ICS: 91.010.30

Geregistreerde Belgische norm

NBN EN 1991-1-7

1e uitg., december 2006

Normklasse: B 03

Eurocode 1 - Belastingen op constructies - Deel 1-7: Algemene belastingen - Buitengewone belastingen: stootbelastingen en ontploffingen (+ AC:2010)

Eurocode 1 - Actions sur les structures - Partie 1-7 : Actions générales - Actions accidentelles (+ AC:2010)

Eurocode 1 - Actions on structures - Part 1-7: General actions - Accidental actions (+ AC:2010)

Toelating tot publicatie: 31 augustus 2006

Vervangt NBN ENV 1991-2-7 (1998).

De Europese norm NBN EN 1991-1-7:2006 heeft de status van een Belgische norm.

Deze Europese norm bestaat in drie officiële versies (Duits, Engels, Frans).

Er is bij het NBN ook een Nederlandstalige versie beschikbaar; die dezelfde status heeft als de officiële versies.

Deze norm mag in België slechts samen met zijn nationale bijlage (ANB) worden toegepast. Deze laatste legt hoofdzakelijk de waarden van de parameters vast die op nationaal vlak worden bepaald.

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norme belge enregistrée

NBN EN 1991-1-7

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Indice de classement: B 03

Eurocode 1 - Actions sur les structures - Partie 1-7 : Actions générales - Actions accidentelles (+ AC:2010)

Eurocode 1 - Belastingen op constructies - Deel 1-7: Algemene belastingen - Buitengewone belastingen: stootbelastingen en ontploffingen (+ AC:2010)

Eurocode 1 - Actions on structures - Part 1-7: General actions - Accidental actions (+ AC:2010)

Autorisation de publication: 31 août 2006

Remplace NBN ENV 1991-2-7 (1998).

La norme européenne NBN EN 1991-1-7:2006 a le statut de norme belge.

La norme européenne existe en trois versions officielles (allemand, anglais, français).

Une version en néerlandais , ayant le même statut que les versions officielles, est également disponible au NBN.

Cette norme ne peut être utilisée en Belgique qu'en combinaison avec son annexe nationale (ANB) qui fixe principalement la valeur des paramètres à déterminer au niveau national.

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AVANT-PROPOS NATIONAL À LA NBN EN 1991-1-7:2006

1. La norme NBN EN 1991-1-7:2006 "Eurocode 1 - Actions sur les structures - Partie 1-7 : Actions générales - Actions accidentelles (+AC:2010)" comprend l'annexe nationale NBN EN 1991-1-7 ANB:2012 qui a un caractère normatif en Belgique. Elle remplace à partir de la date de publication au Moniteur Belge de l'homologation de la norme NBN EN 1991-1-7 ANB:2012 la norme suivante :

NBN ENV 1991-2-7:1998 Eurocode 1: Bases de calcul et actions sur les structures - Partie 2-7: Actions sur les structures - Actions accidentelles dues aux chocs et explosions.

Le corrigendum EN 1991-1-7 :2006/AC:2010, tel que publié par le CEN, est joint à cette norme.

2. La version de langue française de l'EN 1991-1-7 a été rédigée en France par l'AFNOR. En conséquence, on y rencontre certaines expressions d'usage moins courant en Belgique.

Une liste de termes équivalents est donnée ci-après :

Terme de l'EN 1991-1-7	Terme équivalent en Belgique
poteau	colonne
client	le maître de l'ouvrage assisté de ses bureaux d'architectes, d'ingénierie et de consultance
fleuve	rivière navigable

3. Note complémentaire du NBN : les corrections éditoriales suivantes sont à apporter à la version française de la NBN EN 1991-1-7:2006 :

Origine	Paragraphe	Texte à corriger	Nouveau texte
Groupe de travail E250	B.5(5)	Le texte anglais comprend la description de 4 critères d'analyse de risque a) à d), non repris en français.	(a) L'objectif général devrait être la minimisation des risques, sans entraîner une augmentation substantielle des coûts. b) concernant les conséquences dans la zone verticale hachurée de la figure B.2a, les risques associés au scénario peuvent normalement être acceptés. c) concernant les conséquences dans la zone diagonale hachurée de la figure B.2a, une décision concernant l'acceptation du risque de scénario et des mesures d'atténuation pouvant être acceptés à un coût raisonnable devrait être prise d) concernant les conséquences considérées comme étant inacceptables (classées dans la zone hachurée de la figure B.2a), des mesures appropriées d'atténuation des risques (voir B.6) devraient être prises.
TC250 Sweden	B.5(5)	fig. B2a est inexistante	Référence à remplacer par fig. B2 en y ajoutant une zone hachurée.
TC250 Sw	B.9.2(2) formule (B.2)	Lettre «p» minuscule au lieu de «P» majuscule selon texte explicatif	Changer les «p» en «P» dans la formule, conformément au texte explicatif
TC250 Sw	C.4.4(4) formule (C.12)	P_{bow} au lieu de F_{bow} pour la force d'impact	Corriger en F_{bow} conformément aux notations explicitées en C.4.4(2)
E250	D.1(1) NOTE 3	ISO 1684 -a Explosion protection systems	ISO 6184 Explosion protection systems

NATIONAAL VOORWOORD VAN NBN EN 1991-1-7:2006

1. De norm NBN EN 1991-1-7:2006 "Eurocode 1 – Belastingen op constructies - Deel 1-7 : Algemene belastingen – Buitengewone belastingen: stootbelastingen en ontploffingen (+AC:2010)" omvat de nationale bijlage NBN EN 1991-1-7 ANB:2012 met een normatief karakter in België. Hij vervangt vanaf de datum van de publicatie in het Belgische Staatsblad van de bekrachtiging van de norm NBN EN 1991-1-7 ANB:2012 de volgende norm :

NBN ENV 1991-2-7:1998 Eurocode 1: Grondslag voor ontwerp en belastingen op dragers – Deel 2-7 : Belastingen op dragers – Bijzondere belastingen door inslag en ontploffing

Het corrigendum EN 1991-1-7:2006/AC:2010, zoals door CEN gepubliceerd, is na deze norm toegevoegd.

2. De Nederlandstalige versie van EN 1991-1-7 is tot stand gekomen op basis van een voorkeurterminologie die in samenwerking tussen het NBN en het NEN is opgesteld. Daarbij werd voor elk begrip een unieke woordkeuze gemaakt. Dit heeft als gevolg dat in de norm uitdrukkingen voorkomen die in één van de twee landen minder gebruikelijk zijn. Hierna volgt een lijst met synoniemen:

Oorspronkelijke term (Engels)	Verplichte term (Nederlands)	Synoniem (B); (N)
accidental design situation	buitengewone ontwerpsituatie, buitengewone ontwerptoestand	bijzondere toestand (N)
action-effect	belastingseffect of snedegrootheid	(aangrijpende) snedekracht (B)
civil engineering	civiele techniek	burgerlijke bouwkunde (B)
civil engineering work	civieltechnisch werk (kunstwerk)	werk van burgerlijke bouwkunde (B)
classification of actions	indeling van belastingen	classificatie van belastingen (N)
construction work	bouwwerk	werk (B)
diameter	diameter	middellijn (N)
hazard	dreiging, bedreiging	gevaarlijk ongewoon voorval (GOV) (N)
kerb	opstaande wand	schampkant (N)

Oorspronkelijke term (Engels)	Verplichte term (Nederlands)	Synoniem (B); (N)
notes	opmerkingen	noten (B)
principle	beginsel	Principe (B)
redundancy	redundantie	overtolligheid (B)
relevant	van toepassing	voorkomend
representation of actions	representatie van belastingen	voorstelling van belastingen(B)
resistance	weerstand	capaciteit, sterkte (N)
risk acceptance	risicoaanvaarding	risicoacceptatie (N)
risk acceptance criteria	risicoaanvaardingscriteria	risicoacceptatiecriteria (N)
risk acceptance level	risicoaanvaardingsniveau	risicoacceptatieniveau (N)
sag	zakking	pijl
situation	situatie	toestand (B)
Technical Specifications	Technische Voorschriften	Technische Specificaties
the individual project	een project in het bijzonder	het afzonderlijke project
verification	toetsing	verificatie, controle (N)

2bis. De Europese normen (EN) waarnaar de tekst van deze norm met hun Engelse titel verwijst, dragen in België de volgende Nederlandstalige titels :

Vermelde norm met Engelse titel	Nederlandstalige titel (NBN)
EN 1317 Road restraint systems	NBN EN 1317 Afschermende constructies voor wegen
ISO 6184-a Explosion protection systems – Part 1: Determination of explosion indices of combustible dusts in air.	ISO 6184 Explosie-beveiligingssystemen [te verkrijgen bij het NBN, zelfs indien niet in de catalogus]

3. Aanvullende opmerking van het NBN: de volgende redactionele verbeteringen behoren te worden aangebracht in de Nederlandstalige versie van NBN EN 1991-1-7:2006 :

Oorsprong	Paragraaf	Te vervangen tekst	Nieuwe tekst
Werkgroep E250	B.5(5)	(geen fout in het NL)	De Engelse (en Nederlandstalige) tekst beschrijft 4 criteria voor een risicoanalyse die in de Franse tekst niet voorkomen.
TC250 Sweden	B.5(5)	Fig. B2a bestaat niet.	Te vervangen door verwijzing naar fig.B2 met aanvulling van een gearceerd gebied
TC250 Sw	B.9.2(2) formule (B.2)	Kleine letter «p» in plaats van hoofdletter «P» volgens de verklaredende tekst	De «p» in «P» in de formule vervangen, overeenkomstig de verklarende tekst
TC250 Sw	C.4.4(4) formule (C.12)	P_{bow} in plaats van F_{bow} voor de stootkracht	Gebruik F_{bow} overeenkomstig de in C.4.4(2) aangegeven definities
E250	D.1(1) OPMERKING 3	ISO 1684-a Explosion protection systems	ISO 6184-a Explosion protection systems

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1991-1-7

July 2006

ICS 91.010.30

Supersedes ENV 1991-2-7:1998

English Version

Eurocode 1 - Actions on structures - Part 1-7: General actions - Accidental actions

Eurocode 1 - Actions sur les structures Partie 1-7: Actions générales - Actions accidentelles

Eurocode 1 - Einwirkungen auf Tragwerke - Teil 1-7: Allgemeine Einwirkungen - Außergewöhnliche Einwirkungen

This European Standard was approved by CEN on 9 January 2006.

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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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

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Ref. No. EN 1991-1-7:2006: E

Contents Page

Foreword

This European Standard (EN 1991-1-7:2006) has been prepared on behalf of Technical Committee CEN/TC250 “Structural Eurocodes”, the Secretariat of which is held by BSI.

CEN/TC 250 is responsible for all Structural Eurocodes.

This European Standard supersedes ENV 1991-2-7:1998.

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 January 2007 and conflicting national standards shall be withdrawn at the latest by March 2010.

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, Romania, 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 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 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

[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 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 a 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 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 (informative).

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[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 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 the ER 2.

The National Annex (informative) 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;

– 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 shall clearly mention which Nationally Determined Parameters have been taken into account.

Additional information specific to EN 1991-1-7

EN 1991-1-7 describes Principles and Application rules for the assessment of accidental actions on buildings and bridges. The following actions are included:

– impact forces from vehicles, rail traffic, ships and helicopters,

– actions due to internal explosions,

– actions due to local failure from an unspecified cause.

EN 1991-1-7 is intended for use by:

– clients (e.g. for the formulation of their specific requirements on safety levels),

– designers,

– constructors, and

– relevant authorities.

EN 1991-1-7 is intended to be used with EN 1990, the other parts of EN 1991 and EN 1992 – 1999 for the design of structures.

National Annex

This standard 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 1991-1-7 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.

[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.

The National choice is allowed in EN 1991-1-7 through clauses[5]:

Paragraph	Item
2 (2)	Classification of accidental actions
3.1(2)	Strategies for accidental design situations
3.2(1)	Level of risk
3.3(2)P	Notional accidental action
3.3(2)P	Limit of local failure
3.3(2)P	Choice of strategies
3.4(1)	Consequences classes
3.4(2)	Design approaches
4.1(1)	Definition of lightweight structures
4.1(1)	Transmission of impact forces to foundations
4.3.1(1)	Values of vehicle impact forces
4.3.1(1)	Impact force as a function of the distance from traffic lanes
4.3.1(1)	Types or elements of structure subject to vehicular collision
4.3.1(2)	Alternative impact rules
4.3.1(3)	Conditions of impact from road vehicles
4.3.2(1)	Clearances and protection measures and design values
4.3.2(1)	Reduction factor r_F
4.3.2(1)	Impact actions on underside of bridge decks
4.3.2(2)	Use of F_{dy}
4.3.2(3)	Dimension and position of impact areas
4.4(1)	Value of impact forces from forklift trucks
4.5(1)	Type of rail traffic
4.5.1.2(1)	Structures to be included in each exposure class
4.5.1.2(1)	Classification of temporary structures and auxiliary construction works
4.5.1.4(1)	Impact forces from derailed traffic
4.5.1.4(2)	Reduction of impact forces
4.5.1.4(3)	Point of application of impact forces
4.5.1.4(4)	Equivalent static forces
4.5.1.4(5)	Impact forces for speeds greater than 120 km/h
4.5.1.5(1)	Requirements for Class B structures
4.5.2(1)	Areas beyond track ends

[5] It is proposed to add to each clause of the list what will be allowed for choice: value, procedures, classes.

4.5.2(4)	Impact forces on end walls
4.6.1(3)	Classification of ship impacts
4.6.2(1)	Values of frontal and lateral forces from ships
4.6.2(2)	Friction coefficients
4.6.2(3)	Application area of impact
4.6.2(4)	Impact forces on bridge decks from ships
4.6.3(1)	Dynamic impact forces from seagoing ships
4.6.3(3)	Friction coefficients
4.6.3(4)	Dimension and position of impact areas
4.6.3(5)	Forces on superstructure
5.3 (1)P	Procedures for internal explosion
A.4 (1)	Details of effective anchorage

Section 1 General

1.1 Scope

(1) EN 1991-1-7 provides strategies and rules for safeguarding buildings and other civil engineering works against identifiable and unidentifiable accidental actions.

(2) EN 1991-1-7 defines:

- strategies based on identified accidental actions,
- strategies based on limiting the extent of localised failure.

(3) The following subjects are dealt with in this part of EN 1991:

- definitions and symbols (Section 1);
- classification of actions (Section 2);
- design situations (Section 3);
- impact (Section 4);
- explosions (Section 5);
- design for consequences of localised failure in buildings from an unspecified cause (informative Annex A);
- information on risk assessment (informative Annex B);
- dynamic design for impact (informative Annex C);
- internal explosions (informative Annex D).

(4) Rules on dust explosions in silos are given in EN 1991-4.

(5) Rules on impact from vehicles travelling on the bridge deck are given in EN 1991-2.

(6) EN 1991-1-7 does not specifically deal with accidental actions caused by external explosions, warfare and terrorist activities, or the residual stability of buildings or other civil engineering works damaged by seismic action or fire, etc.

NOTE See also 3.1.

1.2 Normative references

(1) This European Standard incorporates by dated or undated reference provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to, or revisions of, any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies (including amendments).

NOTE The Eurocodes were published as European Prestandards. The following European Standards which are published or in preparation are cited in normative clauses or in NOTES to normative clauses.