

Geregistreeerde Belgische norm

NBN EN 1993-1-11

1e uitg., mei 2007

Normklasse: B 51

Eurocode 3 - Ontwerp en berekening van staalconstructies - Deel 1-11: Algemene regels - Ontwerp en berekening van aan trek onderworpen componenten (+ AC:2009)

Eurocode 3 - Calcul des structures en acier - Partie 1-11: Calcul des structures à câbles ou éléments tendus (+ AC:2009)

Eurocode 3 - Design of steel structures - Part 1-11: Design of structures with tension components (+ AC:2009)

Toelating tot publicatie: 19 december 2006

Vervangt NBN ENV 1993-2 (1998).

Deze Europese norm NBN EN 1993-1-11:2006 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 1993-1-11

1e éd., mai 2007

Indice de classement: B 51

Eurocode 3 - Calcul des structures en acier - Partie 1-11: Calcul des structures à câbles ou éléments tendus (+ AC:2009)

Eurocode 3 - Ontwerp en berekening van staalconstructies - Deel 1-11: Algemene regels - Ontwerp en berekening van aan trek onderworpen componenten (+ AC:2009)

Eurocode 3 - Design of steel structures - Part 1-11: Design of structures with tension components (+ AC:2009)

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Remplace NBN ENV 1993-2 (1998).

La présente norme européenne NBN EN 1993-1-11:2006 a le statut d'une norme belge.

La présente norme européenne existe en trois versions officielles (allemand, anglais et 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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Nationaal voorwoord van NBN EN 1993-1-11:2007

1. De norm NBN EN 1993-1-11:2007 «Eurocode 3 – Ontwerp en berekening van staalconstructies – Deel 1-11: Ontwerp en berekening van aan trek onderworpen componenten (+AC:2009)» omvat de nationale bijlage NBN EN 1993-1-11 ANB:2010 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 1993-1-11 ANB:2010 het overeenstemmende deel van de volgende norm:

NBN ENV 1993-2:1998 Eurocode 3: Ontwerp van stalen draagsystemen - Deel 2: Stalen bruggen

Het corrigendum EN 1993-1-11:2006/AC:2009, zoals door CEN gepubliceerd, is na deze norm toegevoegd.

2. De Nederlandstalige versie van EN 1993-1-11:2006 werd opgesteld in samenwerking tussen NBN en NEN. Daarbij werd voor elk begrip een unieke woordkeuze gemaakt. Dit heeft voor 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)
action-effect	belastingeffect, of snedegrootheid	(aangrijpende) snedekracht
civil engineering	civiele techniek	burgerlijke bouwkunde (B)
concentrated load	geconcentreerde belasting	puntlast
construction work	bouwwerk	werk (B)
diameter	diameter	middellijn
defined	vastgesteld	gegeven
design resistance	rekenwaarde van de weerstand	weerstandbiedende snedekracht (B)
first moment of area	statisch moment, lineair oppervlaktemoment	statisch moment (B)
haunch	kniestuk	verzwaring
moment resistance	momentweerstand	moment met betrekking tot de capaciteit (N)
internal force	snedekracht	inwendige kracht

internal moment	snedemoment	inwendig moment
principle	beginsel	principe (B)
permanent action	blijvende belasting	permanente belasting (N)
redundancy	redundantie	overtolligheid
relevant	van toepassing	voorkomend
resistance	weerstand	capaciteit
second moment of area	traagheidsmoment, kwadratisch oppervlaktemoment	traagheidsmoment (B)
serviceability limit state	bruikbaarheidsgrenstoestand	gebruiksgrenstoestand (B)
situation	situatie	toestand (B)
spacing	hart-op-hartafstand	steekmaat, tussenafstand
specified	voorgeschreven	gegeven, bepaald, opgelegd
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 10138 Prestressing steels Part 1: General requirements Part 2: Wires Part 3: Strands Part 4: Bars	NBN EN 10138 Voorspanstaal Deel 1: Algemene eisen Deel 2: Voerspandraad Deel 3: Voorspanstreng Deel 4: Voorspanstaven
EN 10244 Steel wire and wire products – Non-ferrous metallic coatings on steel wire Part 1: General requirements Part 2: Zinc and zinc alloy coatings Part 3: Aluminium coatings	NBN EN 10244 Staaldraad en draadproducten - Deklagen van non-ferrometaal op staaldraad Deel 1: Algemene principes Deel 2: Deklagen van zink of zinklegeringen Deel 3: Deklagen van aluminium

<p>EN 10264 Steel wire and wire products - Steel wire for ropes Part 1: General requirements Part 2: Cold drawn non-alloyed steel wire for ropes for general applications Part 3: Cold drawn and cold profiled non alloyed steel wire for high tensile applications Part 4: Stainless steel wires</p>	<p>NBN EN 10264 Staaldraad en draadproducten - Staaldraad voor kabels Deel 1: Algemene eisen Deel 2: Koudgetrokken draad van ongelegeerd staal voor kabels voor algemene toepassingen Deel 3: Rond en gevormd draad van ongelegeerd staal voor kabels voor toepassingen met zware belastingen Deel 4: Draad van corrosievast staal</p>
<p>EN 12385 Steel wire ropes – safety Part 1: General requirements Part 2: Definitions, designation and classification Part 3: Information for use and maintenance Part 4: Stranded ropes for general lifting applications Part 10: Spiral ropes for general structural applications</p>	<p>NBN EN 12385 Staalkabels - Veiligheid Deel 1: Algemene eisen Deel 2: Definities, aanduiding en classificatie Deel 3: Informatie voor gebruik en onderhoud Deel 4: Strengenkabels voor algemene hijsdoeleinden Deel 10: Spiraalkabels voor algemene toepassing in constructies</p>
<p>EN 13411 Terminations for steel wire ropes – safety Part 3: Ferrules and ferrule-securing Part 4: Metal and resin socketing Part 5: U-bolt wire rope grips</p>	<p>NBN EN 13411 Eindverbindingen voor staalkabels – Veiligheid Deel 3: Met klembus Deel 4: Ingieten in sokken met metaal en kunsthars Deel 5: U-bout kabelklemmen</p>

Avant-propos national à la NBN EN 1993-1-11:2007

1. La norme NBN EN 1993-1-11:2007 "Eurocode 3 – Calcul des structures en acier - Partie 1-11 : Calcul des structures à câbles ou éléments tendus (+AC:2009)" comprend l'annexe nationale NBN EN 1993-1-11 ANB:2010 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 1993-1-11 ANB:2010 la partie correspondante de la norme:

NBN ENV 1993-2 :1998 Eurocode 3: Calcul des structures en acier – Partie 2: Ponts métalliques

Le corrigendum EN 1993-1-11:2006/AC:2009, tel que publié par le CEN, est joint à cette norme.

2. La version en langue française de l'EN 1993-1-11:2007 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 1993-1-11	Terme équivalent en Belgique
client	le maître de l'ouvrage assisté de ses bureaux d'architectes, d'ingénierie et de consultance

English Version

Eurocode 3 - Design of steel structures - Part 1-11: Design of structures with tension components

Eurocode 3 - Calcul des structures en acier - Partie 1-11:
Calcul des structures à câbles ou éléments tendus

Eurocode 3 - Bemessung und Konstruktion von
Stahlbauten - Teil 1-11: Bemessung und Konstruktion von
Tragwerken mit Zuggliedern aus Stahl

This European Standard was approved by CEN on 13 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.



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Foreword

This European Standard EN 1993-1-11, Eurocode 3: Design of steel structures: Part 1-11 Design of structures with tension components, 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 April 2007 and conflicting National Standards shall be withdrawn at latest by March 2010.

This Eurocode partially supersedes ENV 1993-2.

According to the CEN-CENELEC Internal Regulations, the National Standard 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 United Kingdom.

National annex for EN 1993-1-11

This standard gives alternative procedures, values and recommendations with notes indicating where national choices may have to be made. The National Standard implementing EN 1993-1-11 should have a National Annex containing all Nationally Determined Parameters to be used for the design of tension components to be constructed in the relevant country.

National choice is allowed in EN 1993-1-11 through:

- 2.3.6(1)
- 2.3.6(2)
- 2.4.1(1)
- 3.1(1)
- 4.4(2)
- 4.5(4)
- 5.2(3)
- 5.3(2)
- 6.2(2)
- 6.3.2(1)
- 6.3.4(1)
- 6.4.1(1)P
- 7.2(2)
- A.4.5.1(1)
- A.4.5.2(1)
- B(6)

1 General

1.1 Scope

(1) prEN1993-1-11 gives design rules for structures with tension components made of steel, which, due to their connections with the structure, are adjustable and replaceable see Table 1.1.

NOTE: Due to the requirement of adjustability and replaceability such tension components are generally prefabricated products delivered to site and installed into the structure. Tension components that are not adjustable or replaceable, e.g. air spun cables of suspension bridges, or for externally post-tensioned bridges, are outside the scope of this part. However, rules of this standard may be applicable.

(2) This standard also gives rules for determining the technical requirements for prefabricated tension components for assessing their safety, serviceability and durability.

Table 1.1: Groups of tension components

Group	Main tension element	Component
A	rod (bar)	tension rod (bar) system, prestressing bar
B	circular wire	spiral strand rope
	circular and Z-wires	fully locked coil rope
	circular wire and stranded wire	strand rope
C	circular wire	parallel wire strand (PWS)
	circular wire	bundle of parallel wires
	seven wire (prestressing) strand	bundle of parallel strands

NOTE 1: Group A products in general have a single solid round cross section connected to end terminations by threads. They are mainly used as

- bracings for roofs, walls, girders
- stays for roof elements, pylons
- tensioning systems for steel-wooden truss and steel structures, space frames

NOTE 2: Group B products are composed of wires which are anchored in sockets or other end terminations and are fabricated primarily in the diameter range of 5 mm to 160 mm, see EN 12385-2.

Spiral strand ropes are mainly used as

- stay cables for aerials, smoke stacks, masts and bridges
- carrying cables and edge cables for light weight structures
- hangers or suspenders for suspension bridges
- stabilizing cables for cable nets and wood and steel trusses
- hand-rail cables for banisters, balconies, bridge rails and guardrails

Fully locked coil ropes are fabricated in the diameter range of 20 mm to 180 mm and are mainly used as

- stay cables, suspension cables and hangers for bridge construction
- suspension cables and stabilizing cables in cable trusses
- edge cables for cable nets
- stay cables for pylons, masts, aerials

Structural strand ropes are mainly used as

- stay cables for masts, aerials
- hangers for suspension bridges
- damper / spacer tie cables between stay cables
- edge cables for fabric membranes
- rail cables for banister, balcony, bridge and guide rails.

NOTE 3: Group C products need individual or collective anchoring and appropriate protection.

Bundles of parallel wires are mainly used as stay cables, main cables for suspension bridges and external tendons.

Bundles of parallel strands are mainly used as stay cables for composite and steel bridges.

(4) The types of termination dealt with in this part for Group B and C products are

- metal and resin sockets, see EN 13411-4
- sockets with cement grout
- ferrules and ferrule securing, see EN 13411-3
- swaged sockets and swaged fitting
- U-bolt wire rope grips, see EN 13411-5
- anchoring for bundles with wedges, cold formed button heads for wires and nuts for bars.

NOTE: For terminology see Annex C.

1.2 Normative references

(1) This European Standard incorporates dated and undated reference to 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 or revisions to 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.

EN 10138 *Prestressing steels*

Part 1 General requirements

Part 2 Wires

Part 3 Strands

Part 4 Bars

EN 10244 *Steel wire and wire products – Non-ferrous metallic coatings on steel wire*

Part 1 General requirements

Part 2 Zinc and zinc alloy coatings

Part 3 Aluminium coatings

EN 10264 *Steel wire and wire products – Steel wire for ropes*

Part 1 General requirements

Part 2 Cold drawn non-alloyed steel wire for ropes for general applications

Part 3 Cold drawn and cold profiled non alloyed steel wire for high tensile applications

Part 4 Stainless steel wires

EN 12385 *Steel wire ropes – safety*

Part 1 General requirements

Part 2 Definitions, designation and classification