

Geregistreeerde Belgische norm

NBN EN 1993-6

2e uitg., december 2007

Normklasse: B 51

Eurocode 3 - Ontwerp en berekening van staalconstructies - Deel 6: Kraanbanen (+ AC:2009)

Eurocode 3 - Calcul des structures en acier - Partie 6: Chemins de roulement (+ AC:2009)

Eurocode 3 - Design of steel structures - Part 6: Crane supporting structures (+ AC:2009)

Toelating tot publicatie: 12 september 2007

Vervangt NBN ENV 1993-6 (1999).

Deze Europese norm EN 1993-6:2007 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.

***norme belge
enregistrée***

NBN EN 1993-6

2e éd., décembre 2007

Indice de classement: B 51

Eurocode 3 - Calcul des structures en acier - Partie 6: Chemins de roulement (+ AC:2009)

Eurocode 3 - Ontwerp en berekening van staalconstructies - Deel 6: Kraanbanen (+ AC:2009)

Eurocode 3 - Design of steel structures - Part 6: Crane supporting structures (+ AC:2009)

Autorisation de publication: 12 septembre 2007

Remplace NBN ENV 1993-6 (1999).

La présente norme européenne EN 1993-6:2007 a le statut d'une norme belge.

La présente 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.

NATIONAAL VOORWOORD VAN NBN EN 1993-6:2007

1. De norm NBN EN 1993-6:2007 «Eurocode 3 – Ontwerp en berekening van staalconstructies – Deel 6: Kraanbanen» omvat de nationale bijlage NBN EN 1993-6 ANB:2011 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 1993-6 ANB:2011 de volgende norm:

NBN ENV 1993-6:1999 Eurocode 3 – Ontwerp van stalen draagsystemen -
Deel 6: Kraanondersteunende draagsystemen

Het corrigendum EN 1993-6:2007/AC:2009, zoals door CEN gepubliceerd, is na deze norm toegevoegd.

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

Vermelde norm	Nederlandstalige titel (NBN)
EN 1090 Execution of steel structures and aluminium structures Part 2: Technical requirements for steel structures	NBN EN 1090 Uitvoering van staalconstructies en aluminiumconstructies Deel 2: Technische eisen voor staalconstructies
EN 1337 Structural bearings	NBN EN 1337 Opleggingen voor het bouwwezen
EN ISO 1461 Hot dip galvanized coatings on fabricated iron and steel articles – specifications and test methods	NBN EN ISO 1461 Door thermisch verzinken aangebrachte deklagen op ijzeren en stalen voorwerpen – Specificaties
EN 1990 Eurocode: Basis of structural design	NBN EN 1990 Eurocode - Grondslagen van het constructief ontwerp
EN 1991 Eurocode 1: Actions on structures Part 1.1: Actions on structures – Densities, self-weight and imposed loads for buildings	NBN EN 1991 Eurocode 1 : Belastingen op constructies Deel 1-1: Algemene belastingen - Dichtheden, eigen gewicht en opgelegde belastingen voor gebouwen

EN 1991 Eurocode 1: Actions on structures Part 1.2: Actions on structures – Actions on structures exposed to fire	NBN EN 1991 Eurocode 1 : Belastingen op constructies Deel 1-2: Algemene belastingen - Belasting bij brand
EN 1991 Eurocode 1: Actions on structures Part 1.4: Actions on structures – Wind loads	NBN EN 1991 Eurocode 1 : Belastingen op constructies Deel 1-4: Algemene belastingen - Windbelasting
EN 1991 Eurocode 1: Actions on structures Part 1.5: Actions on structures – Thermal actions	NBN EN 1991 Eurocode 1 : Belastingen op constructies Deel 1-5: Algemene belastingen - Thermische belasting
EN 1991 Eurocode 1: Actions on structures Part 1.6: Actions on structures – Construction loads	NBN EN 1991 Eurocode 1 : Belastingen op constructies Deel 1-6: Algemene belastingen - Belastingen tijdens uitvoering
EN 1991 Eurocode 1: Actions on structures Part 1.7: Actions on structures – Accidental actions	NBN EN 1991 Eurocode 1 : Belastingen op constructies Deel 1-7: Buitengewone belastingen: stootbelastingen en ontploffingen
EN 1991 Eurocode 1: Actions on structures Part 3: Actions on structures – Actions induced by cranes and machinery	NBN EN 1991 Eurocode 1 : Belastingen op constructies Deel 3: Belastingen veroorzaakt door kranen en machines
EN 1993 Eurocode 3: Design of steel structures Part 1.1: General rules and rules for buildings	NBN EN 1993 Eurocode 3 - Ontwerp en berekening van staalconstructies Deel 1-1: Algemene regels en regels voor gebouwen
EN 1993 Eurocode 3: Design of steel structures Part 1.2: Structural fire design	NBN EN 1993 Eurocode 3 - Ontwerp en berekening van staalconstructies Deel 1-2: Algemene regels - Ontwerp en berekening van constructies bij brand

EN 1993 Eurocode 3: Design of steel structures Part 1.4: Stainless steels	NBN EN 1993 Eurocode 3 - Ontwerp en berekening van staalconstructies Deel 1-4: Algemene regels - Aanvullende regels voor roestvast staal
EN 1993 Eurocode 3: Design of steel structures Part 1.5: Plated structural elements	NBN EN 1993 Eurocode 3 - Ontwerp en berekening van staalconstructies Deel 1-5: Algemene regels - Constructieve plaatvelden
EN 1993 Eurocode 3: Design of steel structures Part 1.8: Design of joints	NBN EN 1993 Eurocode 3 - Ontwerp en berekening van staalconstructies Deel 1-8: Algemene regels - Ontwerp en berekening van verbindingen
EN 1993 Eurocode 3: Design of steel structures Part 1.9: Fatigue	NBN EN 1993 Eurocode 3 - Ontwerp en berekening van staalconstructies Deel 1-9: Algemene regels - Vermoeiing
EN 1993 Eurocode 3: Design of steel structures Part 1.10: Material toughness and through thickness properties	NBN EN 1993 Eurocode 3 - Ontwerp en berekening van staalconstructies Deel 1-10: Algemene regels - Materiaaltaaiheid en eigenschappen in de dikterichting
EN 1998 Eurocode 8: Design provisions for earthquake resistance of structures	NBN EN 1998 Eurocode 8: Ontwerp en berekening van aardbevingsbestendige constructies
EN 10164 Steel products with improved deformation properties perpendicular to the surface of the product – Technical delivery conditions	NBN EN 10164 Producten van staal met verbeterde vervormingseigenschappen loodrecht op het productoppervlak - Technische leveringsvoorwaarden

AVANT-PROPOS NATIONAL À LA NBN EN 1993-6:2007

1. La norme NBN EN 1993-6:2007 "Eurocode 3 – Calcul des structures en acier - Partie 6 : Chemins de roulement" comprend l'annexe nationale NBN EN 1993-6 ANB:2011 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 1993-6 ANB:2011 la norme suivante:

NBN ENV 1993-6:1999 Eurocode 3 : Calcul des structures en acier –
Partie 6 : Chemins de roulement

Le corrigendum NBN EN 1993-6:2007/AC:2009, tel que publié par le CEN, est joint à cette norme.

2. La version en langue française de l'EN 1993-6:2007 a été rédigée en France par l'AFNOR.
En conséquence, on peut y rencontrer certaines expressions d'usage moins courant en Belgique.

Une liste de termes équivalents est donnée ci-après :

Terme de l'EN 1993-6	Terme équivalent en Belgique
client	le maître de l'ouvrage assisté de ses bureaux d'architectes, d'ingénierie et de consultance
poteau	colonne
attache	assemblage

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 1993-6

April 2007

ICS 53.020.20; 91.010.30; 91.080.10

Supersedes ENV 1993-6:1999

English Version

**Eurocode 3 - Design of steel structures - Part 6: Crane
supporting structures**

Eurocode 3 - Calcul des structures en acier - Partie 6:
Chemins de roulement

Eurocode 3 - Bemessung und Konstruktion von
Stahlbauten - Teil 6: Kranbahnen

This European Standard was approved by CEN on 12 June 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 CEN 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 CEN Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, 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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EN 1993-6: 2007 (E)**Foreword**

This European Standard EN 1993-6, “Eurocode 3: Design of steel structures: Part 6 Crane supporting structures”, 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 October 2007, and conflicting National Standards shall be withdrawn at latest by March 2010.

This Eurocode supersedes ENV 1993-6.

According to the CEN-CENELEC Internal Regulations, the National Standard Organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, 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..

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 1980’s.

In 1989, the Commission and the Member States of the EU and EFTA decided, on the basis of an agreement¹ between the Commission and CEN, to transfer the preparation and the publication of the Eurocodes to the 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
- 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.

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).

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 Documents² referred to in Article 12 of the CPD, although they are of a different nature from harmonised product standard³. 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,

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

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 hENs 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.

EN 1993-6: 2007 (E)**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 works⁴. 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 1993-6

EN 1993-6 is one of the six parts of EN 1993 "Design of Steel Structures" and gives principles and application rules for the safety, serviceability and durability of crane supporting structures.

EN 1993-6 gives design rules that supplement the generic rules in EN 1993-1.

EN 1993-6 is intended for clients, designers, contractors and public authorities.

EN 1993-6 is intended to be used with EN 1990, EN 1991 and EN 1993-1. Matters that are already covered in those documents are not repeated.

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 quality management applies.

National Annex for EN 1993-6

This standard gives alternative procedures, values and recommendations for classes with notes indicating where national choices may be made. So the National Standard implementing EN 1993-6 should have a National Annex containing all Nationally Determined Parameters to be used for the design of crane-supporting members in steel structures to be constructed in the relevant country.

National choice is allowed in EN 1993-6 through:

2.1.3.2(1)P	Design working life.
2.8(2)P	Partial factor $\gamma_{F, \text{test}}$ for crane test loads.
3.2.3(1)	Lowest service temperature for indoor crane supporting structures.
3.2.3(2)P	Selection of toughness properties for members in compression.
3.2.4(1) table 3.2	Requirement Z_{Ed} for through-thickness properties.
3.6.2(1)	Information on suitable rails and rail steels.
3.6.3(1)	Information on special connecting devices for rails.
6.1(1)	Partial factors γ_{M_i} for resistance for ultimate limit states.
6.3.2.3(1)	Alternative assessment method for lateral-torsional buckling
7.3(1)	Limits for deflections and deformations.
7.5(1)	Partial factor $\gamma_{M, \text{ser}}$ for resistance for serviceability limit states.
8.2(4)	Crane classes to be treated as "high fatigue".
9.1(2)	Limit for number of cycles C_0 without a fatigue assessment.
9.2(1)P	Partial factors γ_{Ff} for fatigue loads.
9.2(2)P	Partial factors γ_{Mf} for fatigue resistance.
9.3.3(1)	Crane classes where bending due to eccentricity may be neglected.
9.4.2(5)	Damage equivalence factors λ_{dup} for multiple crane operation.

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.

1 General

1.1 Scope

- (1) This Part 6 of EN 1993 provides design rules for the structural design of runway beams and other crane supporting structures.
- (2) The provisions given in Part 6 supplement, modify or supersede the equivalent provisions given in EN 1993-1.
- (3) It covers overhead crane runways inside buildings and outdoor crane runways, including runways for:
 - a) overhead travelling cranes, either:
 - supported on top of the runway beams;
 - underslung below the runway beams;
 - b) monorail hoist blocks.
- (4) Additional rules are given for ancillary items including crane rails, structural end stops, support brackets, surge connectors and surge girders. However, crane rails not mounted on steel structures, and rails for other purposes, are not covered.
- (5) Cranes and all other moving parts are excluded. Provisions for cranes are given in EN 13001.
- (6) For seismic design, see EN 1998.
- (7) For resistance to fire, see EN 1993-1-2.

1.2 Normative references

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).

EN 1090 *Execution of steel structures and aluminium structures:*

Part 2 *Technical requirements for steel structures;*

EN 1337 *Structural bearings;*

EN ISO 1461 *Hot dip galvanised coatings on fabricated iron and steel articles – specifications and test methods;*

EN 1990 *Eurocode: Basis of structural design;*

EN 1991 *Eurocode 1: Actions on structures:*

Part 1-1 *Actions on structures – Densities, self-weight and imposed loads for buildings;*

Part 1-2 *Actions on structures – Actions on structures exposed to fire;*

Part 1-4 *Actions on structures – Wind loads;*

Part 1-5 *Actions on structures – Thermal actions;*

Part 1-6 *Actions on structures – Construction loads;*

Part 1-7 *Actions on structures – Accidental actions;*

Part 3 *Actions on structures – Actions induced by cranes and machinery;*