Irish Standard
I.S. EN 1991-1-1:2002

Eurocode 1: Actions on structures - Part 1 -1: General actions - Densities, self-weight, imposed loads for buildings (including Irish National Annex:2013)

I.S. EN 1991-1-1:2002

Incorporating amendments/corrigenda issued since publication:
EN 1991-1-1:2002/AC:2009
I.S. EN 1991-1-1:2002/NA:2013

The National Standards Authority of Ireland (NSAI) produces the following categories of formal documents:

I.S. xxx: Irish Standard – national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation - recommendation based on the consensus of an expert panel and subject to public consultation.

SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

This document replaces:
ENV 1991-2-1:1995

This document is based on:
EN 1991-1-1:2002
ENV 1991-2-1:1995

Published:
24 March, 2005

This document was published under the authority of the NSAI and comes into effect on:
24 March, 2005

ICS number:
91.010.30

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Údarás um Chaighdeáin Náisiúnta na hÉireann

National Foreword

This Irish Standard is the official English language version of EN 1991– Eurocode 1- Actions on Structures, Part 1.1:General actions – Densities, self-weight, imposed loads for buildings, prepared by Technical Committee CEN TC 250 "Structural Eurocodes". This document supersedes ENV 1991-2-1:1995.

This standard forms part of a package of 58 Eurocodes, which covers the basis of Structural design, actions (loadings), the main structural materials, geotechnical design and design provision for earthquakes. The European Commission document – Guidance Paper L – Application and Use of Eurocodes provides guidance on the elaboration, implementation and use of Eurocodes.

Where a normative part of this EN allows for a choice to be made at the national level the range and possible choices are given in the normative text and a Note will qualify it as a Nationally Determined Parameter. To enable EN 1991-1-1:2002 to be used in Ireland the NDP recommendations, which have been prepared by the NSAI National Eurocode Advisory Committee, are included as an informative annex to the standard.

The National Annex to I.S. EN 1991-1-1 is also available as a separate document as recommended in Guidance Paper L.

In line with international standard practice the decimal point is shown as a comma (,) throughout this document.

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I.S. EN 1991-1-1:2002

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1991-1-1:2002/AC

March 2009
Mars 2009
März 2009

ICS 91.010.30

English version
Version Française
Deutsche Fassung

Eurocode 1: Actions on structures - Part 1-1: General actions - Densities, self-weight, imposed loads for buildings

Eurocode 1: Actions sur les structures - Partie 1-1: Actions générales - Poids volumiques, poids propres, charges d'exploitation bâtiments

Eurocode 1: Einwirkungen auf Tragwerke - Teil 1-1: Wichten, Eigengewicht und Nutzlasten im Hochbau

This corrigendum becomes effective on 18 March 2009 for incorporation in the three official language versions of the EN.

Ce corrigendum prendra effet le 18 mars 2009 pour incorporation dans les trois versions linguistiques officielles de la EN.

Die Berichtigung tritt am 18.März 2009 zur Einarbeitung in die drei offiziellen Sprachfassungen der EN in Kraft.

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

Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No.:EN 1991-1-1:2002/AC:2009 D/E/F

EN 1991-1-1:2002/AC:2009 (E)

1 Modification to Foreword

Page 7, 'National annex for EN 1991-1-1'*, replace the list of allowed national choices with the following:*

"

- 2.2(3),
- 5.2.3(1) to 5.2.3(5),
- 6.3.1.1(1)P (Table 6.1),
- 6.3.1.2(1)P (Table 6.2),
- 6.3.1.2(10) & (11),
- 6.3.2.2(1)P (Table 6.4),
- 6.3.3.2(1) (Table 6.8),
- 6.3.4.2(1) (Table 6.10)
- 6.4(1) (Table 6.12)

"

2 Modification to Subclause 3.3.2

Page 15, Paragraph '(1)'*, delete:*

"

(1) On roofs, imposed loads, and snow loads or wind actions should not be applied together simultaneously.

"

and replace with:

"

(1) On roofs (particularly for category H roofs), imposed loads, need not be applied in combination with either snow loads and/or wind actions.

"

3 Modification to Subclause 6.2.2

Page 19, delete Paragraph '(1)' *and replace with the following:*

"

(1) For the design of columns and walls, the imposed load should be placed at all unfavourable locations.

NOTE The National Annex may introduce further simplifying rules. It is recommended that the maximum axial force may be calculated assuming the total imposed load on the floor of each story to be uniformly distributed.

"

4 Modifications to Subclause 6.3.1.2

Page 23, Paragraph '(8)'*, delete bullet points as follows:*

"

– for movable partitions with a self-weight ≤ 2,0 kN/m wall length: qk =0,8 kN/m^2;

– for movable partitions with a self-weight ≤ 3,0 kN/m wall length: qk =1,2 kN/m^2.

"

and replace with:

"

– for movable partitions with a self-weight >1 ≤ 2,0 kN/m wall length: qk =0,8 kN/m^2;

– for movable partitions with a self-weight >2 ≤ 3,0 kN/m wall length: qk =1,2 kN/m^2.

"

Page 23, delete Paragraph '(10)'*:*

"

(10) In accordance with 6.2.1(4) a reduction factor α_A may be applied to the q_k values for imposed loads in Tables 6.2, and 6.10 for floors, and accessible roofs, Category I (See Table 6.9).

"

and replace with the following:

"

(10) In accordance with 6.2.1(4) a reduction factor α_A may be applied to the q_k values for imposed loads for floors (see Table 6.2 and subclauses (8)and (9)) and for accessible roofs, Category I (see Table 6.9).

"

Page 23, Paragraph '(10)'*,* 'NOTE 1'*, delete the text that follows:*

"NOTE 1 The recommended value for the reduction factor α_A for categories A to E is determined as follows:"

and replace with:

"NOTE 1 The recommended value for the reduction factor α_A for categories A to D is determined as follows:"

EN 1991-1-1:2002/AC:2009 (E)

5 Modification to 6.3.4.1, 'Categories'

Page 29, delete 'Table 6.9' *and replace with the following:*

"

Table 6.9 - Categorization of roofs

Categories of loaded area	Specific Use
H	Roofs not accessible except for normal maintenance and repair.
I	Roofs accessible with occupancy according to categories A to G
K	Roofs accessible for special services, such as helicopter landing areas

"

6 Modification to 6.4, 'Horizontal loads on parapets and partition walls acting as barriers'

Page 30, Paragraph '(1)'*, add the following* 'NOTE' *to the paragraph:*

"

NOTE The values for q_k in Table 6.12 may be chosen by the National Annex. The recommended values are underlined.

"

7 Modification to Table A.2, 'Construction materials-masonry'

Page 33, replace references to:

"prEN 771-1" *with:* "EN 771-1"*,*

"prEN 771-2" *with:* "EN 771-2"*,*

"prEN 771-3" *with:* "EN 771-3"*,*

"prEN 771-4" *with:* "EN 771-4"*,*

"prEN 771-5" *with:* "EN 771-5"*,*

"prEN 771-6" *with:* "EN 771-6"

and "prEN 1051" *with:* "EN 1051"*.*

8 Modification to Table A.5, 'Construction materials- other materials'

Page 35, delete the last row:

“slate” – “28,0”

(as this is given in Table A.2 on page 33).

9 Modification to Table A.7, ‘Stored materials - building and construction’

Page 37, replace reference to: “prEN 206” *with:* “EN 206”.

10 Modification to Table A.9, ‘Stored products - foodstuffs’

Page 39, delete the table and replace with the following:

EN 1991-1-1:2002/AC:2009 (E)

“

Table A.9 - Stored products – foodstuffs

Products	Density γ [kN/m^3]	Angle of repose ϕ [°]
eggs, in stands	4,0 to 5,0	-
flour		
bulk	6,0	25
bagged	5,0	-
fruit		
apples		
- loose	8,3	30
- boxed	6,5	-
cherries	7,8	-
pears	5,9	-
raspberries, in trays	2,0	-
strawberries, in trays	1,2	-
tomatoes	6,8	-
sugar		
loose, piled	7,5 to 10,0	35
dense and bagged	16,0	
vegetables, green		
cabbages	4,0	-
lettuce	5,0	-
vegetables, legumes		
beans		35
- general	8,1	30
- soya	7,4	-
peas	7,8	
vegetables, root		
general	8,8	-
beetroot	7,4	40
carrots	7,8	35
onions	7	35
turnips	7	35
potatoes		
in bulk	7,6	35
in boxes	4,4	-
sugarbeet,		
dried and chopped	2,9	35
raw	7,6	-
wet shreds	10,0	-
NOTE See Section 4.		

“

I.S. EN 1991-1-1:2002

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1991-1-1

April 2002

ICS 91.010.30

Supersedes ENV 1991-2-1:1995

English version

Eurocode 1: Actions on structures - Part 1-1: General actions - Densities, self-weight, imposed loads for buildings

Eurocode 1: Actions sur les structures - Partie 1-1: Actions générales - Poids volumiques, poids propres, charges d'exploitation bâtiments

Eurocode 1: Einwirkungen auf Tragwerke - Teil 1-1: Wichten, Eigengewicht und Nutzlasten im Hochbau

This European Standard was approved by CEN on 30 November 2001.

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 Management Centre 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 Management Centre has the same status as the official versions.

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

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

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Foreword

This document (EN 1991-1-1:2002) has been prepared by Technical Committee CEN/TC 250 "Structural Eurocodes", the secretariat of which is held by BSI.

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 October 2002, and conflicting national standards shall be withdrawn at the latest by March 2010.

CEN/TC 250 is responsible for all Structural Eurocodes.

This document supersedes ENV 1991-2-1:1995.

The annexes A and B are informative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, 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 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[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

[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).

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
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 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[2] referred to in Article 12 of the CPD, although they are of a different nature from harmonised product standards[3]. Therefore, technical aspects arising from the Eurocodes work need to be adequately considered by

[2] 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.

[3] 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.

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 also 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 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 should clearly mention which Nationally Determined Parameters have been taken into account.

Additional information specific for EN 1991-1-1

EN 1991-1-1 gives design guidance and actions for the structural design of buildings and civil engineering works, including the following aspects:

– densities of construction materials and stored materials ;
– self-weight of construction elements, and
– imposed loads for buildings.

[4] 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.

EN 1991-1-1 is intended for clients, designers, contractors and public authorities.

EN 1991-1-1 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.

National annex for EN 1991-1-1

This standard gives alternative procedures, values and recommendations for classes with notes indicating where National choices have to be made, therefore the National Standard implementing EN 1991-1-1 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 1991-1-1 through:

- 2.2(3),
- 5.2.3(1) to 5.2.3(5),
- 6.3.1.1 (Table 6.1),
- 6.3.1.2(1)P (Table 6.2),
- 6.3.1.2(10) & (11),
- 6.3.2.2 (1)P (Table 6.4),
- 6.3.2.2 (3),
- 6.3.3.2(1) (Table 6.8),
- 6.3.4.2 (Table 6.10) and
- 6.4 (1)(P) (Table 6.12)

Section 1 General

1.1 Scope

(1) EN 1991-1-1 gives design guidance and actions for the structural design of buildings and civil engineering works including some geotechnical aspects for the following subjects:

- Densities of construction materials and stored materials;

- Self-weight of construction works;

- Imposed loads for buildings.

(2) Section 4 and Annex A give nominal values for densities of specific building materials, additional materials for bridges and stored materials. In addition for specific materials the angle of repose is provided.

(3) Section 5 provides methods for the assessment of the characteristic values of self-weight of construction works.

(4) Section 6 gives characteristic values of imposed loads for floors and roofs according to category of use in the following areas in buildings:
- residential, social, commercial and administration areas;
- garage and vehicle traffic areas;
- areas for storage and industrial activities;
- roofs;
- helicopter landing areas.

(5) The loads on traffic areas given in Section 6 refer to vehicles up to a gross vehicle weight of 160 kN. The design for traffic areas for heavy vehicles of more than 160 kN gross weight needs to be agreed with the relevant authority. Further information may be obtained from EN 1991-2.

(6) For barriers or walls having the function of barriers, horizontal forces are given in Section 6. Annex B gives additional guidance for vehicle barriers in car parks.

NOTE Forces due to vehicle impact are specified in EN 1991-1-7 and EN 1991-2.

(7) For the design situations and effects of actions in silos and tanks caused by water or other materials see EN 1991-3.