

## საქართველოს ეროვნული სტანდარტი

ფურცელი 2: ბეტონის კონსტრუქციების დაპროექტება.  
ნაწილი 1-1: ერთიანი წესები და წესები შენობებისთვის

საქართველოს სტანდარტების, ტექნიკური რეგლამენტების  
და მეტროლოგიის ეროვნული სააგენტო  
თბილისი

სსტ 26 1992-1-1 : 2009

## საინფორმაციო მონაცემები

1 შემუშავებულია საქართველოს სტანდარტების, ტექნიკური რეგლამენტების და მეგროლოგიის ეროვნული სააგენტოს სტანდარტებისა და ტექნიკური რეგლამენტების დეპარტამენტის მიერ

2 დამტკიცებულია და შემოღებულია სამოქმედო საქართველოს სტანდარტების, ტექნიკური რეგლამენტების და მეგროლოგიის ეროვნული სააგენტოს 2009 წლის 8 მაისის №24 “ს” განკარგულებით

3 მიღებულია გარეკანის მეთოდით სტანდარტიზაციის საერთაშორისო ორგანიზაციის სტანდარტი ისო 26 1992-1-1 : 2004 “ევროკოდი 2: ბეტონის კონსტრუქციების დაპროექტება. ნაწილი 1-1: ერთიანი წესები და წესები შენობებისთვის”

## 4 პირველად

5 რეგისტრირებულია საქართველოს სტანდარტების, ტექნიკური რეგლამენტების და მეგროლოგიის ეროვნული სააგენტოს რეესტრში: 2009 წლის 15 მაისი №268-1.3-2431

წინამდებარე სტანდარტის სრული ან ნაწილობრივი აღწარმოება, გირაჟირება და გავრცელება საქართველოს სტანდარტების, ტექნიკური რეგლამენტების და მეგროლოგიის ეროვნული სააგენტოს ნებართვის გარეშე არ დაიშვება

ICS 91.010.30; 91.080.40

Supersedes ENV 1992-1-1:1991, ENV 1992-1-3:1994,  
ENV 1992-1-4:1994, ENV 1992-1-5:1994, ENV 1992-1-  
6:1994, ENV 1992-3:1998

English version

## Eurocode 2: Design of concrete structures - Part 1-1: General rules and rules for buildings

Eurocode 2: Calcul des structures en béton - Partie 1-1 :  
Règles générales et règles pour les bâtiments

Eurocode 2: Bemessung und konstruktion von Stahlbeton-  
und Spannbetontragwerken - Teil 1-1: Allgemeine  
Bemessungsregeln und Regeln für den Hochbau

This European Standard was approved by CEN on 16 April 2004.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists 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 Central Secretariat has the same status as the official versions.

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



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

Management Centre: rue de Stassart, 36 B-1050 Brussels

## Contents List

- 1. General
  - 1.1 Scope
    - 1.1.1 Scope of Eurocode 2
    - 1.1.2 Scope of Part 1-1 of Eurocode 2
  - 1.2 Normative references
    - 1.2.1 General reference standards
    - 1.2.2 Other reference standards
  - 1.3 Assumptions
  - 1.4 Distinction between principles and application rules
  - 1.5 Definitions
    - 1.5.1 General
    - 1.5.2 Additional terms and definitions used in this Standard
      - 1.5.2.1 Precast structures
      - 1.5.2.2 Plain or lightly reinforced concrete members
      - 1.5.2.3 Unbonded and external tendons
      - 1.5.2.4 Prestress
  - 1.6 Symbols
- 2. Basis of design
  - 2.1 Requirements
    - 2.1.1 Basic requirements
    - 2.1.2 Reliability management
    - 2.1.3 Design working life, durability and quality management
  - 2.2 Principles of limit state design
  - 2.3 Basic variables
    - 2.3.1 Actions and environment influences
      - 2.3.1.1 General
      - 2.3.1.2 Thermal effects
      - 2.3.1.3 Differential settlements/movements
      - 2.3.1.4 Prestress
    - 2.3.2 Material and product properties
      - 2.3.2.1 General
      - 2.3.2.2 Shrinkage and creep
    - 2.3.3 Deformations of concrete
    - 2.3.4 Geometric data
      - 2.3.4.1 General
      - 2.3.4.2 Supplementary requirements for cast in place piles
  - 2.4 Verification by the partial factor method
    - 2.4.1 General
    - 2.4.2 Design values
      - 2.4.2.1 Partial factor for shrinkage action
      - 2.4.2.2 Partial factors for prestress
      - 2.4.2.3 Partial factor for fatigue loads
      - 2.4.2.4 Partial factors for materials
      - 2.4.2.5 Partial factors for materials for foundations
    - 2.4.3 Combinations of actions
    - 2.4.4 Verification of static equilibrium - EQU
  - 2.5 Design assisted by testing
  - 2.6 Supplementary requirements for foundations
  - 2.7 Requirements for fastenings

- 3. Materials
  - 3.1 Concrete
    - 3.1.1 General
    - 3.1.2 Strength
    - 3.1.3 Elastic deformation
    - 3.1.4 Creep and shrinkage
    - 3.1.5 Stress-strain relation for non-linear structural analysis
    - 3.1.6 Design compressive and tensile strengths
    - 3.1.7 Stress-strain relations for the design of sections
    - 3.1.8 Flexural tensile strength
    - 3.1.9 Confined concrete
  - 3.2 Reinforcing steel
    - 3.2.1 General
    - 3.2.2 Properties
    - 3.2.3 Strength
    - 3.2.4 Ductility characteristics
    - 3.2.5 Welding
    - 3.2.6 Fatigue
    - 3.2.7 Design assumptions
  - 3.3 Prestressing steel
    - 3.3.1 General
    - 3.3.2 Properties
    - 3.3.3 Strength
    - 3.3.4 Ductility characteristics
    - 3.3.5 Fatigue
    - 3.3.6 Design assumptions
    - 3.3.7 Prestressing tendons in sheaths
  - 3.4 Prestressing devices
    - 3.4.1 Anchorages and couplers
      - 3.4.1.1 General
      - 3.4.1.2 Mechanical properties
        - 3.4.1.2.1 Anchored tendons
        - 3.4.1.2.2 Anchored devices and anchorage zones
    - 3.4.2 External non-bonded tendons
      - 3.4.2.1 General
      - 3.4.2.2 Anchorages
- 4. Durability and cover to reinforcement
  - 4.1 General
  - 4.2 Environmental conditions
  - 4.3 Requirements for durability
  - 4.4 Methods of verifications
    - 4.4.1 Concrete cover
      - 4.4.1.1 General
      - 4.4.1.2 Minimum cover,  $c_{min}$
      - 4.4.1.3 Allowance in design for tolerance
- 5. Structural analysis
  - 5.1 General
    - 5.1.1 General requirements
    - 5.1.2 Special requirements for foundations
    - 5.1.3 Load cases and combinations
    - 5.1.4 Second order effects

## EN 1992-1-1:2004 (E)

- 5.2 Geometric imperfections
- 5.3 Idealisation of the structure
  - 5.3.1 Structural models for overall analysis
  - 5.3.2 Geometric data
    - 5.3.2.1 Effective width of flanges (all limit states)
    - 5.3.2.2 Effective span of beams and slabs in buildings
- 5.4 Linear elastic analysis
- 5.5 Linear analysis with limited redistribution
- 5.6 Plastic analysis
  - 5.6.1 General
  - 5.6.2 Plastic analysis for beams, frames and slabs
  - 5.6.3 Rotation capacity
  - 5.6.4 Analysis with struts and tie models
- 5.7 Non-linear analysis
- 5.8 Analysis of second order effects with axial load
  - 5.8.1 Definitions
  - 5.8.2 General
  - 5.8.3 Simplified criteria for second order effects
    - 5.8.3.1 Slenderness Criterion for isolated members
    - 5.8.3.2 Slenderness and effective length of isolated members
    - 5.8.3.3 Global second order effects in buildings
  - 5.8.4 Creep
  - 5.8.5 Methods of analysis
  - 5.8.6 General method
  - 5.8.7 Method based on nominal stiffness
    - 5.8.7.1 General
    - 5.8.7.2 Nominal stiffness
    - 5.8.7.3 Moment magnification factor
  - 5.8.8 Method based on nominal curvature
    - 5.8.8.1 General
    - 5.8.8.2 Bending moments
    - 5.8.8.3 Curvature
  - 5.8.9 Biaxial bending
- 5.9 Lateral instability of slender beams
- 5.10 Prestressed members and structures
  - 5.10.1 General
  - 5.10.2 Prestressing force during tensioning
    - 5.10.2.1 Maximum stressing force
    - 5.10.2.2 Limitation of concrete stress
    - 5.10.2.3 Measurements
  - 5.10.3 Prestress force
  - 5.10.4 Immediate losses of prestress for pre-tensioning
  - 5.10.5 Immediate losses of prestress for post-tensioning
    - 5.10.5.1 Losses due to the instantaneous deformation of concrete
    - 5.10.5.2 Losses due to friction
    - 5.10.5.3 Losses at anchorage
  - 5.10.6 Time dependent losses of prestress for pre- and post-tensioning
  - 5.10.7 Consideration of prestress in analysis
  - 5.10.8 Effects of prestressing at ultimate limit state
  - 5.10.9 Effects of prestressing at serviceability limit state and limit state of fatigue
- 5.11 Analysis for some particular structural members

- 6. Ultimate limit states (ULS)
  - 6.1 Bending with or without axial force
  - 6.2 Shear
    - 6.2.1 General verification procedure
    - 6.2.2 Members not requiring design shear reinforcement
    - 6.2.3 Members requiring design shear reinforcement
    - 6.2.4 Shear between web and flanges of T-sections
    - 6.2.5 Shear at the interface between concretes cast at different times
  - 6.3 Torsion
    - 6.3.1 General
    - 6.3.2 Design procedure
    - 6.3.3 Warping torsion
  - 6.4 Punching
    - 6.4.1 General
    - 6.4.2 Load distribution and basic control perimeter
    - 6.4.3 Punching shear calculation
    - 6.4.4 Punching shear resistance of slabs and column bases without shear reinforcement
    - 6.4.5 Punching shear resistance of slabs and column bases with shear reinforcement
  - 6.5 Design with strut and tie models
    - 6.5.1 General
    - 6.5.2 Struts
    - 6.5.3 Ties
    - 6.5.4 Nodes
  - 6.6 Anchorages and laps
  - 6.7 Partially loaded areas
  - 6.8 Fatigue
    - 6.8.1 Verification conditions
    - 6.8.2 Internal forces and stresses for fatigue verification
    - 6.8.3 Combination of actions
    - 6.8.4 Verification procedure for reinforcing and prestressing steel
    - 6.8.5 Verification using damage equivalent stress range
    - 6.8.6 Other verifications
    - 6.8.7 Verification of concrete under compression or shear
- 7. Serviceability limit states (SLS)
  - 7.1 General
  - 7.2 Stress limitation
  - 7.3 Crack control
    - 7.3.1 General considerations
    - 7.3.2 Minimum reinforcement areas
    - 7.3.3 Control of cracking without direct calculation
    - 7.3.4 Calculation of crack widths
  - 7.4 Deflection control
    - 7.4.1 General considerations
    - 7.4.2 Cases where calculations may be omitted
    - 7.4.3 Checking deflections by calculation
- 8 Detailing of reinforcement and prestressing tendons - General
  - 8.1 General
  - 8.2 Spacing of bars
  - 8.3 Permissible mandrel diameters for bent bars
  - 8.4 Anchorage of longitudinal reinforcement
    - 8.4.1 General

- 8.4.2 Ultimate bond stress
- 8.4.3 Basic anchorage length
- 8.4.4 Design anchorage length
- 8.5 Anchorage of links and shear reinforcement
- 8.6 Anchorage by welded bars
- 8.7 Laps and mechanical couplers
  - 8.7.1 General
  - 8.7.2 Laps
  - 8.7.3 Lap length
  - 8.7.4 Transverse reinforcement in the lap zone
    - 8.7.4.1 Transverse reinforcement for bars in tension
    - 8.7.4.2 Transverse reinforcement for bars permanently in compression
  - 8.7.5 Laps for welded mesh fabrics made of ribbed wires
    - 8.7.5.1 Laps of the main reinforcement
    - 8.7.5.2 Laps of secondary or distribution reinforcement
- 8.8 Additional rules for large diameter bars
- 8.9 Bundled bars
  - 8.9.1 General
  - 8.9.2 Anchorage of bundles of bars
  - 8.9.3 Lapping bundles of bars
- 8.10 Prestressing tendons
  - 8.10.1 Arrangement of prestressing tendons and ducts
    - 8.10.1.1 General
    - 8.10.1.2 Pre-tensioned tendons
    - 8.10.1.3 Post-tension ducts
  - 8.10.2 Anchorage of pre-tensioned tendons
    - 8.10.2.1 General
    - 8.10.2.2 Transfer of prestress
    - 8.10.2.3 Anchorage of tensile force for the ultimate limit state
  - 8.10.3 Anchorage zones of post-tensioned members
  - 8.10.4 Anchorages and couplers for prestressing tendons
  - 8.10.5 Deviators
- 9. Detailing of members and particular rules
  - 9.1 General
  - 9.2 Beams
    - 9.2.1 Longitudinal reinforcement
      - 9.2.1.1 Minimum and maximum reinforcement areas
      - 9.2.1.2 Other detailing arrangements
      - 9.2.1.3 Curtailment of the longitudinal tension reinforcement
      - 9.2.1.4 Anchorage of bottom reinforcement at an end support
      - 9.2.1.5 Anchorage of bottom reinforcement at intermediate supports
    - 9.2.2 Shear reinforcement
    - 9.2.3 Torsion reinforcement
    - 9.2.4 Surface reinforcement
    - 9.2.5 Indirect supports
  - 9.3 Solid slabs
    - 9.3.1 Flexural reinforcement
      - 9.3.1.1 General
      - 9.3.1.2 Reinforcement in slabs near supports
      - 9.3.1.3 Corner reinforcement
      - 9.3.1.4 Reinforcement at the free edges



- 9.3.2 Shear reinforcement
- 9.4 Flat slabs
  - 9.4.1 Slab at internal columns
  - 9.4.2 Slab at edge columns
  - 9.4.3 Punching shear reinforcement
- 9.5 Columns
  - 9.5.1 General
  - 9.5.2 Longitudinal reinforcement
  - 9.5.3 Transverse reinforcement
- 9.6 Walls
  - 9.6.1 General
  - 9.6.2 Vertical reinforcement
  - 9.6.3 Horizontal reinforcement
  - 9.6.4 Transverse reinforcement
- 9.7 Deep beams
- 9.8 Foundations
  - 9.8.1 Pile caps
  - 9.8.2 Column and wall footings
    - 9.8.2.1 General
    - 9.8.2.2 Anchorage of bars
  - 9.8.3 Tie beams
  - 9.8.4 Column footing on rock
  - 9.8.5 Bored piles
- 9.9 Regions with discontinuity in geometry or action
- 9.10 Tying systems
  - 9.10.1 General
  - 9.10.2 Proportioning of ties
    - 9.10.2.1 General
    - 9.10.2.2 Peripheral ties
    - 9.10.2.3 Internal ties
    - 9.10.2.4 Horizontal ties to columns and/or walls
    - 9.10.2.5 Vertical ties
  - 9.10.3 Continuity and anchorage of ties
- 10. Additional rules for precast concrete elements and structures
- 10.1 General
  - 10.1.1 Special terms used in this section
- 10.2 Basis of design, fundamental requirements
- 10.3 Materials
  - 10.3.1 Concrete
    - 10.3.1.1 Strength
    - 10.3.1.2 Creep and shrinkage
  - 10.3.2 Prestressing steel
    - 10.3.2.2 Technological properties of prestressing steel
- 10.5 Structural analysis
  - 10.5.1 General
  - 10.5.2 Losses of prestress
- 10.9 Particular rules for design and detailing
  - 10.9.1 Restraining moments in slabs
  - 10.9.2 Wall to floor connections
  - 10.9.3 Floor systems
  - 10.9.4 Connections and supports for precast elements

- 10.9.4.1 Materials
- 10.9.4.2 General rules for design and detailing of connections
- 10.9.4.3 Connections transmitting compressive forces
- 10.9.4.4 Connections transmitting shear forces
- 10.9.4.5 Connections transmitting bending moments or tensile forces
- 10.9.4.6 Half joints
- 10.9.4.7 Anchorage of reinforcement at supports
- 10.9.5 Bearings
  - 10.9.5.1 General
  - 10.9.5.2 Bearings for connected (non-isolated) members
  - 10.9.5.3 Bearings for isolated members
- 10.9.6 Pocket foundations
  - 10.9.6.1 General
  - 10.9.6.2 Pockets with keyed surfaces
  - 10.9.6.3 Pockets with smooth surfaces
- 10.9.7 Tying systems
- 11. Lightweight aggregated concrete structures
- 11.1 General
  - 11.1.1 Scope
  - 11.1.2 Special symbols
- 11.2 Basis of design
- 11.3 Materials
  - 11.3.1 Concrete
  - 11.3.2 Elastic deformation
  - 11.3.3 Creep and shrinkage
  - 11.3.4 Stress-strain relations for structural analysis
  - 11.3.5 Design compressive and tensile strengths
  - 11.3.6 Stress-strain relations for the design of sections
  - 11.3.7 Confined concrete
- 11.4 Durability and cover to reinforcement
  - 11.4.1 Environmental conditions
  - 11.4.2 Concrete cover and properties of concrete
- 11.5 Structural analysis
  - 11.5.1 Rotational capacity
- 11.6 Ultimate limit states
  - 11.6.1 Members not requiring design shear reinforcement
  - 11.6.2 Members requiring design shear reinforcement
  - 11.6.3 Torsion
    - 11.6.3.1 Design procedure
  - 11.6.4 Punching
    - 11.6.4.1 Punching shear resistance of slabs and column bases without shear reinforcement
    - 11.6.4.2 Punching shear resistance of slabs and column bases with shear reinforcement
  - 11.6.5 Partially loaded areas
  - 11.6.6 Fatigue
- 11.7 Serviceability limit states
- 11.8 Detailing of reinforcement - General
  - 11.8.1 Permissible mandrel diameters for bent bars
  - 11.8.2 Ultimate bond stress
- 11.9 Detailing of members and particular rules

- 11.10 Additional rules for precast concrete elements and structures
- 11.12 Plain and lightly reinforced concrete structures
- 12. Plain and lightly reinforced concrete structures
  - 12.1 General
  - 12.2 Basis of design
    - 12.2.1 Strength
  - 12.3 Materials
    - 12.3.1 Concrete: additional design assumptions
  - 12.5 Structural analysis: ultimate Limit states
  - 12.6 Ultimate limit states
    - 12.6.1 Design resistance to bending and axial force
    - 12.6.2 Local Failure
    - 12.6.3 Shear
    - 12.6.4 Torsion
    - 12.6.5 Ultimate limit states induced by structural deformation (buckling)
      - 12.6.5.1 Slenderness of columns and walls
      - 12.6.5.2 Simplified design method for walls and columns
  - 12.7 Serviceability limit states
  - 12.9 Detailing of members and particular rules
    - 12.9.1 Structural members
    - 12.9.2 Construction joints
    - 12.9.3 Strip and pad footings

## Annexes

- |                 |  |
|-----------------|--|
| A (Informative) | Modification of partial factors for materials                        |
| B (Informative) | Creep and shrinkage strain   |
| C (Normative)   | Reinforcement properties   |
| D (Informative) | Detailed calculation method for prestressing steel relaxation losses |
| E (Informative) | Indicative Strength Classes for durability                           |
| F (Informative) | Reinforcement expressions for in-plane stress conditions             |
| G (Informative) | Soil structure interaction   |
| H (Informative) | Global second order effects in structures                            |
| I (Informative) | Analysis of flat slabs and shear walls                               |
| J (Informative) | Examples of regions with discontinuity in geometry or action         |

## Foreword

This European Standard EN 1992, Eurocode 2: Design of concrete structures: General rules and rules for buildings, has been prepared by Technical Committee CEN/TC250 « Structural Eurocodes », the Secretariat of which is held by BSI. CEN/TC250 is responsible for all Structural Eurocodes.

This European Standard shall be given the status of a National Standard, either by publication of an identical text or by endorsement, at the latest by June 2005, and conflicting National Standards shall be withdrawn at latest by March 2010.

This Eurocode supersedes ENV 1992-1-1, 1992-1-3, 1992-1-4, 1992-1-5, 1992-1-6 and 1992-3.

According to the CEN-CENELEC Internal Regulations, the National Standard Organisations of the following countries are bound to implement these European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary,

## EN 1992-1-1:2004 (E)

Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

### Background to the Eurocode programme

In 1975, the Commission of the European Community decided on an action programme in the field of construction, based on article 95 of the Treaty. The objective of the programme was the elimination of technical obstacles to trade and the harmonisation of technical specifications.

Within this action programme, the Commission took the initiative to establish a set of harmonised technical rules for the design of construction works which, in a first stage, would serve as an alternative to the national rules in force in the Member States and, ultimately, would replace them.

For fifteen years, the Commission, with the help of a Steering Committee with Representatives of Member States, conducted the development of the Eurocodes programme, which led to the first generation of European codes in the 1980s.

In 1989, the Commission and the Member States of the EU and EFTA decided, on the basis of an agreement<sup>1</sup> between the Commission and CEN, to transfer the preparation and the publication of the Eurocodes to CEN through a series of Mandates, in order to provide them with a future status of European Standard (EN). This links *de facto* the Eurocodes with the provisions of all the Council's Directives and/or Commission's Decisions dealing with European standards (e.g. the Council Directive 89/106/EEC on construction products - CPD - and Council Directives 93/37/EEC, 92/50/EEC and 89/440/EEC on public works and services and equivalent EFTA Directives initiated in pursuit of setting up the internal market).

The Structural Eurocode programme comprises the following standards generally consisting of a number of Parts:

EN 1990	Eurocode 0:	Basis of Structural 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

Eurocode standards recognise the responsibility of regulatory authorities in each Member State and have safeguarded their right to determine values related to regulatory safety matters at national level where these continue to vary from State to State.

### Status and field of application of eurocodes

The Member States of the EU and EFTA recognise that Eurocodes serve as reference documents for the following purposes :

- as a means to prove compliance of building and civil engineering works with the essential

<sup>1</sup> Agreement between the Commission of the European Communities and the European Committee for Standardisation (CEN) concerning the work on EUROCODES for the design of building and civil engineering works (BC/CEN/03/89).

requirements of Council Directive 89/106/EEC, particularly Essential Requirement N°1 – Mechanical resistance and stability – and Essential Requirement N°2 – Safety in case of fire;

- as a basis for specifying contracts for construction works and related engineering services;
- as a framework for drawing up harmonised technical specifications for construction products (ENs and ETAs)

The Eurocodes, as far as they concern the construction works themselves, have a direct relationship with the Interpretative Documents<sup>2</sup> referred to in Article 12 of the CPD, although they are of a different nature from harmonised product standards<sup>3</sup>. Therefore, technical aspects arising from the Eurocodes work need to be adequately considered by CEN Technical Committees and/or EOTA Working Groups working on product standards with a view to achieving full compatibility of these technical specifications with the Eurocodes.

The Eurocode standards provide common structural design rules for everyday use for the design of whole structures and component products of both a traditional and an innovative nature. Unusual forms of construction or design conditions are not specifically covered and additional expert consideration will be required by the designer in such cases.

### National Standards implementing Eurocodes

The National Standards implementing Eurocodes will comprise the full text of the Eurocode (including any annexes), as published by CEN, which may be preceded by a National title page and National foreword, and may be followed by a National annex.

The National annex may only contain information on those parameters which are left open in the Eurocode for national choice, known as Nationally Determined Parameters, to be used for the design of buildings and civil engineering works to be constructed in the country concerned, *i.e.* :

- values and/or classes where alternatives are given in the Eurocode,
- values to be used where a symbol only is given in the Eurocode,
- country specific data (geographical, climatic, etc.), *e.g.* snow map,
- the procedure to be used where alternative procedures are given in the Eurocode.

It may contain

- decisions on the application of informative annexes,
- references to non-contradictory complementary information to assist the user to apply the Eurocode.

### Links between Eurocodes and harmonised technical specifications (ENs and ETAs) for products

There is a need for consistency between the harmonised technical specifications for

<sup>2</sup> According to Art. 3.3 of the CPD, the essential requirements (ERs) shall be given concrete form in interpretative documents for the creation of the necessary links between the essential requirements and the mandates for harmonised ENs and ETAGs/ETAs.

<sup>3</sup> According to Art. 12 of the CPD the interpretative documents shall :

- a) give concrete form to the essential requirements by harmonising the terminology and the technical bases and indicating classes or levels for each requirement where necessary ;
- b) indicate methods of correlating these classes or levels of requirement with the technical specifications, *e.g.* methods of calculation and of proof, technical rules for project design, etc. ;
- c) serve as a reference for the establishment of harmonised standards and guidelines for European technical approvals.

The Eurocodes, *de facto*, play a similar role in the field of the ER 1 and a part of ER 2.

## EN 1992-1-1:2004 (E)

construction products and the technical rules for works<sup>4</sup>. Furthermore, all the information accompanying the CE Marking of the construction products which refer to Eurocodes should clearly mention which Nationally Determined Parameters have been taken into account.

### Additional information specific to EN 1992-1-1

EN 1992-1-1 describes the principles and requirements for safety, serviceability and durability of concrete structures, together with specific provisions for buildings. It is based on the limit state concept used in conjunction with a partial factor method.

For the design of new structures, EN 1992-1-1 is intended to be used, for direct application, together with other parts of EN 1992, Eurocodes EN 1990, 1991, 1997 and 1998.

EN 1992-1-1 also serves as a reference document for other CEN TCs concerning structural matters.

EN 1992-1-1 is intended for use by:

- committees drafting other standards for structural design and related product, testing and execution standards;
- clients (e.g. for the formulation of their specific requirements on reliability levels and durability);
- designers and constructors ;
- relevant authorities.

Numerical values for partial factors and other reliability parameters are recommended as basic values that provide an acceptable level of reliability. They have been selected assuming that an appropriate level of workmanship and of quality management applies. When EN 1992-1-1 is used as a base document by other CEN/TCs the same values need to be taken.

### National annex for EN 1992-1-1

This standard gives values with notes indicating where national choices may have to be made. Therefore the National Standard implementing EN 1992-1-1 should have a National annex containing all Nationally Determined Parameters to be used for the design of buildings and civil engineering works to be constructed in the relevant country.

National choice is allowed in EN 1992-1-1 through the following clauses:

<sup>4</sup> see Art.3.3 and Art.12 of the CPD, as well as clauses 4.2, 4.3.1, 4.3.2 and 5.2 of ID 1.

2.3.3 (3)	5.10.3 (2)	9.2.2 (7)
2.4.2.1 (1)	5.10.8 (2)	9.2.2 (8)
2.4.2.2 (1)	5.10.8 (3)	9.3.1.1(3)
2.4.2.2 (2)	5.10.9 (1)P	9.5.2 (1)
2.4.2.2 (3)	6.2.2 (1)	9.5.2 (2)
2.4.2.3 (1)	6.2.2 (6)	9.5.2 (3)
2.4.2.4 (1)	6.2.3 (2)	9.5.3 (3)
2.4.2.4 (2)	6.2.3 (3)	9.6.2 (1)
2.4.2.5 (2)	6.2.4 (4)	9.6.3 (1)
3.1.2 (2)P	6.2.4 (6)	9.7 (1)
3.1.2 (4)	6.4.3 (6)	9.8.1 (3)
3.1.6 (1)P	6.4.4 (1)	9.8.2.1 (1)
3.1.6 (2)P	6.4.5 (3)	9.8.3 (1)
3.2.2 (3)P	6.4.5 (4)	9.8.3 (2)
3.2.7 (2)	6.5.2 (2)	9.8.4 (1)
3.3.4 (5)	6.5.4 (4)	9.8.5 (3)
3.3.6 (7)	6.5.4 (6)	9.10.2.2 (2)
4.4.1.2 (3)	6.8.4 (1)	9.10.2.3 (3)
4.4.1.2 (5)	6.8.4 (5)	9.10.2.3 (4)
4.4.1.2 (6)	6.8.6 (1)	9.10.2.4 (2)
4.4.1.2 (7)	6.8.6 (2)	11.3.5 (1)P
4.4.1.2 (8)	6.8.7 (1)	11.3.5 (2)P
4.4.1.2 (13)	7.2 (2)	11.3.7 (1)
4.4.1.3 (1)P	7.2 (3)	11.6.1 (1)
4.4.1.3 (3)	7.2 (5)	11.6.1 (2)
4.4.1.3 (4)	7.3.1 (5)	11.6.2 (1)
5.1.3 (1)P	7.3.2 (4)	11.6.4.1 (1)
5.2 (5)	7.3.4 (3)	12.3.1 (1)
5.5 (4)	7.4.2 (2)	12.6.3 (2)
5.6.3 (4)	8.2 (2)	A.2.1 (1)
5.8.3.1 (1)	8.3 (2)	A.2.1 (2)
5.8.3.3 (1)	8.6 (2)	A.2.2 (1)
5.8.3.3 (2)	8.8 (1)	A.2.2 (2)
5.8.5 (1)	9.2.1.1 (1)	A.2.3 (1)
5.8.6 (3)	9.2.1.1 (3)	C.1 (1)
5.10.1 (6)	9.2.1.2 (1)	C.1 (3)
5.10.2.1 (1)P	9.2.1.4 (1)	E.1 (2)
5.10.2.1 (2)	9.2.2 (4)	J.1 (3)
5.10.2.2 (4)	9.2.2 (5)	J.2.2 (2)
5.10.2.2 (5)	9.2.2 (6)	J.3 (2)
		J.3 (3)