

BRE: The Next Generation of Structural Eurocodes

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Fire Safety

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Scope of presentation

- Background to Eurocode development
- Structural Eurocodes and structural fire engineering design
- Mandate M515
- Tasks relevant to structural fire engineering design
- Who will be involved
- Implications

Structural Eurocodes - Background

- 1975 – Action programme in field of construction based on article 95 of the Treaty. Objective of the programme was the elimination of technical obstacles to trade and the harmonisation of technical specifications.
- Establish a set of harmonised technical rules for the structural design of construction works which, in the first stage, would serve as an alternative to national rules and ultimately would replace national rules
- 1989 Transfer preparation and publication from the Commission to CEN – note this links the Eurocodes with the CPD and Public Procurement Directives

Structural Eurocodes - Background

- The Eurocodes originally produced by CEN as 62 pre-standards (ENVs) with boxed values used where member states could determine their own values
- ENVs produced between 1992 and 1998 together with National Application Documents (NADs) which provided details of how the ENV document should be used in individual member states
- Publication of Eurocodes as full standards (with National Annexes) took place between 2002 and 2006

Structural Eurocodes

- EN 1990 Basis of Design
- Eurocode 1 Actions on Structures
 - EN1991-1-1 Densities, self weight and imposed loads
 - EN 1991-1-2 Actions on structures exposed to fire**
 - EN 1991-1-3 Snow loads
 - EN 1991-1-4 Wind loads
 - EN 1991-1-5 Thermal actions
 - EN 1991-1-6 Actions during execution
 - EN 1991-1-7 Accidental actions due to impact and explosions
 - EN 1991-2 Traffic loads on bridges
 - EN 1991-3 Actions induced by cranes and machinery
 - EN 1991-4 Actions in silos and tanks

Structural Eurocodes

– Eurocode 2 Design of concrete structures

EN 1992-1-1 Common rules for buildings and civil engineering structures

EN 1992-1-2 Structural fire design

EN 1992-2 Bridges

EN 1992-3 Liquid retaining and containment structures

Structural Eurocodes

– Eurocode 3 Design of steel structures

EN 1993-1-1 General rules

EN 1993-1-2 Structural fire design

EN 1993-1-3 Cold formed thin gauge members and sheeting

EN 1993-1-4 Structures in stainless steel

EN 1993-1-5 Strength and stability of planar plated structures without transverse loading

EN 1993-1-6 Strength and stability of shell structures

EN 1993-1-7 Strength of planar plated structures loaded transversally

EN 1993-1-8 Design of joints

Structural Eurocodes

– Eurocode 3 Design of steel structures (continued)

EN 1993-1-9 Fatigue strength

EN 1993-1-10 Fracture toughness assessment

EN 1993-1-11 Use of high strength cables

EN 1993-2 Bridges

EN 1993-3 Buildings

EN 1993-4-1 Silos, tanks and pipelines – Silos

EN 1993-4-2 Silos, tanks and pipelines – Tanks

EN 1993-4-3 Silos, tanks and pipelines – Pipelines

EN 1993-5 Piling

Structural Eurocodes

– Eurocode 3 Design of steel structures (contd.)

EN 1993-6 Crane supporting structures

EN 1993-7-1 Towers, masts and chimneys – Towers and masts

EN 1993-7-2 Towers, masts and chimneys – Chimneys

Structural Eurocodes

– Eurocode 4 Design of composite steel and concrete structures

EN 1994-1-1 General – Common rules

EN 1994-1-2 Structural fire design

EN 1994-2 Bridges

EN 1994-3 Buildings

Structural Eurocodes

– Eurocode 5 Design of timber structures

EN 1995-1-1 Common rules and rules for buildings

EN 1995-1-2 Structural fire design

EN 1995-2 Bridges

Structural Eurocodes

– Eurocode 6 Design of masonry structures

EN 1996-1-1 Rules for reinforced and unreinforced masonry

EN 1996-1-2 Structural fire design

EN 1996-1-3 Detailed rules on lateral loading

EN 1996-2 Selection and execution of masonry

EN 1996-3 Simplified calculation methods and simple rules for masonry structures

Structural Eurocodes

– Eurocode 7 geotechnical design

EN 1997-1 General rules

EN 1997-2 Design assisted by laboratory testing

EN 1997-3 Design assisted by field testing

Structural Eurocodes

– Eurocode 8 Design of structures for earthquake resistance

EN 1998-1 General rules, seismic actions and rules for buildings

EN 1998-2 Bridges

EN 1998-3 Strengthening and repair of buildings

EN 1998-4 Silos, tanks and pipelines

EN 1998-5 Foundations, retaining structures and geotechnical aspects

EN 1998-6 Towers, masts and chimneys

Structural Eurocodes

– Eurocode 9 Design of aluminium structures

EN 1999-1-1 Common rules

EN 1999-1-2 Structural fire design

EN 1999-2 Structures susceptible to fatigue

Summary of important documents for SFE

- EN 1991-1-2 Actions on structures exposed to fire
- EN 1992-1-2 Structural fire design
- EN 1993-1-2 Structural fire design
- EN 1994-1-2 Structural fire design
- EN 1995-1-2 Structural fire design
- EN 1996-1-2 Structural fire design
- EN 1999-1-2 Structural fire design

Call for Tenders – Grant Agreement CEN/2014-02

- Request for tenders for 25 project team leaders and up to 125 technical experts, in response to Mandate M/515 phase 1 tasks for the development of the 2nd Generation of EN Eurocodes

Evolution of the structural Eurocodes

- The European Commission and EFTA awarded a grant agreement for Phase 1 of the proposed work programme to CEN.
- The Dutch Foundation for Standardization (NEN) is responsible for the financial and operational management of the Mandate M/515 relating to the funding provided by the EC and EFTA.

Overview of the CEN/TC 250 Work Programme

- The full TC250 work programme comprises 79 discrete tasks in four overlapping phases
- Phase 1 includes those parts of the work programme upon which other activities are primarily dependent.
- Phase 1 of the TC250 work programme includes 29 tasks of which 25 are funded by EC and EFTA

Call for tenders

- The call relates to a request for up to 25 project team leaders and up to 125 technical experts, in response to Mandate M/515 phase 1 tasks for the development of the 2nd generation of EN Eurocodes.
- The call covers a wide range of different subject areas reflecting the scope of the Eurocodes. Those areas of direct relevance to fire issues include areas covered by SC4 (composite steel and concrete construction) and SC9 (aluminium structures) although the most directly relevant areas are those covered by **SC1 (Actions)** and **HG-F (Horizontal Group – Fire)**.

Summary of final deliverables for Phase 1 tasks

Task ref.	Task name	Deliverable
WG7.T1	Evolution of EN1990 – General.	Revised EN1990 including new Annexes. Background documents (BD).
SC1.T1	EN1991-1-2 (Fire)	Revised EN1991-1-2 with modified clauses on fire actions. BD.
SC1.T5	Climate change	Technical report. Report for recommended clauses for material codes. BD.
SC1.T9	EN1991-2 (road and rail traffic loads)	Revised EN 1991-2 with new clauses on road and railway bridges. BD
SC2.T1	New items in EN1992-1-1, EN1992-2, EN1992-3	Report on new content in parts 1-1, 2 and 3 of EN1992 including new annexes. BD
SC3.T1	Design of sections and members to EN1993-1-1	Revised EN 1993-1-1. BD
SC3.T2	Joints and connections according to EN1993-1-8	Revised EN1993-1-8. BD
SC4.T1	Respond to demands from industry, including needs for harmonisation with EN1992 and EN1994.	Report on revisions to EN1994-1-1, EN1994-1-2 and EN1994-2. BD
SC4.T2	Composite beams with large web openings.	New part of EN1994 or report on revisions to EN1994 1-1 and 1-2. BD
SC4.T3	Revised rules for shear connection in the presence of modern forms of profiles sheeting.	Report on revisions to EN1994-1-1. BD
SC4.T4	Develop new rules for composite columns (concrete filled tubes) in fire.	Report on revised EN1994-1-2 Annex H. BD

Summary of final deliverables for Phase 1 tasks (contd.)

Task ref.	Task name	Deliverable
SC5.T1	New items in revised EN1995-1-1	Report on revisions to EN1995-1-1. BD
SC5.T2	New En 1995 part on timber concrete composites	New CEN technical specification. BD
SC6.T1	Revised version of EN1996-1-1	Revised EN1996-1-1. BD
SC7.T1	Harmonization and ease of use.	Report including reorganised framework of EN1997. BD
SC7.T2	General rules.	Report on revisions to EN 1997-1 incorporating modifications to the text and annexes of EN1997-2; additions to the text of EN1997-1 and Annexes A and B. BD
SC8.T1	Material independent sections of EN1998-1.	Report on redrafting of Section 3 and annex B of EN1998-1. BD
SC8.T3	Evolution of EN1998-3	Revision, update and extension of EN1998-3. BD
SC9.T1	Update and simplification of all parts of EN1999.	Report on partially revised EN1999-1-1 and revised EN1999-1-2, EN1999-1-3, EN1999-1-4, EN 1999-1-5 with new clauses. BD
SC9.T2	New types of connection.	Report on further revision to EN1999-1-1 with new clauses. BD
HG-B.T1	Bridges – consultation activities and ease of use review.	Report containing specific recommendations to other SCs.

Summary of final deliverables for Phase 1 tasks (contd.)

Task ref.	Task name	Deliverable
HG-F-T1	Harmonisation of fire parts of Structural Eurocodes	Report containing harmonised section 1 to 3 of the parts 1-2 of all related Eurocodes and new informative annexes in EN1992-1-2, EN1993-1-2 and EN1994-1-2. BD
WG2.T1b	Assessment and retrofitting of existing structures – General rules/actions	Conversion of the report into CEN TS for general rules and actions.
WG3.T2	Structural Glass – Preparation of CEN TS	Conversion of the report into CEN TS on Structural Glass (parts 1, 2 and 3).
WG6.T1	Robustness framework.	Report on new and revised clauses in EN1990 and EN1991-1-7

UK representation

Task ref.	CEN/TC 250 mirror group	BSI mirror committee	UK experts expressing an interest in PT
TCEN1990.T1	CEN/TC250/WG7	B/525/1	Gerard Canisius, Andrew Bond, Mungo Stacy
SC1.T1	CEN/TC250/SC1	B525/1	Tom Lennon?
SC1.T5	CEN/TC250/SC1	B525/1	
SC1.T9	CEN/TC250/SC1	B525/10	Mungo Stacy, David Cooper
SC2.T1	CEN/TC250/SC2	B525/2	Jon Shave
SC3.T1	CEN/TC250/SC3	CB/203	
SC3.T2	CEN/TC250/SC3	CB/203	Ana Margarida, Girao Coelho
SC4.T1	CEN/TC250/SC4	B525/4	Mike Banfi, Stephen Hicks
SC4.T2	CEN/TC250/SC4	B525/4	Mark Lawson, Stephen Hicks, Yong Wang
SC4.T3	CEN/TC250/SC4	B525/4	Dennis Lam, Stephen Hicks
SC4.T4	CEN/TC250/SC4	B525/4	Yong Wang

UK representation

Task ref.	CEN/TC 250 mirror group	BSI mirror committee	UK experts expressing an interest in PT
SC5.T1	CEN/TC250/SC5	B/525/5	
SC5.T2	CEN/TC250/SC5	B525/5	Richard Harris
SC6.T1	CEN/TC250/SC6	B525/6	John Roberts, John Morton
SC7.T1	CEN/TC250/SC7	B526	Brian Simpson
SC7.T2	CEN/TC250/SC7	B526	Brian Simpson
SC8.T1	CEN/TC250/SC8	B525/8	
SC8.T3	CEN/TC250/SC8	B525/8	Andreas Kappos
SC9.T1	CEN/TC250/SC9	B525/9	
SC9.T2	CEN/TC250/SC9	B525/9	
WG2.T1	CEN/TC250/WG2	B525	Jon Shave
WG3.T1	CEN/TC250/WG3	B525	

UK representation

Task ref.	CEN/TC 250 mirror group	BSI mirror committee	UK experts expressing an interest in PT
WG3.T2	CEN/TC250/WG3	B/525	
WG4.T1	CEN/TC250/WG4	B525	
WG5.T1	CEN/TC250/WG5	B525	
WG6.T1	CEN/TC250/WG6	B525	Gerard Canisius
HG-B.T1	CEN/TC250/HG-B	B525/10	Mungo Stacy
HG-F.T1	CEN/TC250/HG-F	B525/-/32	Tom Lennon

Implications of potential changes

- Principal impetus behind proposed changes is twofold: firstly to simplify and enhance the ease of use of the codes and secondly to increase harmonisation.
- The first is a worthy aim and the proposed changes should remove inconsistencies between the various fire parts by redrafting the common parts and should deal with the issue of differences in the thermal properties of concrete between EN1992 and EN1994.
- The second is also a worthy aim but may prove more problematic. The intention is to reduce the number of NDPs and to harmonise NAs. On the fire side this means a push towards acceptance of the NFSC approach as set out in Annex E dealing with fire actions.

Implications of potential changes

- Changes to the fire parts of the Structural Eurocodes may have a significant impact on regulatory requirements for buildings. This may affect all areas of the UK construction industry including regulatory bodies, FRS, insurance industry as well as designers.
- It is important that the UK is aware of potential changes and retains some influence within the CEN project teams.

Previous relationship between BRE and UK government

- In the past it has been the policy of the Department to consider material codes (such as EC3, EC4, EC5, EC6, EC9) to be the responsibility of the industries concerned to maintain and support. There has been a recognition that no such support is available for material independent codes such as EC1 or for issues that cut across different materials.
- The development of the fire part of EC1 and its implementation in the UK has been supported by DCLG (and its predecessors) for many years. Some of the proposed changes (particularly to Annex E) could result in a conflict between the Eurocode and current prescriptive fire resistance requirements as set out in Regulatory Guidance Documents. It is essential that regulatory bodies are aware of these implications and aware that they may no longer have any form of representation in the development of the code.