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Eurocode 1 - Actions sur les structures - Partie 1-6: Actions générales - Actions en cours d'exécution

Eurocode 1 - Einwirkungen auf Tragwerke - Teil 1-6 : Allgemeine Einwirkungen - Einwirkungen während der Ausführung

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Foreword

This European document (EN 1991-1-6), has been prepared by Technical Committee CEN/TC250 “Structural Eurocodes”, the Secretariat of which is held by BSI.

This European Standard shall be given the status of national standard, either by publication of an identical text or by endorsement, at the latest by December 2005, and conflicting national standards shall be withdrawn at the latest by March 2010.

CEN/TC250 is responsible for all Structural Eurocodes.

This document will supersede ENV 1991-2-6:1996.

Annexes A1 and A2 are normative and Annex B is informative. This standard includes a Bibliography.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: 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 the United Kingdom.

Background of 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 harmonized 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[1] 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	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

[1] 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).

EN 1998	Eurocode 8:	Design of structures for earthquake resistance
EN 1999	Eurocode 9:	Design of aluminium structures

Eurocode standards recognize the responsibility of regulatory authorities in each Member State and have safeguarded their right to determine values related to regulatory safety matters at the 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 recognize 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 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 harmonized 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[2] referred to in Article 12 of the CPD, although they are of a different nature from harmonized product standards[3]. 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 a 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 also contain:

– decisions on the application of informative annexes,

– references to non-contradictory complementary information to assist the user to apply the Eurocode.

[2] According to Article 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 hENs and ETAGs/ETAs.

[3] According to Article 12 of the CPD the interpretative documents shall :
a)give concrete form to the essential requirements by harmonizing 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 harmonized 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.

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

There is a need for consistency between the harmonized technical specifications for construction products and the technical rules for works[4]. Furthermore, all the information accompanying the CE Marking of the construction products which refer to Eurocodes shall clearly mention which Nationally Determined Parameters have been taken into account.

Additional information specific to EN 1991-1-6

EN 1991-1-6 describes Principles and Application rules for the determination of actions to be considered during execution of buildings and civil engineering works, including the following aspects :

– actions on structural and non-structural members during handling;

– geotechnical actions ;

– actions due to prestressing effects ;

– pre-deformations ;

– temperature, shrinkage, hydration effects ;

– wind actions ;

– snow loads ;

– actions caused by water ;

– actions due to atmospheric icing ;

– construction loads ;

– accidental actions

– seismic actions;

EN 1991-1-6 is intended for use by:

– clients (*e.g.* for the formulation of their specific requirements),

– designers and constructors,

– relevant authorities.

EN 1991-1-6 is intended to be used with EN 1990, the other parts of EN 1991 and EN 1992 to EN 1999 for the design of structures.

[4] see Article 3.3 and Article 12 of the CPD, as well as clauses 4.2**,** 4.3.1, 4.3.2 and 5.2 of ID 1.

National annex

This part of EN1991 gives alternative procedures, values and recommendations for classes with notes indicating where national choices may have to be made. Therefore the National Standard implementing EN 1991-1-6 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 1991-1-6 through clauses:

Clause	Item
1.1(3)	Design rules for auxiliary construction works
2 (4)	Positioning of construction loads classified as free
3.1(1)P	Design situation corresponding to storm conditions
3.1(5) NOTE 1	Return periods for the determination of the characteristic values of variable actions during execution
NOTE 2	Minimum wind speed during execution
3.1(7)	Rules for the combination of snow loads and wind actions with construction loads
3.1(8) NOTE 1	Rules concerning imperfections in the geometry of the structure
3.3(2)	Criteria associated with serviceability limit states during execution
3.3(6)	Serviceability requirements for auxiliary construction works
4.9(6) NOTE 2	Loads and water levels for floating ice
4.10(1)P	Definition of actions due to atmospheric icing
4.11.1(1) Table 4.1	Recommended characteristic values of construction loads Q_{ca}, Q_{cb} and Q_{cc}
4.11.2(1)	Construction loads during the casting of concrete
4.12(1)P NOTE 2	Dynamic effects due to accidental actions
4.12(2)	Dynamic effects due to falls of equipment
4.12 (3)	Design values of human impact loads
4.13(2)	Seismic actions
Annex A1 A1.1(1)	Representative values of the variable actions due to construction loads
Annex A1 A1.3(2)	Characteristic values of equivalent horizontal forces
Annex A2 A2.3(1)	Design values of vertical deflections for the incremental launching of bridges.
Annex A2 A2.4(2)	Reduction of the characteristic value of snow loads
Annex A2 A2.4(3)	Reduced values of characteristic snow loads for the verification of static equilibrium
Annex A2 A2.5(2)	Design values of horizontal friction forces
Annex A2 A2.5(3)	Determination of friction coefficients μ_{min} and μ_{max}