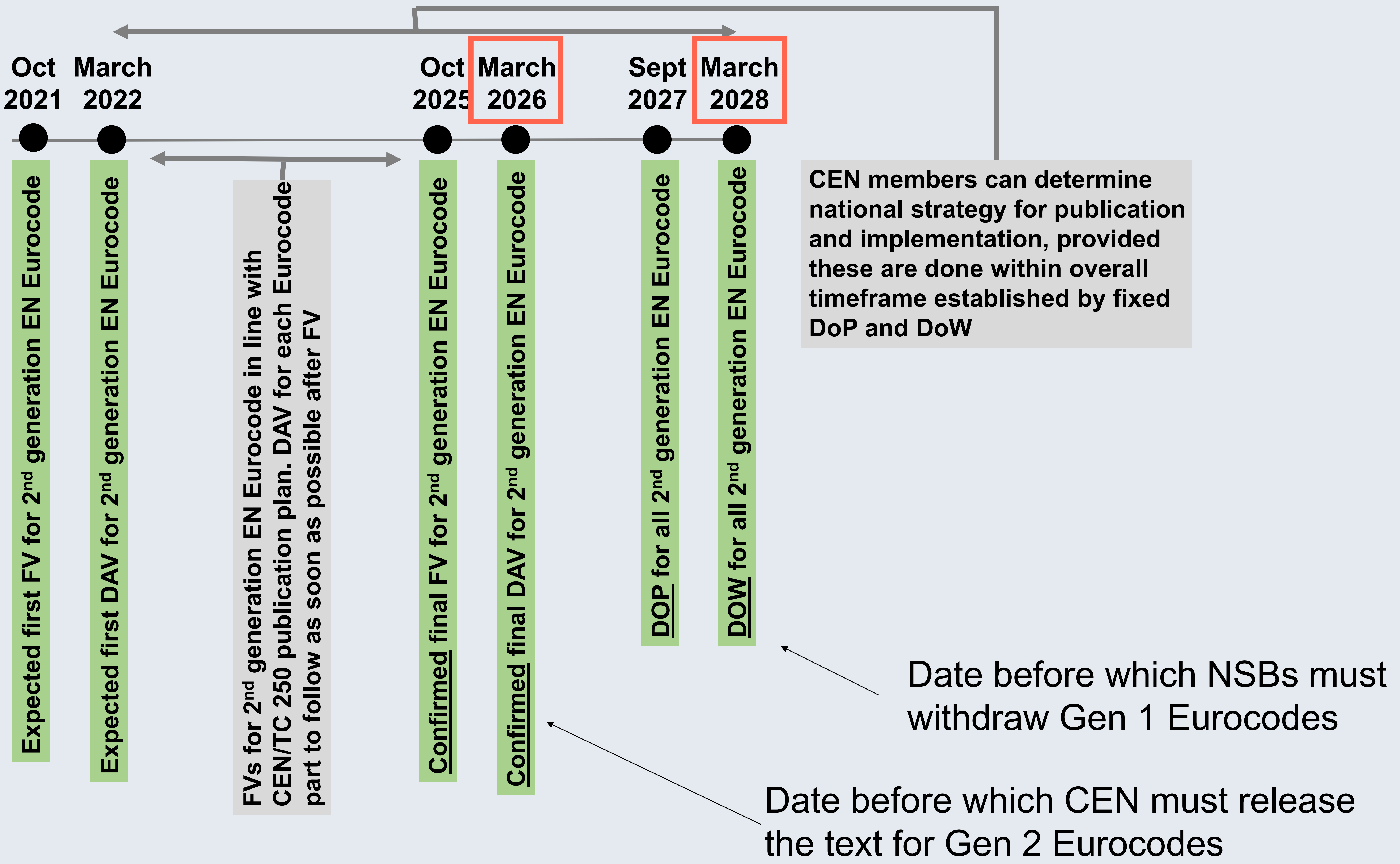
Over 98% were taken unanimously

Second Generation Eurocode timeline



THE FUTURE OF STEEL CONSTRUCTION

National Implementation



UK implementation strategy

National foreword

This British Standard is the UK implementation of EN 1993-1-1:2022. It supersedes BS EN 1993-1-1:2005+A1:2014, which will be withdrawn on 30 March 2028.

The UK participation in its preparation was entrusted to Technical Committee CB/203, Design & execution of steel structures.

A list of organizations represented on this committee can be obtained on request to its committee manager.

National choice is allowed in this standard where explicitly stated within notes. The National Annex to this standard contains the national choices to be used for buildings and civil engineering works constructed in the UK.

The first generation of EN Eurocodes was published between 2002 and 2007, with conflicting British Standards withdrawn in 2010. This document forms part of the second generation of EN Eurocodes.

Positive confirmation that this document is 2nd generation

The second generation of EN Eurocodes is expected to be published between 2023 and 2026. These documents are being published as soon as they are available. This is being done to enable users to prepare for the transition from the first generation to second generation of EN Eurocodes.

Explanation of reason for coexistence period

UK adoptions of the first generation of EN Eurocodes will be withdrawn by BSI on 30 March 2028. Until that date, the first generation documents should be considered as the applicable standards for buildings and civil engineering works constructed in the UK unless otherwise specified by the relevant authority or in the specification for a particular project.

Statement of UK implementation strategy and DoW

This standard is intended to be used with its National Annex and other referenced documents, including other second generation Eurocodes, as an interdependent suite of documents.

Reference to Eurocodes as interdependent system of standards

While the use of provisions in this standard in conjunction with first generation Eurocodes is not precluded, it should be undertaken with care and should only be done when users are satisfied that it will not result in a lower level of reliability than the minimum level set in the first generation Eurocodes and associated UK National Annexes.

Conditions for interim use of 2nd generation and 1st generation together

Eurocode Second Generation Updates EN 1990 Basis of Design and EN 1991 Actions on Structures

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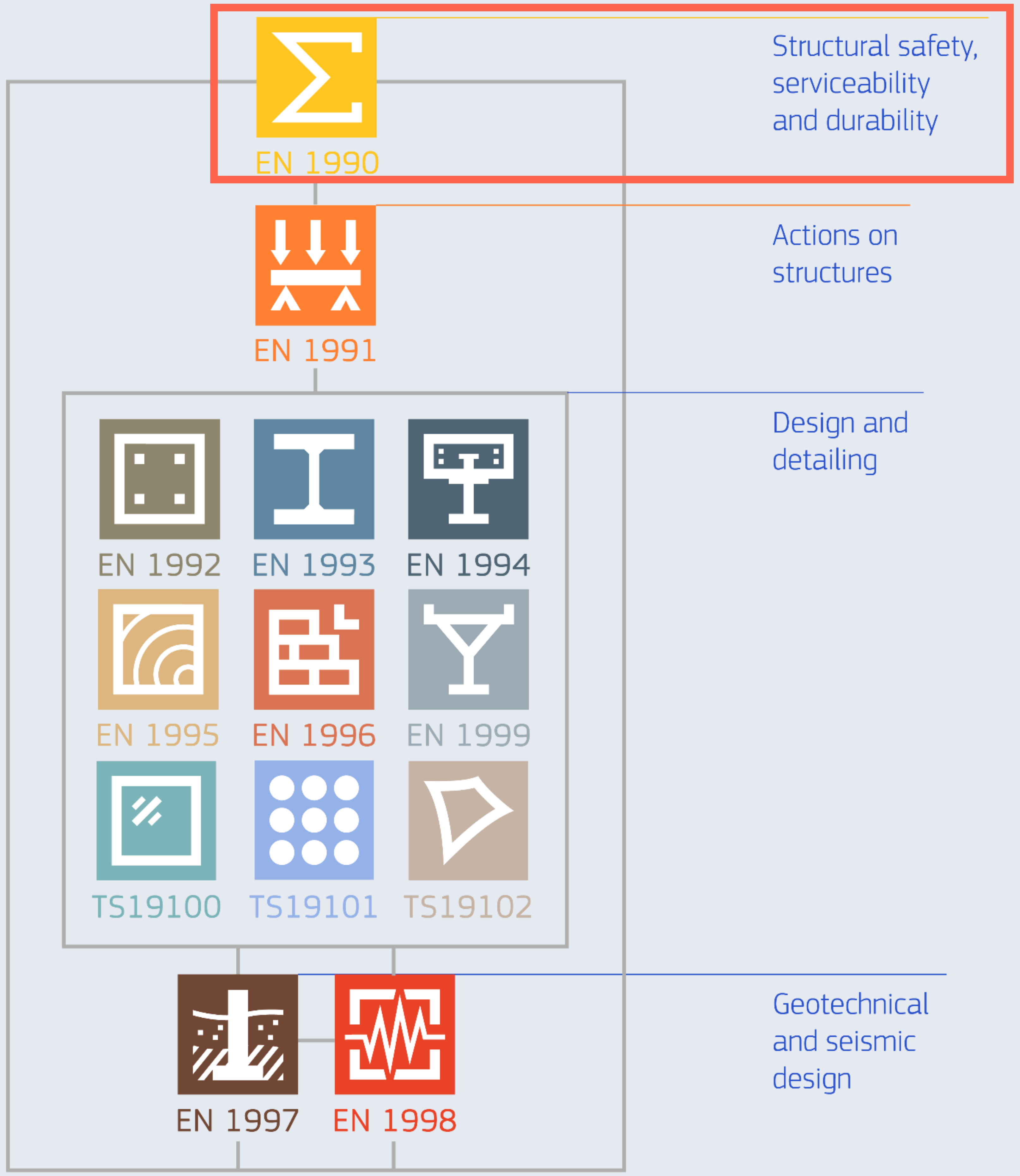

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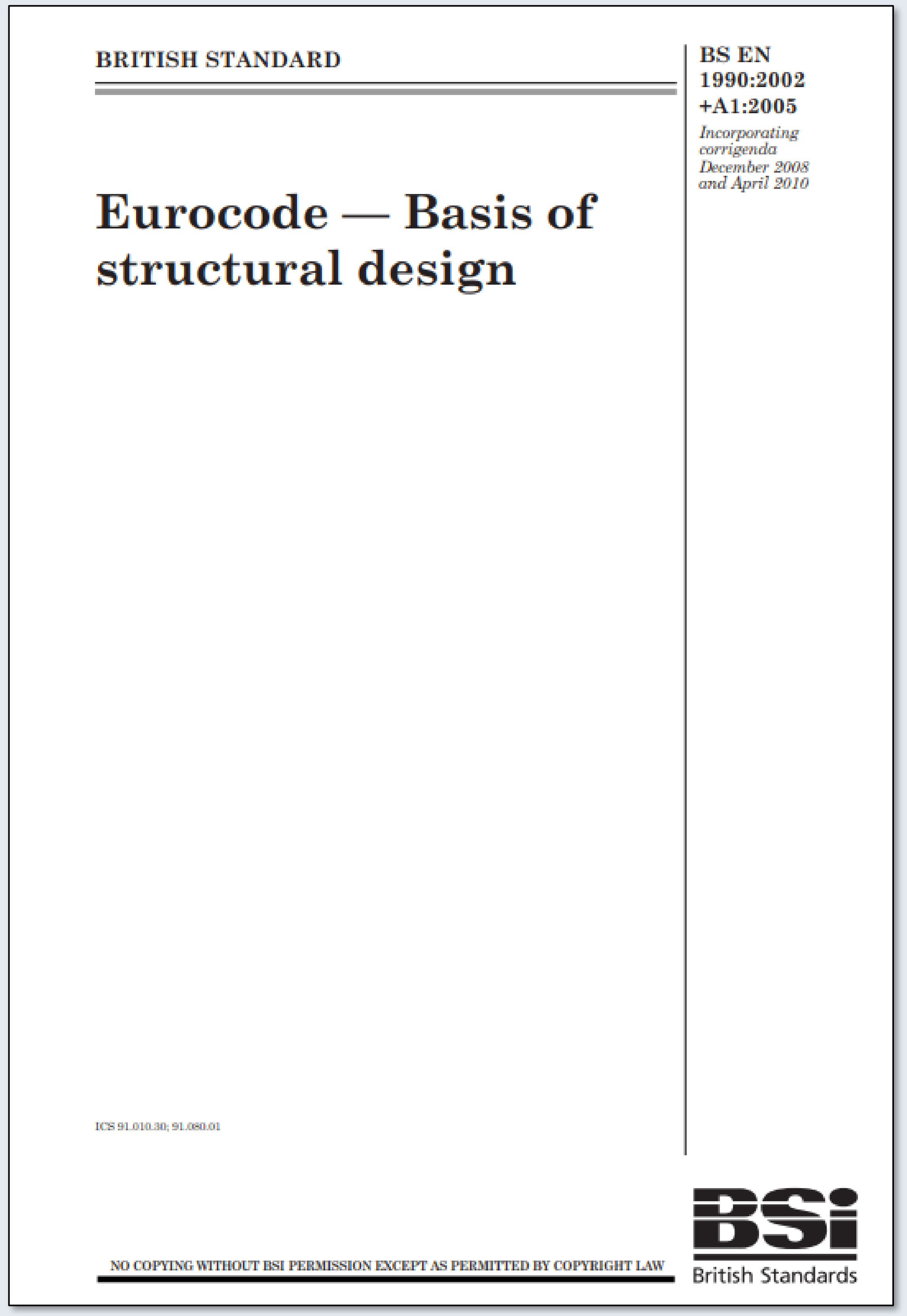
EN 1990


BRITISH STANDARD

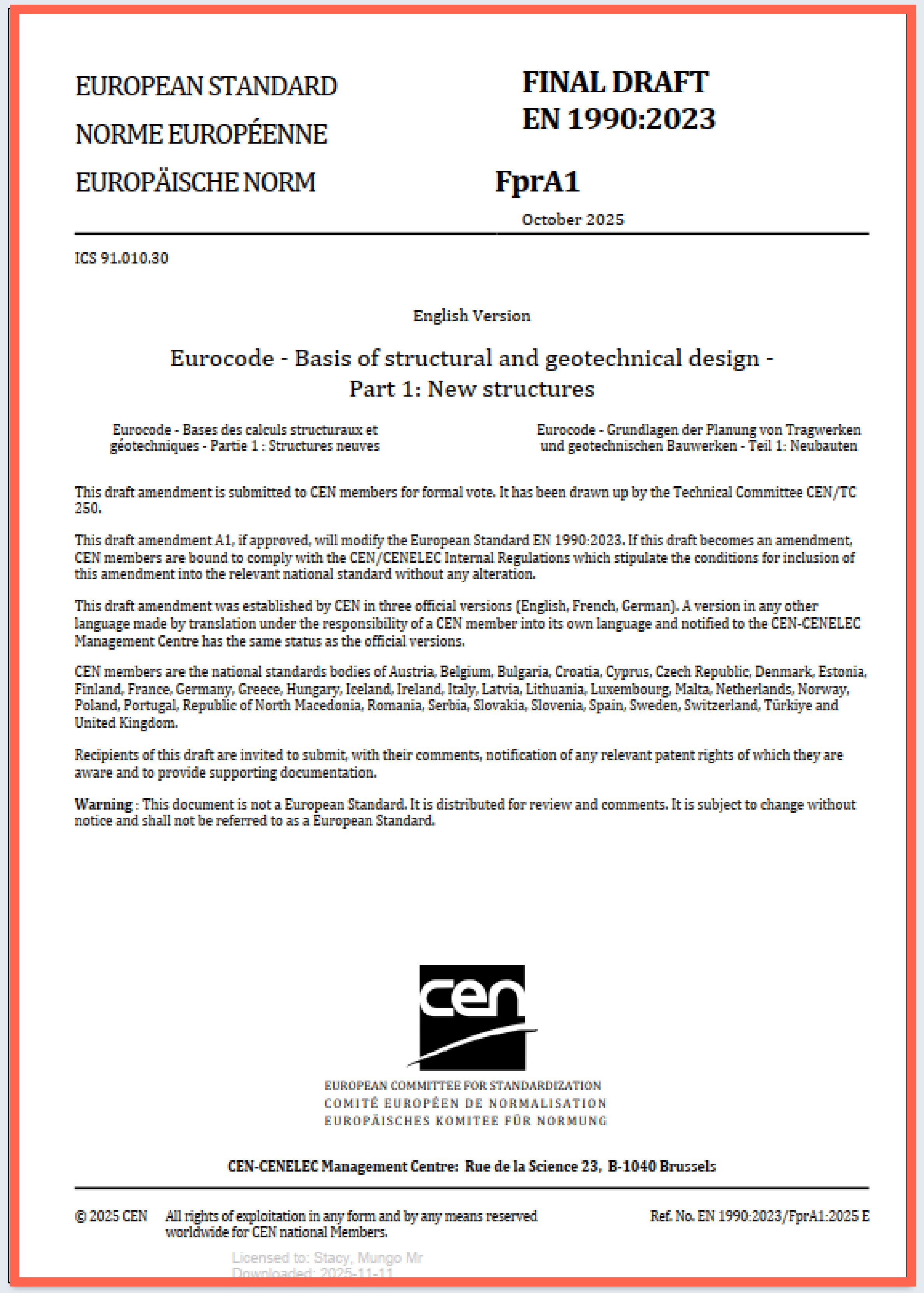
BS EN 1990:2002 +A1:2005

Incorporating corrigenda December 2008 and April 2010

Eurocode — Basis of structural design

ICS 91.010.30; 91.080.01

BSI British Standards


EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

FINAL DRAFT EN 1990:2023

FprA1

October 2025

ICS 91.010.30

English Version

Eurocode - Basis of structural and geotechnical design - Part 1: New structures

Eurocode - Bases des calculs structuraux et géotechniques - Partie 1 : Structures neuves

Eurocode - Grundlagen der Planung von Tragwerken und geotechnischen Bauwerken - Teil 1: Neubauten

This draft amendment is submitted to CEN members for formal vote. It has been drawn up by the Technical Committee CEN/TC 250.

This draft amendment A1, if approved, will modify the European Standard EN 1990:2023. If this draft becomes an amendment, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for inclusion of this amendment into the relevant national standard without any alteration.

This draft amendment 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.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.

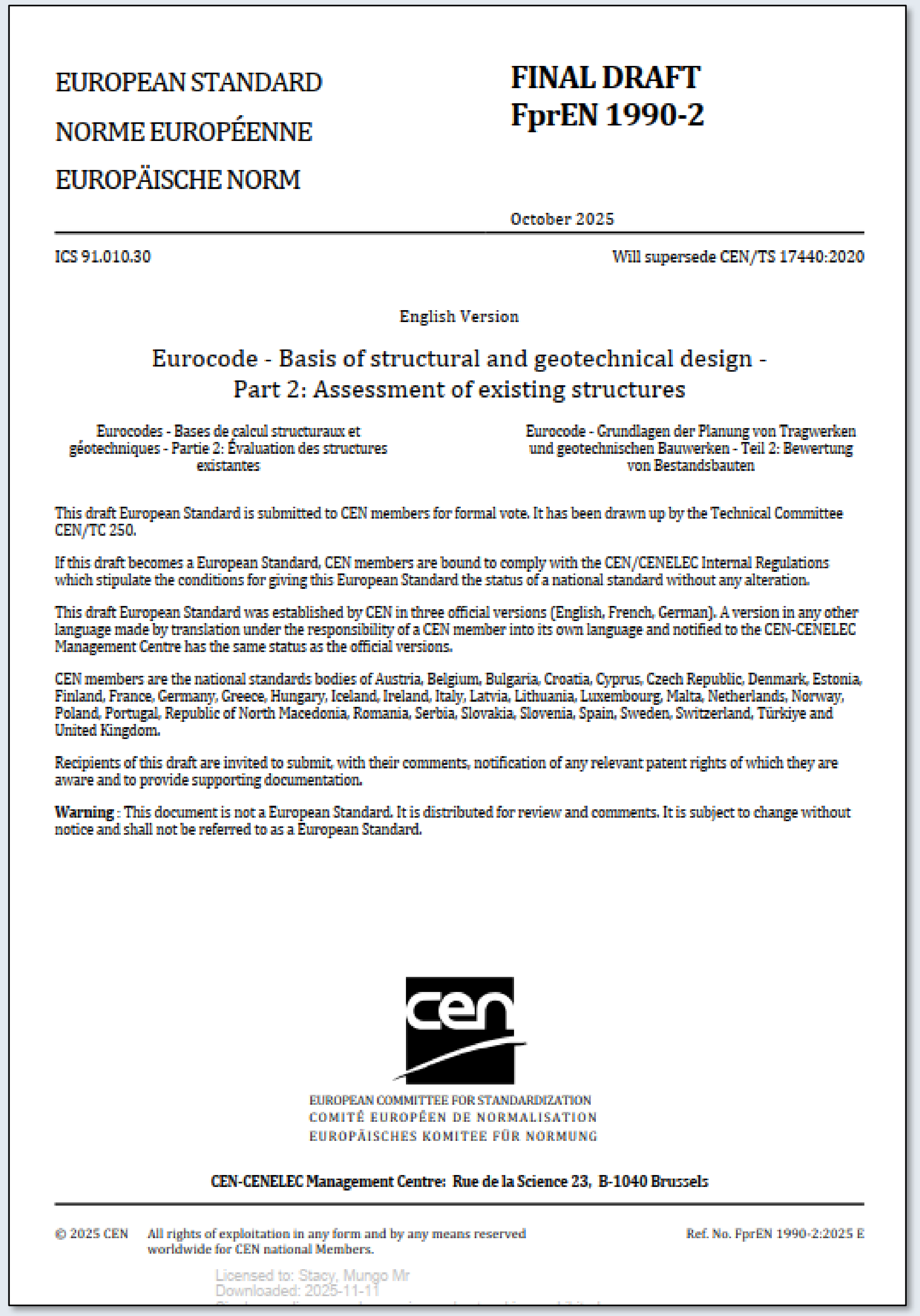
Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN 1990:2023/FprA1:2025 E


EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

FINAL DRAFT FprEN 1990-2

October 2025

ICS 91.010.30

Will supersede CEN/TS 17440:2020

English Version

Eurocode - Basis of structural and geotechnical design - Part 2: Assessment of existing structures

Eurocodes - Bases de calcul structuraux et géotechniques - Partie 2: Évaluation des structures existantes

Eurocode - Grundlagen der Planung von Tragwerken und geotechnischen Bauwerken - Teil 2: Bewertung von Bestandsbauten

This draft European Standard is submitted to CEN members for formal vote. 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.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. FprEN 1990-2:2025 E

First generation

Second generation

EN 1990-1
Basic requirements

THE FUTURE OF STEEL CONSTRUCTION

4.1 Basic requirements

(1) The assumptions given in 1.2 and in the other Eurocodes shall be met.

(2) A structure shall be designed and executed in such a way that it will, during its design service life, with appropriate degrees of reliability and in an economical way:

— sustain all reasonably foreseeable actions and influences that can occur during its execution and use, as specified for the structure;

— meet the specified serviceability requirements for the structure or a structural member;

— meet the specified durability requirements for the structure or a structural member.

NOTE Design carried out in accordance with the Eurocodes is assumed to satisfy these requirements.

(3) In the case of fire, the structural resistance shall be adequate for the required period of time.

NOTE For general provisions related to fire design, see also EN 1991-1-2.

4.4 Robustness

(1) A structure should be designed to have an adequate level of robustness so that during its design service life it will not be damaged by unforeseen adverse events to an extent disproportionate to the original cause.

NOTE 1 Progressive collapse is an example of a damage that is disproportionate to the original cause.

EN 1990-1
Combinations of actions

THE FUTURE OF STEEL CONSTRUCTION

8 Verification by the partial factor method

8.3.4.2 Combination of actions for persistent and transient (fundamental) design situations

(2) When applying factors to actions, combinations of actions ΣF_d for persistent and transient (fundamental) design situations should be calculated by one of the following:

— Formula (8.12); or

— the most adverse of the two expressions in Formula (8.13); or

— the most adverse of the two expressions in Formula (8.14).

$$\Sigma F_{\mathrm{d}} = \sum_i \gamma_{\mathrm{G},i} G_{\mathrm{k},i} + \gamma_{\mathrm{Q},1} Q_{\mathrm{k},1} + \sum_{j>1} \gamma_{\mathrm{Q},j} \psi_{0,j} Q_{\mathrm{k},j} + \left(\gamma_{\mathrm{P}} P_{\mathrm{k}}\right) \quad (8.12)$$

or

$$\Sigma F_{\mathrm{d}} = \begin{cases} \sum_i \gamma_{\mathrm{G},i} G_{\mathrm{k},i} + \gamma_{\mathrm{Q},1} \psi_{0,1} Q_{\mathrm{k},1} + \sum_{j>1} \gamma_{\mathrm{Q},j} \psi_{0,j} Q_{\mathrm{k},j} + \left(\gamma_{\mathrm{P}} P_{\mathrm{k}}\right) \\ \sum_i \xi_i \gamma_{\mathrm{G},i} G_{\mathrm{k},i} + \gamma_{\mathrm{Q},1} Q_{\mathrm{k},1} + \sum_{j>1} \gamma_{\mathrm{Q},j} \psi_{0,j} Q_{\mathrm{k},j} + \left(\gamma_{\mathrm{P}} P_{\mathrm{k}}\right) \end{cases} \quad (8.13)$$

or

$$\Sigma F_{\mathrm{d}} = \begin{cases} \sum_i \gamma_{\mathrm{G},i} G_{\mathrm{k},i} + \left(\gamma_{\mathrm{P}} P_{\mathrm{k}}\right) \\ \sum_i \xi_i \gamma_{\mathrm{G},i} G_{\mathrm{k},i} + \gamma_{\mathrm{Q},1} Q_{\mathrm{k},1} + \sum_{j>1} \gamma_{\mathrm{Q},j} \psi_{0,j} Q_{\mathrm{k},j} + \left(\gamma_{\mathrm{P}} P_{\mathrm{k}}\right) \end{cases} \quad (8.14)$$

EN 1990-1
Basis of geotechnical design

THE FUTURE OF
STEEL
CONSTRUCTION

6.3.2 Design values of the effects of actions

(2) In most cases, the following simplification can be made :

$$E_d = E\{\gamma_{F,i} F_{rep,i}\ ; a_d\} \quad i \geq 1 \tag{6.2a}$$

First generation

8.3.2 Design values of the effects of actions

$$E_{\mathrm{d}} = E\{\Sigma F_{\mathrm{d}}; a_{\mathrm{d}}; X_{\mathrm{Rd}}\} = E\{\Sigma(\gamma_{\mathrm{F}} \psi F_{\mathrm{k}}); a_{\mathrm{d}}; X_{\mathrm{Rd}}\} \tag{8.4}$$

Second generation

EN 1990-1
Combinations of actions

Table A.1.6 — Combinations of actions for serviceability limit states

Combinations	Characteristic	Frequent	Quasi-permanent	Seismic[b]
General formula for effects of actions	(8.28)			
Formula for combination of actions	(8.29)	(8.30)	(8.31)	(8.32)
Permanent ($G_{d,i}$)	$G_{k,i}$	$G_{k,i}$	$G_{k,i}$	$G_{k,i}$
Leading variable ($Q_{d,1}$)	$Q_{k,1}$	$\psi_{1,1}Q_{k,1}$	$\psi_{2,j}Q_{k,j}$	$\psi_{2,j}Q_{k,j}$
Accompanying variable ($Q_{d,j}$)	$\psi_{0,j}Q_{k,j}$	$\psi_{2,j}Q_{k,j}$		
Prestressing (P_d)[a]	P_k	P_k	P_k	P_k
Seismic (A_{Ed})	-	-	-	$A_{Ed,SLS}$

[a] The characteristic value of prestressing P_k can be an upper, lower, or mean value. Guidance is given in the other Eurocodes.

[b] Depending on the magnitude of $A_{Ed,SLS}$, the seismic combination of actions covers both the damage limitation (DL) and fully operational (OP) serviceability limit states defined in EN 1998 (all parts).

THE FUTURE OF STEEL CONSTRUCTION

EN 1990-1
ULS partial factors

"Set B" "Set A" "Set C" **First generation sets**

Table A.1.8 (NDP) — Partial factors on actions and effects for verification cases VC1 to VC4 for persistent and transient (fundamental) design situations

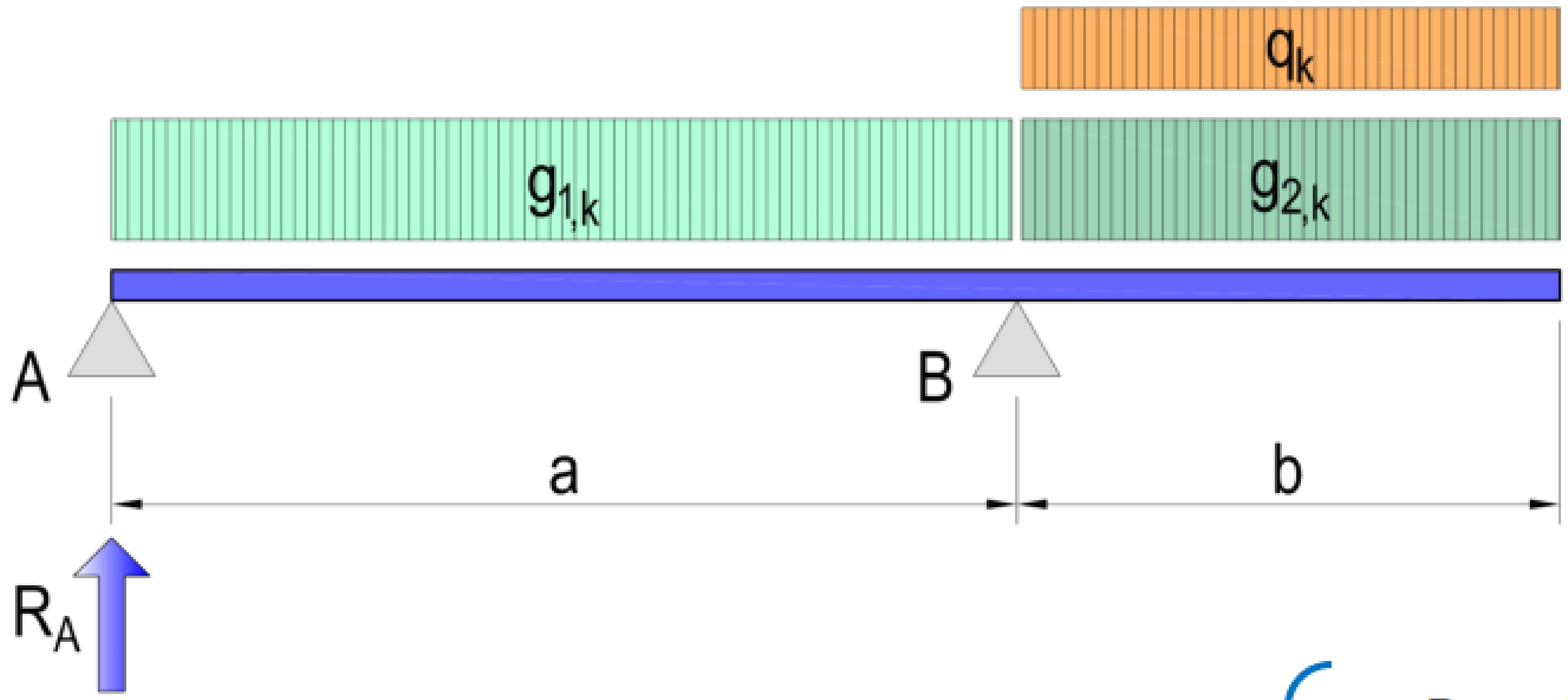
Action or effect				Partial factors γ_F and γ_E for verification cases				
Type	**Group**	**Symbol**	**Resulting effect**	**Structural resistance**[a]	**Static equilibrium and uplift**[b]		**Geotechnical design**	
Verification case				**VC1**[a]	**VC2(a)**[b]	**VC2(b)**[b]	**VC3**[c]	**VC4**[d]
Permanent action (G_k)	All[f]	γ_G	unfavourable /destabilizing	$1{,}35k_F$	$1{,}35k_F$	1,0	1,0	G_k is not factored
	Water[l]	γ_{Gw}		$1{,}2k_F$	$1{,}2k_F$	1,0	1,0	
	All[f]	$\gamma_{G,stb}$	stabilizing[g]	not used	1,15[e]	1,0	not used	
	Water[l]	$\gamma_{Gw,stb}$			1,0[e]	1,0		
	All	$\gamma_{G,fav}$	favourable[h]	1,0	1,0	1,0	1,0	
Prestressing (P_k)		γ_P[k]						
Variable action (Q_k)	All[f]	γ_Q	unfavourable	$1{,}5k_F$	$1{,}5k_F$	$1{,}5k_F$	1,3	$\gamma_{Q,red}$[j]
	Water[l]	γ_{Qw}		$1{,}35k_F$	$1{,}35k_F$	$1{,}35k_F$	1,15	1,0
	All	$\gamma_{Q,fav}$	favourable	0				
Effects of actions (E)		γ_E	unfavourable	γ_E is not applied				$1{,}35k_F$
		$\gamma_{E,fav}$	favourable					1,0

EN 1990-1
EQU equilibrium changes

$a = 5m$

$\beta = \frac{b}{a}$

$\beta^2 = 0{,}5$



$g_{1,k} = g_{2,k} = g_k$

$x = \frac{q_k}{g_k}$

$$R_A = \frac{a}{2}\left[\gamma_{G,stb} - \gamma_G \beta^2 - \gamma_Q x \beta^2\right]$$

- $R_A > 0$ No anchor needed at support A
- $R_A < 0$ Anchor needed at A

EN 1990-1
EQU equilibrium changes

"Set B" "Set A" "Set C" First generation sets

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Prestressing (P_k)		γ_P[k]						
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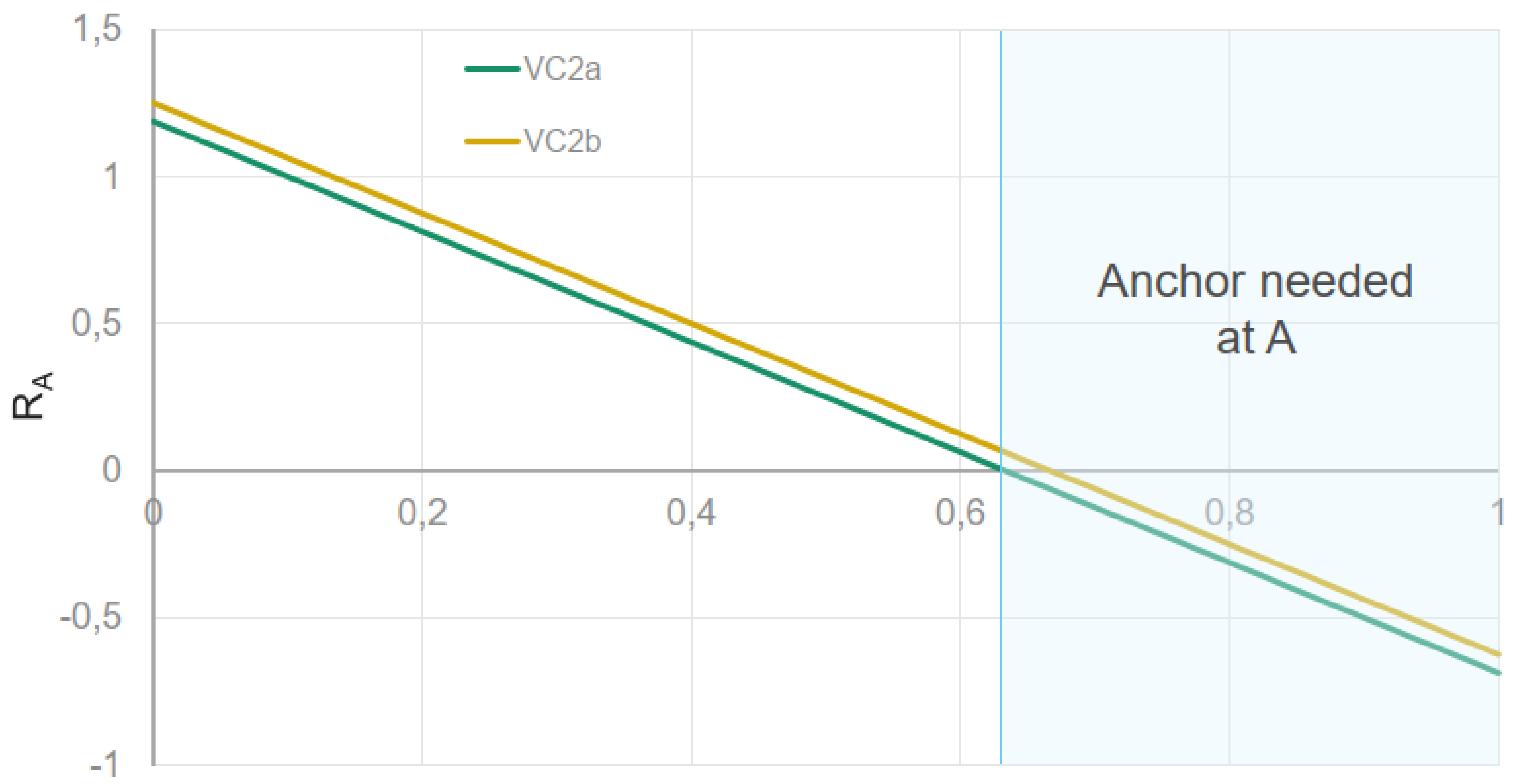
	Water[l]	γ_{Qw}		$1{,}35k_F$	$1{,}35k_F$	$1{,}35k_F$	1,15	1,0
	All	$\gamma_{Q,fav}$	favourable		0			
Effects of actions (E)		γ_E	unfavourable	γ_E is not applied				$1{,}35k_F$
		$\gamma_{E,fav}$	favourable					1,0

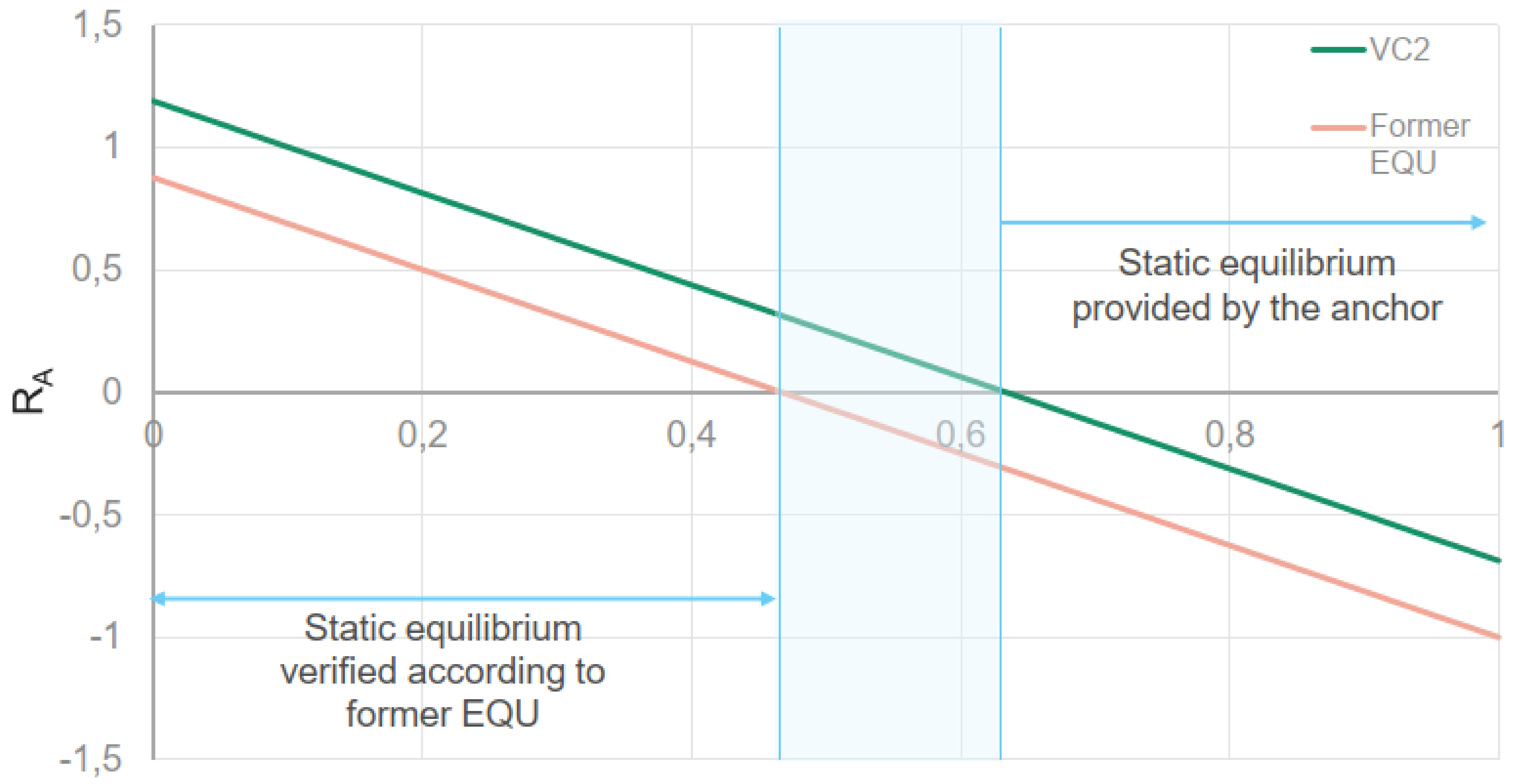
EN 1990-1
EQU equilibrium changes



$$x = \frac{q_k}{g_k}$$

Second generation

EN 1990-1
EQU equilibrium changes



$$x = \frac{q_k}{g_k}$$

First generation

THE FUTURE OF STEEL CONSTRUCTION

EN 1990-1
EQU equilibrium changes

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Prestressing (P_k)		γ_P[k]						
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	All	$\gamma_{Q,fav}$	favourable	0				
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		$\gamma_{E,fav}$	favourable					1,0

EN 1990-1 Robustness

THE FUTURE OF STEEL CONSTRUCTION

4.4 Robustness

(1) A structure should be designed to have an adequate level of robustness so that during its design service life it will not be damaged by unforeseen adverse events to an extent disproportionate to the original cause.

NOTE 1 Progressive collapse is an example of a damage that is disproportionate to the original cause.

NOTE 2 For most structures, design in accordance with the Eurocodes is assumed to provide an adequate level of robustness without the need for any additional design measures to enhance structural robustness.

(2) Design measures to enhance structural robustness should be applied when specified by the relevant authority or, where not specified, as agreed for a specific project by the relevant parties.

NOTE 1 Guidance on additional design measures to enhance structural robustness for buildings and bridges is given in Annex E.

NOTE 2 Further guidance can be given in the National Annex.

EN 1990-1 Robustness

THE FUTURE OF STEEL CONSTRUCTION

Annex E
(informative)

Additional guidance for enhancing the robustness of buildings and bridges

Table E.1 —Design for identified accidental actions and design strategies for enhanced robustness

Design for accidental actions (EN 1991 (all parts)) Explicit design of the structure (e.g. against explosion, impact)		**Design for enhanced robustness (EN 1990)** Strategies based on limiting the extent of damage		
Design structure to resist the action	Prevent or reduce the action e.g. protective measures, control of events	Alternative load paths either providing sufficient ductility, resistance and deformation capacity and redundancy, or applying prescriptive design rules	Key members i.e. designing selected members to resist notional action(s)	Segmentation i.e. separation into distinct parts

EN 1990-1 Robustness

Table E.2 — Indicativ

Consequence class	
CC3	W sp p a a b c d
CC2	W sp p a b c
CC1	N n

Indicative national choice – draft NA

Table NA.E.2 – Design methods for enhancing robustness for buildings

Consequence class	Design methods
CC3	A systematic risk assessment of the building should be undertaken taking into account all the normal hazards that can reasonably be foreseen, together with any abnormal hazards. Critical situations for design should be selected that reflect the conditions that can reasonably be foreseen as possible during the life of the building. The structural form and concept and any protective measures should then be chosen and the detailed design of the structure and its elements undertaken in accordance with the Eurocodes.
CC2b **Upper risk group**	In addition to the measures listed for CC1, either: a) for framed and load-bearing wall construction, provide effective horizontal ties, together with effective vertical ties in all supporting columns and walls; or b) check that upon the notional removal of each supporting column and each beam supporting one or more columns, or any nominal length of load-bearing wall (one at a time in each storey of the building), the building remains stable and that the area of floor at any storey does not exceed the tolerable limit. Where the notional removal of such columns and lengths of walls would result in an extent of damage in excess of the tolerable limit, then such elements should be designed as a key element.
CC2a **Lower risk group**	In addition to the measures listed for CC1, for framed and load-bearing wall construction, provide effective horizontal ties, or effective anchorage of suspended floors to walls.
CC1	Provided the structure is designed in accordance with other provisions in the Eurocodes, no additional measures are likely to be necessary.

THE FUTURE OF STEEL CONSTRUCTION

EN 1990-1
Robustne

Table A.1.1 (NDP) -

Consequence class	
CC4a	
CC3	
CC2	
CC1	
CC0a	

[a] For provisions conce

Indicative national choice – draft NA

Table NA.1 – Table A.1.1 (NA) – Examples of buildings in different consequence classes

Consequence class	Description of consequence	Example of categorization of building type and occupancy [a]
CC4	Highest	Critical infrastructure, (e.g. parts of a nuclear or chemical plant), when specified by the relevant authority or, where not specified, agreed for a specific project by the relevant parties
CC3b	High (upper class)	Buildings defined for CC3a, where an increased level of reliability is required, when specified by the relevant authority or, where not specified, agreed for a specific project by the relevant parties
CC3a	High (lower class)	All buildings that exceed the limits on area and number of storeys defined for CC2b All buildings to which members of the public are admitted in significant numbers Stadia accommodating more than 5 000 spectators Buildings containing hazardous substances and/or processes
CC2b	Normal (upper class)	Hotels, flats, apartments and other residential buildings greater than 4 storeys but not exceeding 15 storeys Educational buildings greater than single storey but not exceeding 15 storeys Retailing premises greater than 3 storeys but not exceeding 15 storeys Hospitals not exceeding 3 storeys Offices greater than 4 storeys but not exceeding 15 storeys All buildings to which the public are admitted and which contain floor areas exceeding 2 000 m^2 but not exceeding 5 000 m^2 at each storey Car parking not exceeding 6 storeys
CC2a	Normal (lower class)	5 storey single occupancy houses Hotels not exceeding 4 storeys

THE FUTURE OF STEEL CONSTRUCTION

EN 1990-1
Reliability differentiation

Table A.1.8 (NDP) — Partial factors on actions and effects for verification cases VC1 to VC4 for persistent and transient (fundamental) design situations

Action or effect				Partial factors γ_F and γ_E for verification cases				
Type	Group	Symbol	Resulting effect	Structural resistance[a]	Static equilibrium and uplift[b]		Geotechnical design	
Verification case				VC1[a]	VC2(a)[b]	VC2(b)[b]	VC3[c]	VC4[d]
Permanent action (G_k)	All[f]	γ_G	unfavourable /destabilizing	$1,35k_F$	$1,35k_F$	1,0	1,0	G_k is not factored
	Water[l]	γ_{Gw}		$1,2k_F$	$1,2k_F$	1,0	1,0	
	All[f]	$\gamma_{G,stb}$	stabilizing[g]	not used	1,15[e]	1,0	not used	
	Water[l]	$\gamma_{Gw,stb}$			1,0[e]	1,0		
	All	$\gamma_{G,fav}$	favourable[h]	1,0	1,0	1,0	1,0	
Prestressing (P_k)		γ_P[k]						
Variable action (Q_k)	All[f]	γ_Q	unfavourable	$1,5k_F$	$1,5k_F$	$1,5k_F$	1,3	$\gamma_{Q,red}$[j]
	Water[l]	γ_{Qw}		$1,35k_F$	$1,35k_F$	$1,35k_F$	1,15	1,0
	All	$\gamma_{Q,fav}$	favourable	0				
Effects of actions (E)		γ_E	unfavourable	γ_E is not applied				$1,35k_F$
		$\gamma_{E,fav}$	favourable					1,0

THE FUTURE OF STEEL CONSTRUCTION

EN 1990-1
Reliability differentiation

Table NA.4 – Table A.1.9 (NA) – Consequence factors for buildings and geotechnical structures

Consequence class (CC) [a]	Description of consequences	Consequence factor k_F
CC3b	High (upper class)	1,1
CC3a	High (lower class)	
CC2	Normal (upper class)	1,0
CC1b	Low (upper class)	
CC1a	Low (lower class)	0,9

[a] The provisions in Eurocodes cover design rules for structures classified as CC1 to CC3, see 4.3. For CC4 structures, additional provisions to those given in the Eurocodes are needed, e.g. reliability-based or risk-informed approaches.

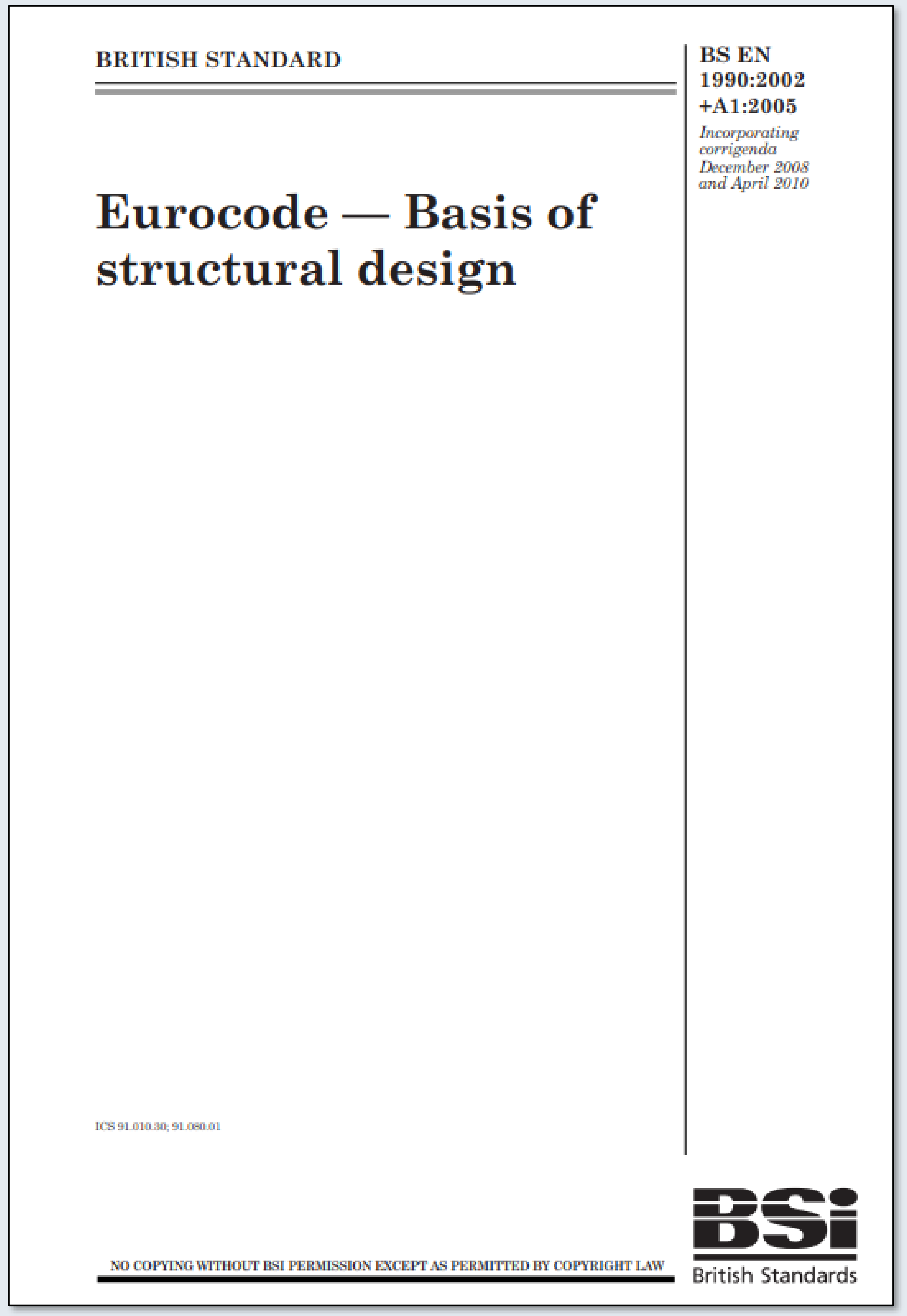
[b] Values of k_F = 1,1 for CC3b or k_F = 0,9 for CC1a structures are used when specified by the relevant authority or, where not specified, agreed for a specific project by th… parties with appropriate justification.

Indicative national choice – draft NA

CC1b	Low (upper class)	Single occupancy houses not exceeding 4 storeys Buildings defined for CC1a, where an increased level of reliability is required when specified by the relevant authority or, where not specified, agreed for a specific project by the relevant parties.
CC1a	Low (lower class)	Where a reduced level of reliability is acceptable, when specified by the relevant authority or, where not specified, agreed for a specific project by the relevant parties Agricultural buildings with low human occupancy (Class 2 in accordance with BS 5502-22:2003+A1:2013) Buildings into which people rarely go, provided no part of the building is closer to another building, or area where people do go, than a distance of 1,5 times the building height
CC0	Lowest	Elements other than structural

EN 1990

THE FUTURE OF STEEL CONSTRUCTION



BRITISH STANDARD

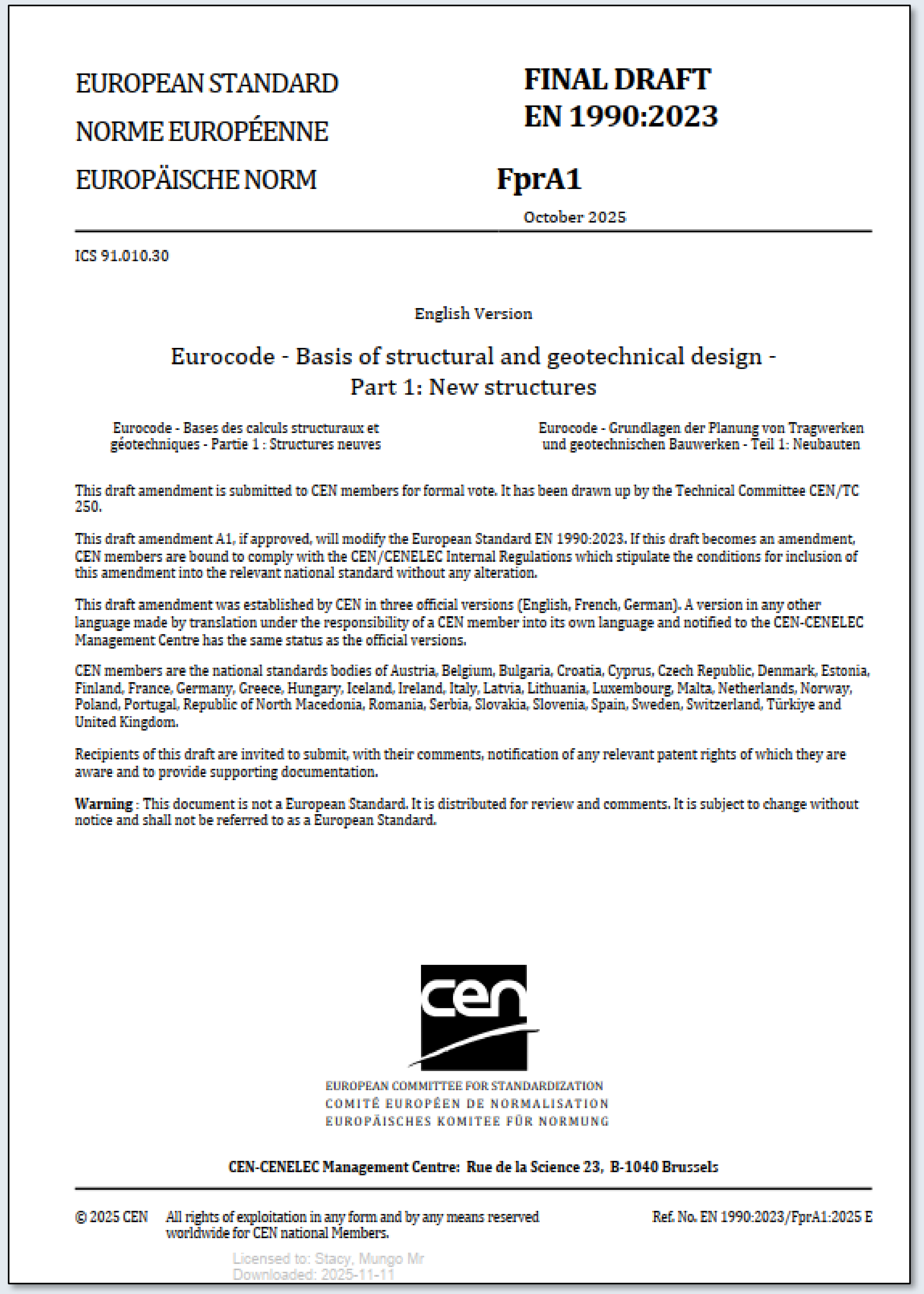
BS EN 1990:2002 +A1:2005

Incorporating corrigenda December 2008 and April 2010

Eurocode — Basis of structural design

ICS 91.010.30; 91.080.01

BSi British Standards



EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

FINAL DRAFT
EN 1990:2023
FprA1

October 2025

ICS 91.010.30

English Version

Eurocode - Basis of structural and geotechnical design - Part 1: New structures

Eurocode - Bases des calculs structuraux et géotechniques - Partie 1 : Structures neuves

Eurocode - Grundlagen der Planung von Tragwerken und geotechnischen Bauwerken - Teil 1: Neubauten

This draft amendment is submitted to CEN members for formal vote. It has been drawn up by the Technical Committee CEN/TC 250.

This draft amendment A1, if approved, will modify the European Standard EN 1990:2023. If this draft becomes an amendment, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for inclusion of this amendment into the relevant national standard without any alteration.

This draft amendment 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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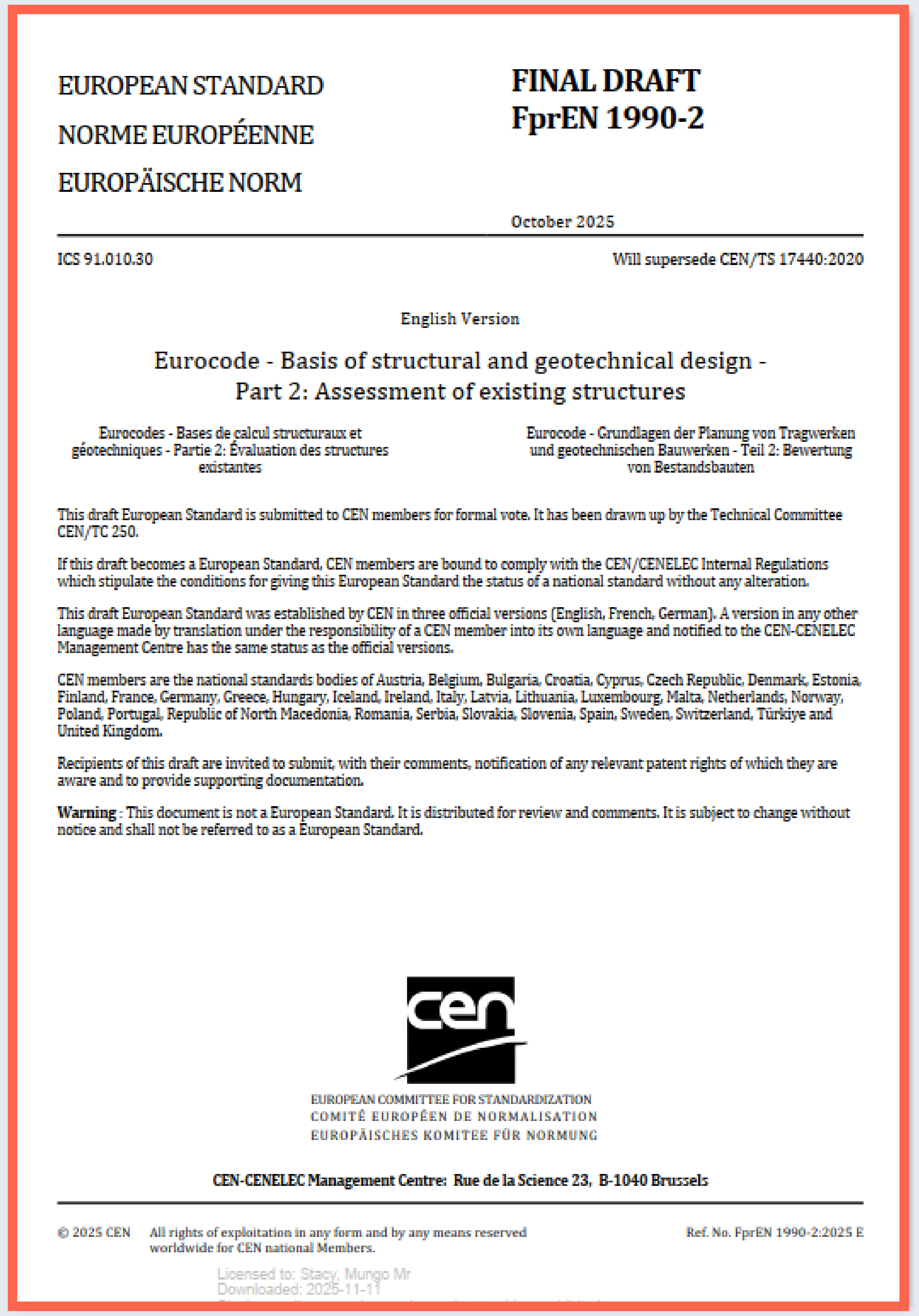
EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN 1990:2023/FprA1:2025 E



EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

FINAL DRAFT
FprEN 1990-2

October 2025

ICS 91.010.30

Will supersede CEN/TS 17440:2020

English Version

Eurocode - Basis of structural and geotechnical design - Part 2: Assessment of existing structures

Eurocodes - Bases de calcul structuraux et géotechniques - Partie 2: Évaluation des structures existantes

Eurocode - Grundlagen der Planung von Tragwerken und geotechnischen Bauwerken - Teil 2: Bewertung von Bestandsbauten

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

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EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

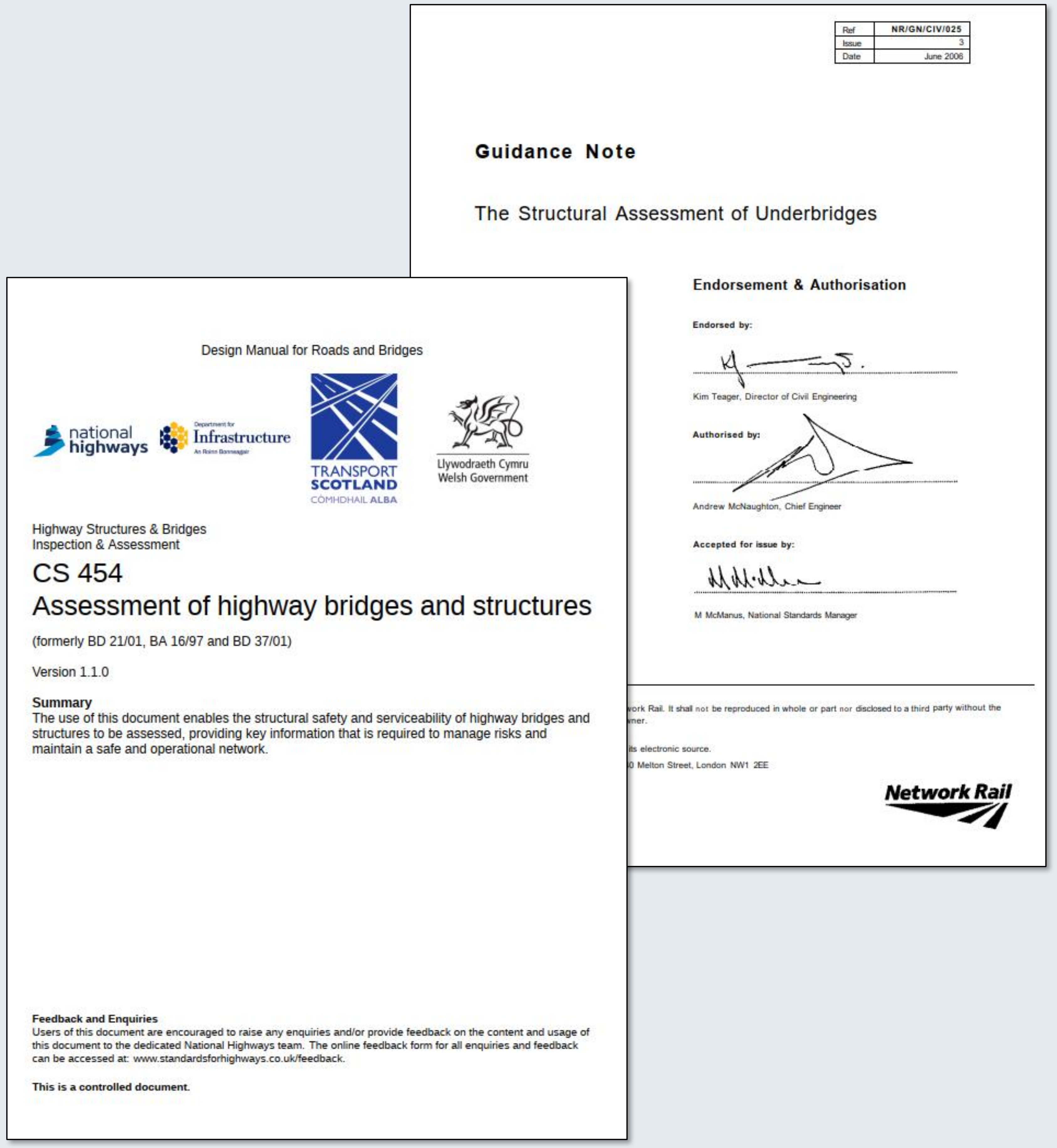
Ref. No. FprEN 1990-2:2025 E

First generation

Second generation

THE FUTURE OF STEEL CONSTRUCTION

UK approach to assessment


Design Manual for Roads and Bridges

national highways | Department for Infrastructure | TRANSPORT SCOTLAND COMHDHAIL ALBA | Llywodraeth Cymru Welsh Government

Highway Structures & Bridges
Inspection & Assessment

CS 454
Assessment of highway bridges and structures

(formerly BD 21/01, BA 16/97 and BD 37/01)

Version 1.1.0

Summary
The use of this document enables the structural safety and serviceability of highway bridges and structures to be assessed, providing key information that is required to manage risks and maintain a safe and operational network.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated National Highways team. The online feedback form for all enquiries and feedback can be accessed at: www.standardsforhighways.co.uk/feedback.

This is a controlled document.

Ref	NR/GN/CIV/025
Issue	3
Date	June 2006

Guidance Note

The Structural Assessment of Underbridges

Endorsement & Authorisation

Endorsed by:

Kim Teager, Director of Civil Engineering

Authorised by:

Andrew McNaughton, Chief Engineer

Accepted for issue by:

M McManus, National Standards Manager

Network Rail

EN 1990-2
Basis of assessment

EN 1990-1

4.1 Basic requirements

(1) The assumptions given in 1.2 and in the other Eurocodes shall be met.

(2) A structure shall be designed and executed in such a way that it will, during its design service life, with appropriate degrees of reliability and in an economical way:

— sustain all reasonably foreseeable actions and influences that can occur during its execution and use, as specified for the structure;

— meet the specified serviceability requirements for the structure or a structural member;

— meet the spe

NOTE Design

(3) In the case of

NOTE For ge

EN 1990-2

4.1 Basic requirements

(1) The assumptions given in 1.2 and in the other Eurocodes shall be met.

(2) The assessment of an existing structure shall verify that the structure fulfils the specified requirements during the remaining service life.

NOTE 1 Additional conditions for existing structures to which this document applies can be given in the National Annex.

NOTE 2 The basic requirements for an existing structure can be different from the basic requirements applicable for a new structure.

NOTE 3 Minimum requirements for the verification where the structure includes new and existing parts can be given in the National Annex.

EN 1990-2
Basis of assessment

THE FUTURE OF STEEL CONSTRUCTION

5 Principles of assessment

5.1 General

5.1.1 Assessment process

(1) The assessment of a structure may be carried out following a stepwise process with increasing levels of detail and accuracy.

NOTE 1 A stepwise process can include preliminary and detailed stages in order to optimize the overall level of effort required for the assessment.

EN 1990-2
Basis of assessment

(3) Available information ahead of the assessment of an existing structure should be checked and taken into consideration where relevant, including from:

— the original design and construction record;

— previous condition surveys;

— inspections carried out during the past service life, monitoring;

— previous assessment reports;

— previous rehabilitation and/or structural modifications;

— information about significant environmental, seismic or other extreme events occurred after construction;

— information about changes in ground conditions occurred after construction.

EN 1990-2
Basis of assessment

THE FUTURE OF STEEL CONSTRUCTION

5.1.2 Assessment scope and objectives

(2) The assessment scope and objectives should include the following:

— the extent of the structure to be assessed;

— the requirements to be fulfilled in the remaining service life;

— the assessment situations to be considered for the structure, including those related to possible changes in structural conditions or actions;

— the actions to be considered according to the relevant assessment situations;

— the limit states to be assessed and the methods of assessment for the relevant limit states;

NOTE For verification of the serviceability limit state, see 5.4.

— the format for describing the outcome of the assessment.

EXAMPLE For example in terms of a calculated operational restriction for a particular action.

EN 1990-2
Basis of assessment

THE FUTURE OF STEEL CONSTRUCTION

5.1.3 Assessment approach

(1) The assessment approach and the assumptions for the assessment shall be specified and documented, including:

a) the method of assessment;

b) the approach for assessing the effects of structural condition, deterioration, construction process and subsequent changes to the structure, if relevant;

c) the data for the basic variables used in the assessment;

d) the structural analysis methodology;

e) the verification methods.

EN 1990-2
Basis of assessment

8.3 Verification of ultimate limit states (ULS)

8.3.1 General

(1) When verifying ultimate limit states EN 1990:2023, 8.3 should be applied, unless otherwise specified, substituting where appropriate the values of design parameters with the corresponding values for assessment.

NOTE 1 Combinations of actions for assessment are given in EN 1990:2023, 8.3, unless the National Annex defines other combinations of actions.

NOTE 2 Partial factors can be (i) fixed (standardized for use in a country), valid for a range of cases, or (ii) adjusted for a specific case.

NOTE 3 Fixed partial factors for actions are used, unless conditions for the use of adjusted partial factors for actions are given in the National Annex.

NOTE 4 For fixed partial factors for actions and combination factors ψ, see Annex A.

EN 1990-2
Basis of assessment

THE FUTURE OF STEEL CONSTRUCTION

A

A.1 General application and appl

A.1.7 Partial factors for ultimate lin

(1) Partial factors for ultimate limit states

NOTE EN 1990:2023, A.1.7 applies, unles

NA to PD CEN/TS 17440:2020 – indicative of national choice

The values of all partial factors for actions and ψ factors for assessment shall be as specified by the relevant authority.

Where no values of partial factors for actions and ψ factors for assessment are specified by the relevant authority, values may be agreed with the relevant parties.

Partial factors that implicitly include ψ factors may be used as an alternative to setting ψ factors for assessment.

Partial factors for actions may be split into factors relating to uncertainty in the magnitude of the action and uncertainty in the model effects.

In the absence of agreed values of partial factors for actions and ψ factors between the relevant parties, the values should be taken as the corresponding values for design given in BS EN 1990 (together with its UK National Annex) and BS EN 1991 (all parts, together with their UK National Annexes).

NOTE 1: It is common practice in UK bridge assessments to use partial factors for actions γ_{fL} that are defined for each combination of actions (implicitly including ψ factors), and to apply an additional partial factor γ_{f3} accounting for uncertainty in the model effects.

NOTE 2: It is common practice in the UK to apply fixed default values for partial factors for actions, rather than calculate partial factors on a project basis.

EN 1990-2
Basis of assessment

THE FUTURE OF STEEL CONSTRUCTION

8.3.2 Assessment of resistance

(2) The assessment values of resistance shall be determined from resistance models that are consistent with the information of the existing structure related to:

— material properties;

— structural detailing;

— geometry;

— structural conditions.

NOTE 1 Structures that were designed and constructed to withdrawn standards can have material properties, detailing arrangements and execution tolerances that do not comply with or are not covered by current standards. Particular attention is needed in the implementation of resistance models from current standards valid for new structures, which implicitly or explicitly rely on design requirements for material properties, detailing arrangements and execution tolerances being satisfied. Further guidance can be found in the relevant Eurocodes.

NOTE 2 Structures that do not comply with current design standards are not necessarily unsafe. The use of updated values for basic variables and refined resistance models for the assessment that explicitly take into account deficiencies can be particularly beneficial in accurately assessing the resistance of existing structures.

EN 1990-2
Basis of assessment

THE FUTURE OF STEEL CONSTRUCTION

(4) In absence of specific assessment resist
the Eurocodes, valid for design, should be u
in good condition and have

— material properties,

— detailing provisions, and

— execution tolerances

that satisfy

— the requirements of the relevant Euroco

— the related product standards, and

— execution standards.

NOTE The National Annex can provide ap
resistance models in the Eurocodes valid for des

NA to PD CEN/TS 17440:2020 – indicative of national choice

The approach for assessing the structural resistance of

- structures that are not within the scope of the Eurocodes;
- structures that do not satisfy the requirements of the respective material-oriented Eurocodes (and the related product standards and execution standards) with respect to material properties, detailing arrangements and execution tolerances;
- structures exhibiting deterioration;

should be as specified by the relevant authority or, where not specified, agreed for a specific project by the relevant parties.

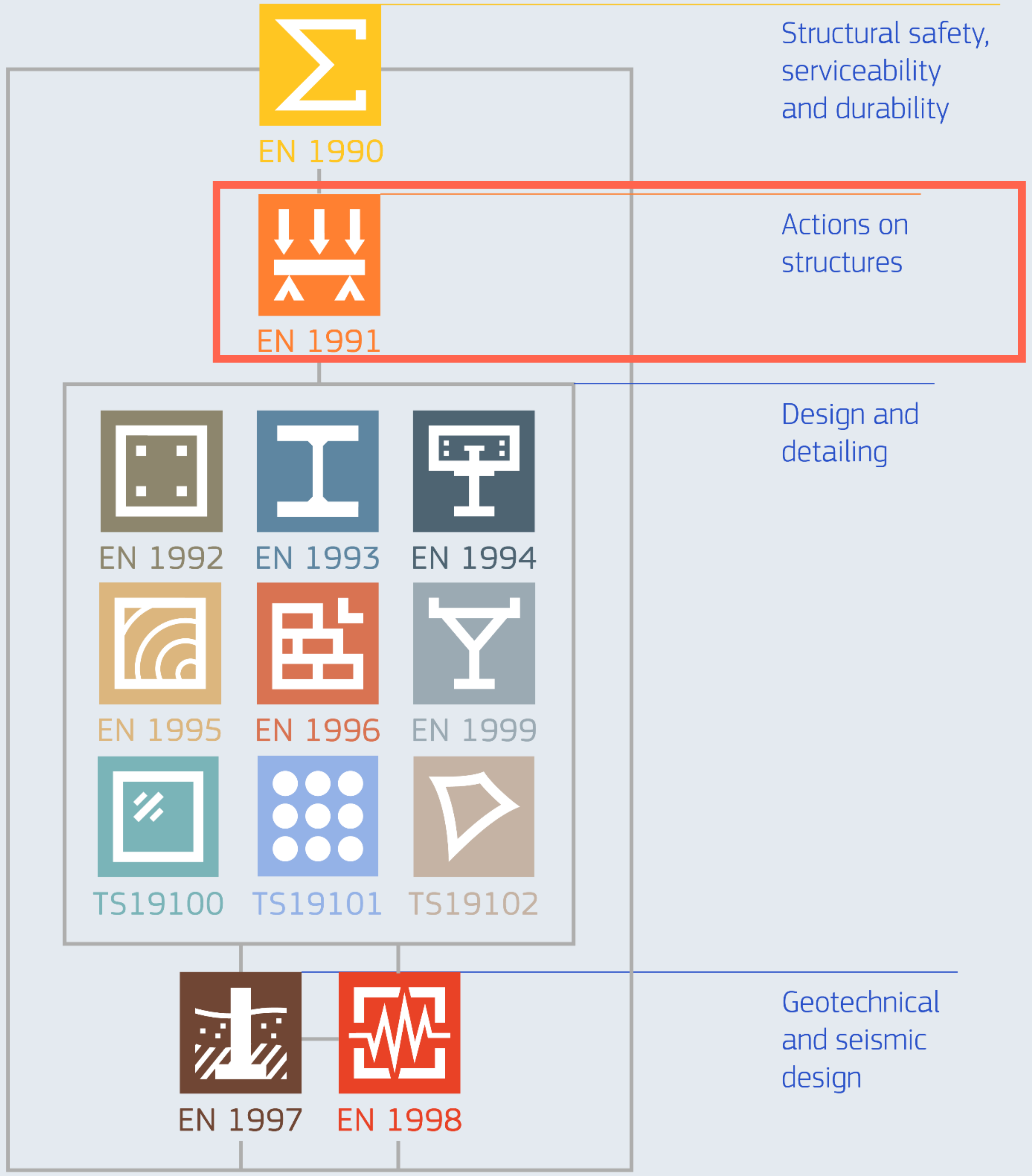
NOTE: Guidance for assessment of resistance for buildings can be found in BRE Digest 366.

NOTE: Criteria for assessment of resistance for cast iron bridge structures and masonry arch bridge structures are included in CS 454.

NOTE: Methods for assessing the structural resistance of common types of bridge structure found in the UK, including assessment of the effects of deterioration, can be found in the Design Manual for Roads and Bridges, including CS 454, CS 455, CS 456, and CS457.

Eurocode Second Generation Updates EN 1990 Basis of Design and EN 1991 Actions on Structures

THE FUTURE OF STEEL CONSTRUCTION



EN 1991-1-1 Imposed loads

EN 1990-1

elements other than structural

completion and finishing elements connected with the structure that are not classified as structural members and that have the lowest consequence of failure

Note 1 to entry: See 4.3 for the classification of consequences of failure.

EXAMPLE Roofing; surfacing and coverings; partitions and linings; kerbs; wall cladding; suspended ceilings; thermal insulation; bridge furniture, road surfacing; services fixed permanently to, or within, the structure such as equipment for lifts and moving stairways; heating, ventilating and air conditioning equipment; electrical equipment; pipes; cable trunking and conduits.

THE FUTURE OF STEEL CONSTRUCTION

THE FUTURE OF STEEL CONSTRUCTION

EN 1991-1-1 Imposed loads

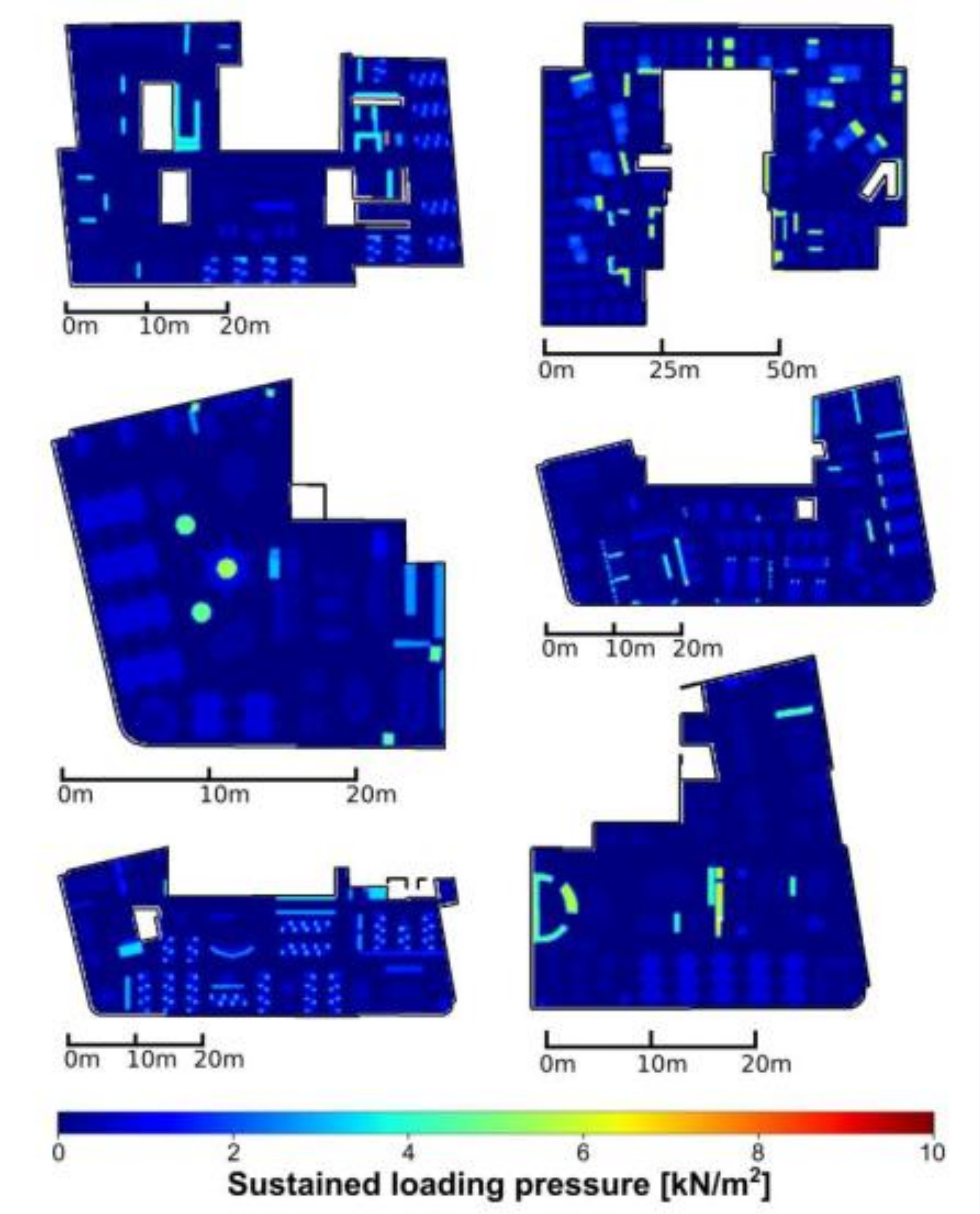
Table 6.1 — (NDP) Categories of use and values for q_k and Q_k

Category	Specific Use	Sub-categories with examples	q_k [kN/m²]	Q_k [kN]	Typical dimension of the area loaded by Q_k expressed in (m × m)
A	Areas for domestic and residential activities	**A1** Rooms in residential buildings and houses, including corridors.	2,0	2,0	0,05 × 0,05
		A2 Bedrooms, wards, dormitories, private bathrooms and toilets in hospitals, hotels, hostels and other institutional residential occupancies.	2,0	2,0	0,05 × 0,05
B[a]	Public areas (not susceptible to crowding)	**B1** Office areas for general use including corridors other than archive / storage areas (see Category E)	3,0	3,0	0,05 × 0,05
		B2 Kitchens, communal bathrooms and toilets in hospitals, hotels, hostels and other institutional residential occupancies.	3,0	3,0	0,05 × 0,05
C[b,c,d]	Public areas where people can congregate (with the exception of areas defined under category A, B, and D)	**C1**: Areas with tables, etc. e.g. areas in schools, cafés, restaurants, dining halls, reading rooms, receptions.	3,0	4,0	0,05 × 0,05
		C2: Areas with fixed seats, e.g. areas in churches, theatres, cinemas, conference rooms, lecture halls, assembly halls, waiting rooms.	4,0	4,0	0,05 × 0,05
		C3: Areas without obstacles for moving people, e.g. areas in museums, exhibition rooms, etc. and corridors to areas not belonging to categories A1, B1 and C5.	5,0	4,0	0,05 × 0,05
		C4: Areas with possible physical activities, e.g. dance halls, gymnastic rooms, stages.	5,0	7,0	0,05 × 0,05

Category	Specific Use	Sub-categories with examples	q_k [kN/m²]	Q_k [kN]	Typical dimension of the area loaded by Q_k expressed in (m × m)
		C5: Areas susceptible to large crowds, e.g. in buildings for public events including corridors like concert halls, sports halls including stands, and railway platforms.	7,5	4,5	0,05 × 0,05
D	Shopping areas	**D1**: Areas in retail shops	4,0	4,0	0,05 × 0,05
		D2: Areas in department stores	5,0	7,0	0,05 × 0,05
E	Areas for archive, storage and industrial use[e]	**E1**: Areas susceptible to accumulation of goods, including access areas [f]	7,5	7,0	[a]
		E2: Industrial use [g,h,i,j]	[a]		
F	Garages and vehicle traffic areas (excluding ordinary roads and bridges)	Gross vehicle weight ≤ 30 kN: **F1** Traffic and parking areas for light vehicles (≤8 seats not including driver) e.g. garages; parking areas, parking halls	2,5	20	[a]
G		30 kN < Gross vehicle weight ≤ 160 kN: **G1** Traffic and parking areas for medium vehicles (on 2 axles) e.g. access routes, delivery zones, zones accessible to fire engines	5,0	90	0,2 × 0,2
		Gross vehicle weight > 160 kN: **G2** Traffic and parking areas for heavy vehicles [k]	[a]		
H[l]	Roofs not accessible except for normal maintenance and repair		0,4	1,0	0,05 × 0,05
I	Roofs accessible with occupancy according to categories A to G		See categories A to G		
K	Roofs accessible for special services, such as classes HC for helicopter landing areas		5,0	See Table 6.4	
S	Stairs and landings	**S1** Stairs and landings to areas belonging to category A1 and B1. [m]	See categories A1 and B1		0,05 × 0,05
		S2 Stairs and landings for tribunes without fixed seats that are defined as escape ways. [m]	7,5	3,0	0,05 × 0,05
		S3 Stairs and landings not belonging to category S1 or S2. [m]	5,0	2,0	0,05 × 0,05

EN 1991-1-1 Imposed loads
Office floor loading

B[a]	Public areas (not susceptible to crowding)	**B1** Office areas for general use including corridors other than archive / storage areas (see Category E)	3,0	3
		B2 Kitchens, communal bathrooms and toilets in hospitals, hotels, hostels and other institutional residential occupancies.	3,0	3



Stochastic modelling of imposed floor loads in modern office buildings, Hawkins et al (under peer review)

Category	Specific Use	Sub-categories with examples	q_k [kN/m²]	Q_k [kN]
B	Offices and communal areas for non-domestic residential activities	**B1** Office areas for general use other than archive / storage areas (see Category E)		
		B11 Office areas other than those covered in B12	2.5	2.7
		B12 Office areas at or below ground floor level; corridors, stairs and landings in offices	3.0	2.7
		B2 Communal areas (kitchens and communal bathrooms and toilets) in residential occupancies for non-domestic use such as hospitals, hotels, hostels, student accommodations.	3.0	2.0

Indicative national choice – draft NA

THE FUTURE OF STEEL CONSTRUCTION

THE FUTURE OF STEEL CONSTRUCTION

EN 1991-1-1 Imposed loads
Car park loading

F	Garages and vehicle traffic areas (excluding ordinary roads and	<u>Gross vehicle weight ≤ 30 kN:</u> **F1** Traffic and parking areas for light vehicles (≤8 seats not including driver) e.g. garages; parking areas, parking halls	2,5	20	a

Category	Specific Use	Sub-categories with examples	q_k [kN/m²]	Q_k [kN]
F	Garages and vehicle traffic areas (excluding ordinary roads and bridges) (see NOTE 1)	<u>Gross vehicle weight ≤ 32 kN:</u> **F1** Traffic and parking areas for light vehicles (≤8 seats not including driver) e.g. garages; parking areas, parking halls	3.0	30 kN (axle load to be divided by two wheels as in Figure 6.5 to BS EN 1991-1-1:2025; loaded area per wheel is 0.2 × 0.2 (m × m) or 15 kN (jack load) applied to an area 0.05 × 0.05 (m × m)

Indicative national choice – draft NA

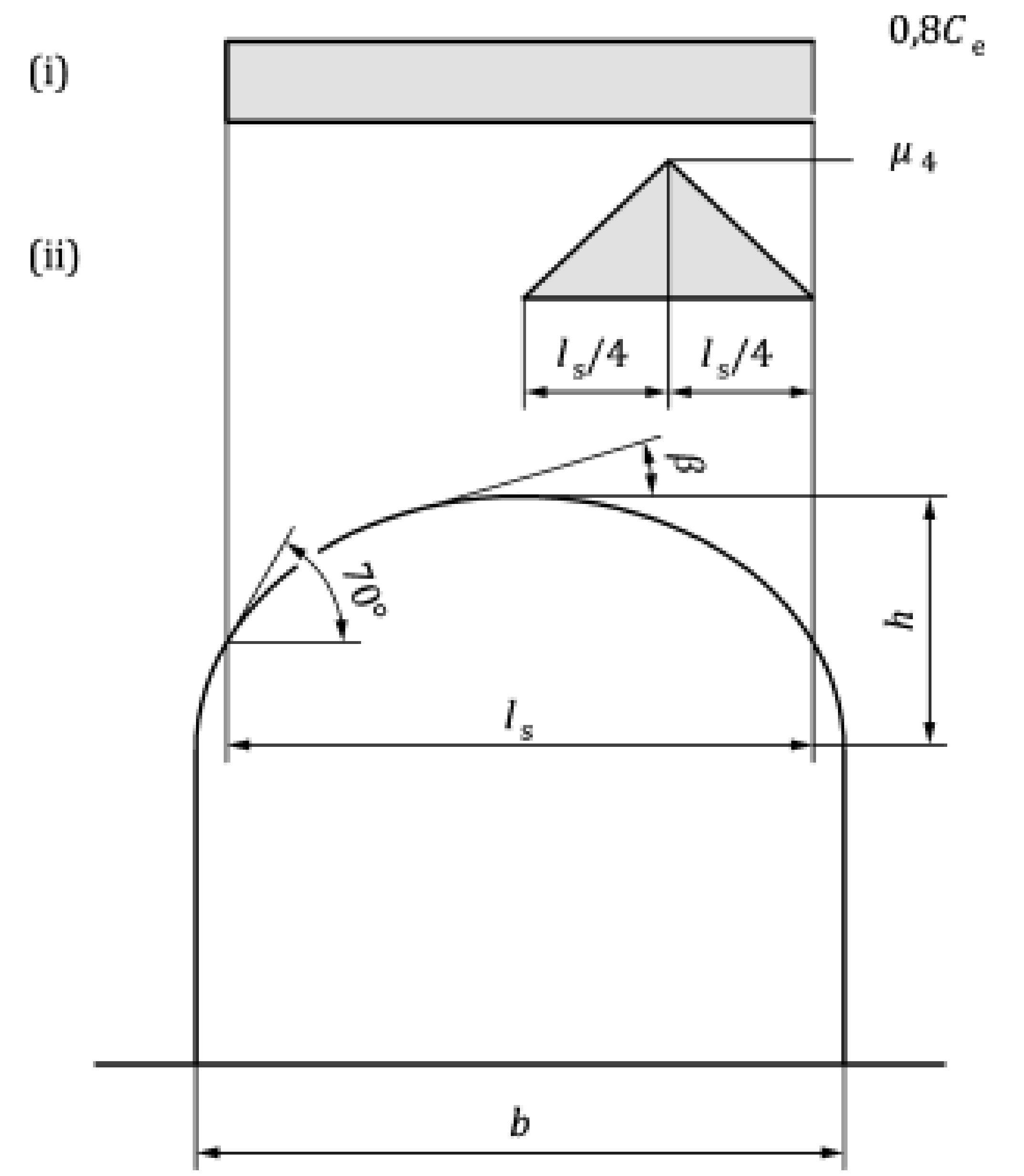
EN 1991-1-3 Snow

THE FUTURE OF STEEL CONSTRUCTION

3.1.5
balanced snow load arrangement on the roof
load arrangement which describes the uniformly distributed snow load on the roof, affected by the shape of the roof and its exposure to wind

3.1.6
unbalanced snow load arrangement on the roof
load arrangement which describes the snow load distribution resulting from snow having been moved from one location to another location on a roof or off the roof, depending on the exposure of the roof to wind and the effects of sliding

Note 1 to entry: Unbalanced load arrangements given in this document assume that wind can have any direction.



Key
(i) balanced load arrangement
(ii) unbalanced load arrangement

EN 1991-1-3 Snow

THE FUTURE OF STEEL CONSTRUCTION

6.1 Characteristic values

(1) The characteristic value of snow load on the ground (s_k) should be determined in accordance with EN 1990:2023, 6.1.2.3(2) and the definition for characteristic snow load on the ground given in 3.1.1.

NOTE 1 Characteristic values of snow load on the ground at sites for altitudes up to 1 500 m can be set by the National Annex.

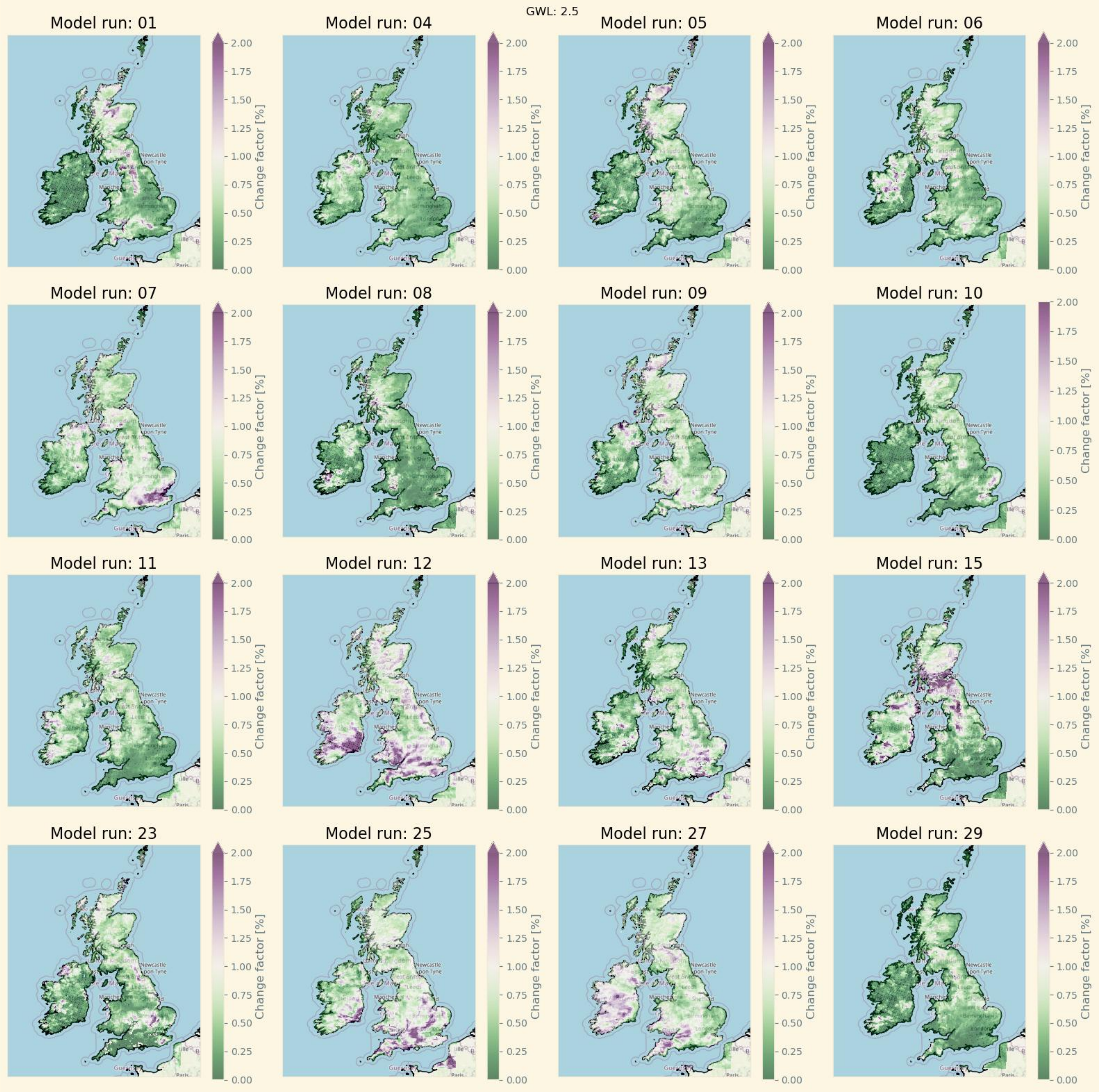
(3) The effects of climate change shall be taken into account.

NOTE 1 The effects of climate change are taken into account by multiplying the characteristic value of snow load on the ground (s_k) by a scaling factor, $f_{s,cc}$, greater than or equal to 1, unless the National Annex gives a different approach.

NOTE 2 When the scaling factor approach is used, minimum values for the scaling factor $f_{s,cc}$ can be set in the National Annex.

(4) Additional project-specific requirements to account for the effects of climate change should be as specified by the relevant authority or, where not specified, may be agreed for a specific project by the relevant parties.

Climate change
Factor of change approach



Project in progress

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EN 1991-1-4 Wind

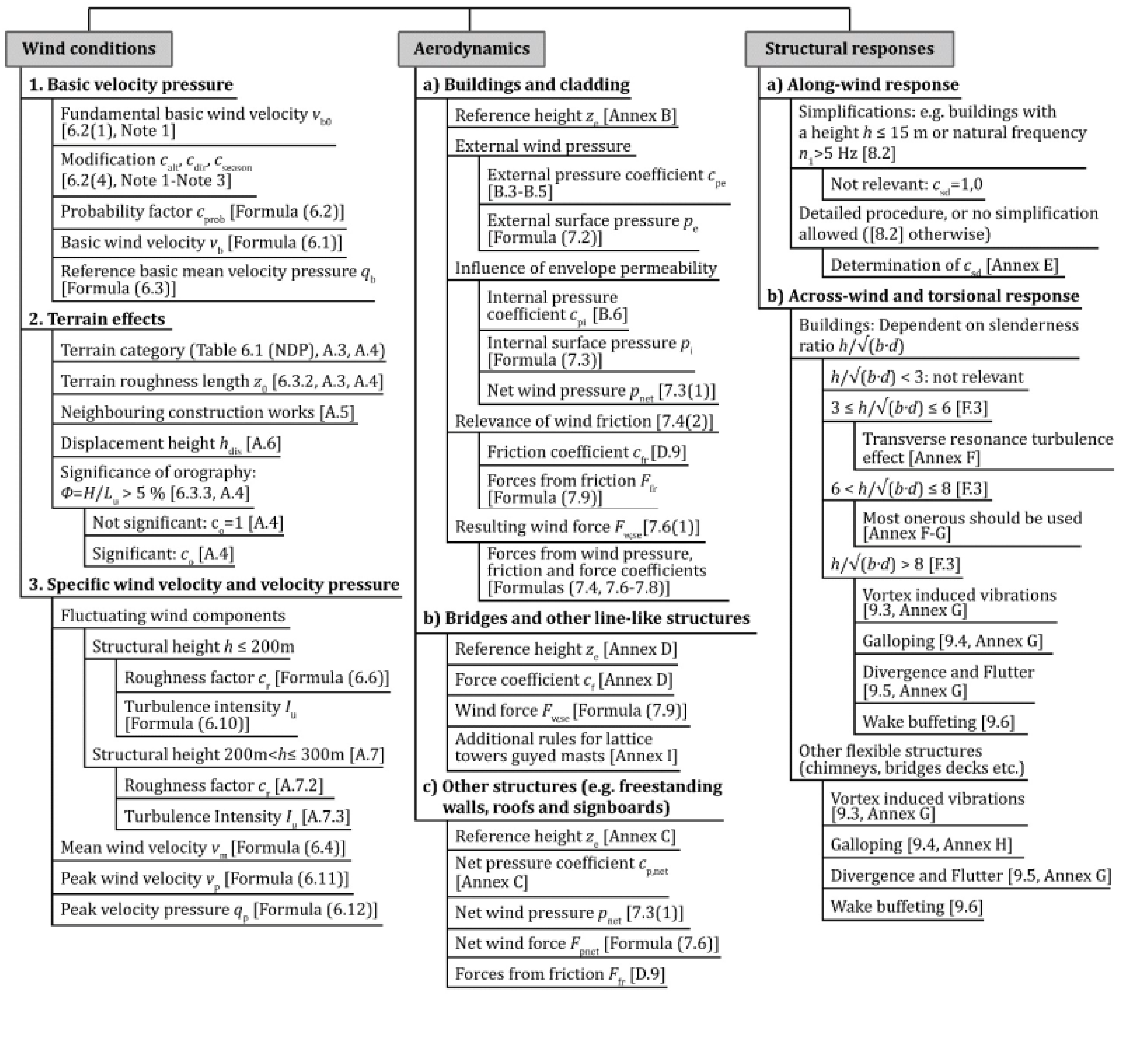


Figure 5.1 — Overview of the general design process and classification regarding the relevance of methods for individual design situations

EN 1991-1-5 Thermal

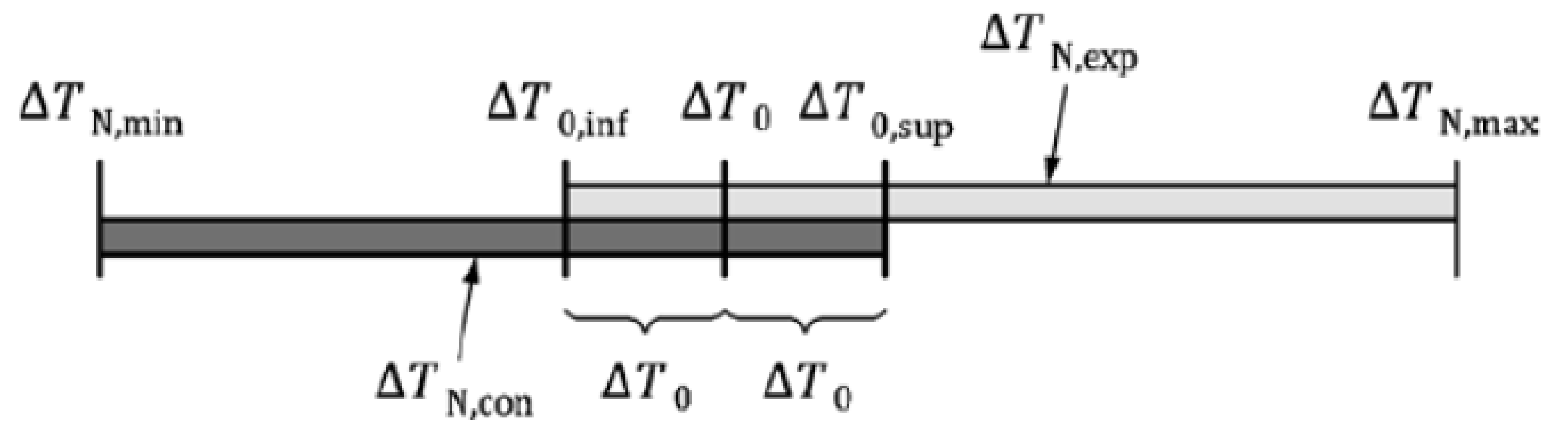
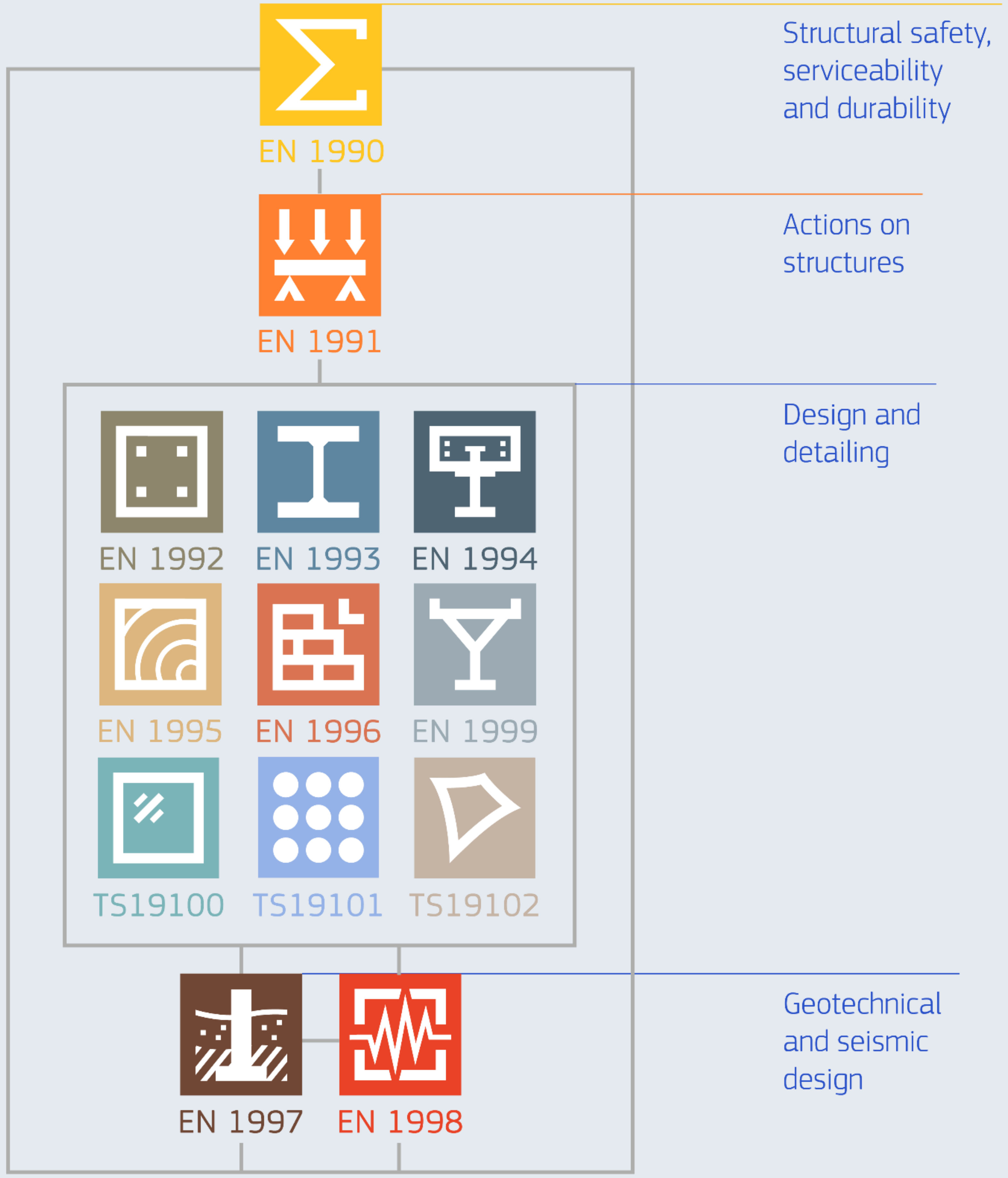


Figure 8.1 — Characteristic value of the maximum contraction ($\Delta T_{N,con}$) and expansion ($\Delta T_{N,exp}$) range of the uniform bridge temperature component

Eurocode Second Generation Updates EN 1990 Basis of Design and EN 1991 Actions on Structures



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30 March 2028

Thank you