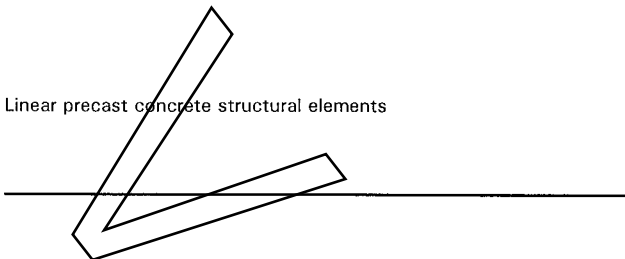


**norm****NEN-EN 13225**

Vooraf vervaardigde balkvormige  
constructieve elementen van beton

Publicatie uitsluitend voor commentaar

Linear precast concrete structural elements



mei 1998

ICS 91.100.30

Commentaar voor 1998-09-01

Als Europees normontwerp is gepubliceerd: prEN 13225:1998

Definitief vastgestelde normen zullen als Nederlandse norm gelden. Daarom wordt dit normontwerp in Nederland voor commentaar gepubliceerd. Op het ontwerp ingebracht commentaar zal aan de bevoegde normcommissie worden voorgelegd die hiermee rekening zal houden bij de bepaling van de Nederlandse stem. Indien er geen bezwaar bij het NNI wordt ingebracht, kan dat leiden tot ongewijzigd definitieve vaststelling van het ontwerp als norm.

Van Europese normen bestaat drie officiële versies: Engels, Frans en Duits. Voor Nederland zal de Engelse versie gelden, tenzij voor een geautoriseerde versie in het Nederlands wordt gekozen.

Normcommissie 353 055 "Vooraf vervaardigde betonproducten"

Auteursrecht voorbehouden. Behoudens uitzondering door de wet gesteld mag zonder schriftelijke toestemming van het Nederlands Normalisatie-instituut niets uit deze uitgave worden veeleelvoudigd en/of openbaar gemaakt door middel van fotokopie, microfilm, opslag in computerbestanden of anderszins, hetgeen ook van toepassing is op gehele of gedeeltelijke bewerking.

Het Nederlands Normalisatie-instituut is met uitsluiting van ieder ander gerechtigd de door derden verschuldigde vergoedingen voor veeleelvoudiging te innen en/of daartoe in en buiten rechte op te treden, voor zover deze bevoegdheid niet is overgedragen c.q. rechtens toekomt aan de Stichting Reprorecht.

Hoewel bij deze uitgave de uiterste zorg is nagestreefd, kunnen fouten en onvolledigheden niet geheel worden uitgesloten. Het Nederlands Normalisatie-instituut en/of de leden van de commissies aanvaarden derhalve geen enkele aansprakelijkheid, ook niet voor directe of indirecte schade, ontstaan door of verband houdende met toepassing van door het Nederlands Normalisatie-instituut gepubliceerde uitgaven.

Voorbeeld  
Preview

April 1998

ICS

Descriptors:



English version

## Linear precast concrete structural elements

Eléments linéaires de structures préfabriqués en béton

Vorgefertigte stabförmige Betonbauteile

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 229.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

Preview



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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

## Contents

<b>Foreword</b> .....	<b>5</b>
<b>Introduction</b> .....	<b>6</b>
<b>1 Scope</b> .....	<b>6</b>
<b>2 Normative references</b> .....	<b>6</b>
<b>3 Definitions</b> .....	<b>7</b>
3.1 Linear structural elements.....	7
3.2 Structural systems .....	7
<b>4 Requirements</b> .....	<b>10</b>
4.1 Material requirements .....	10
4.1.1 General.....	10
4.1.7 Reinforcing steel.....	10
4.1.8 Prestressing steel .....	10
4.2 Production requirements.....	11
4.2.2 Hardened concrete .....	11
4.3 Finished product requirements.....	11
4.3.1 Geometrical characteristics.....	11
4.3.1.1 Design tolerances .....	11
4.3.1.2 Acceptance tolerances.....	13
4.3.1.3 Minimum dimensions .....	20
4.3.1.4 Concrete cover .....	20
4.3.1.5 Modular co-ordination .....	21
4.3.1.6 Corner treatment.....	21
4.3.3 Mechanical strength.....	22
4.3.3.1 General .....	22
4.3.3.2 Transient situations.....	22
4.3.3.3 Stability requirements .....	23
4.3.3.4 Supports and connections .....	24
4.3.4 Fire resistance .....	24
4.3.4.1 General .....	24
4.3.4.2 Simplified specific rules.....	25
4.3.7 Durability.....	26
4.3.7.1 General .....	26
4.3.7.2 Design provisions.....	27
4.3.7.3 Special provisions .....	28
4.3.8 Other requirements.....	28
4.3.8.1 Handling .....	28
<b>5 Test methods</b> .....	<b>29</b>
<b>6 Evaluation of conformity</b> .....	<b>29</b>
6.1 General.....	29
6.2 Test methods for elements .....	30
6.3 Actions subsequent to nonconformity .....	32
<b>7 Marking and labelling</b> .....	<b>32</b>
<b>Annex A (informative)</b> .....	<b>34</b>
A.1 Types of products .....	34
A.2 Combination of construction tolerances .....	44
A.3 Minimum dimensions .....	46
A.4 Modular systems for dimensional coordination .....	48
A.4.1 Minor modular systems.....	48

A.4.2	Middle modular system .....	50
A.4.3	Major modular system.....	51
A.5	Lateral buckling of beams .....	55
A.5.1	General.....	55
A.5.2	Lifting pendulum conditions .....	57
A.5.3	Transitory isolated conditions.....	60
A.5.4	References .....	62
A.6	Control chart for production checks .....	63
A.7	Flexural test of beams.....	64
A.7.1	General.....	64
A.7.2	Load test under service conditions.....	66
A.7.3	Load test up to failure conditions .....	68
A.8	Tests on finished elements .....	69
A.9	Lifting devices .....	70

Orbbeam  
Preview

*Drafting note :*

*Annex Z "Conformity attestation" will be added after CEN Enquiry following Background Document indications. This Annex will give the tasks of the Third Party, the list of the "harmonized" clauses referred to the CPD essential requirements and proper provisions for CE marking.*

Forbiden  
Preview

## Foreword

This draft European Standard has been drafted by the Task Group No 7 of the Working Group n° 1 of the CEN-Technical Committee No 229 and approved by the TC resolution n. 38 on 95.11.28 to go forward to the CEN Enquiry stage.

Part of the included text is covered by the specific mandate given to CEN by the European Commission.

The standard sets out the two essential requirements for "Mechanical resistance and stability" and "Safety in case of fire" in line with the Construction Product Directive for the satisfactory use of precast linear elements over a reasonable economic working life. It covers their use as a part of frame or skeletal structures, which are mainly or partially made of precast concrete.

Orbbee.nl  
Preview

## Introduction

The evaluation of conformity given in this standard refers to the completed precast elements which are supplied to the market and covers all the production operations carried out in the factory. Much reference is made to ENV 206 for the basic material properties of concrete produced within the factory and this is included in the overall evaluation of conformity of the finished elements.

For design rules reference is made to ENV 1992-1-1 and ENV 1992-1-3. Additional complementary rules are provided where necessary.

The precast elements considered in this standard are factory produced for buildings or other civil engineering works. The *structural design* shall be verified expressly to ensure their fitness for the particular application. Special attention must be given with regard to *Public Safety* and to the *design co-ordination* of the other parts of construction.

## 1 Scope

This standard identifies the requirements and the basic performance criteria and specifies minimum values where appropriate for precast linear elements made of reinforced or prestressed concrete.

The standard covers terminology, performance criteria, preferred shapes and dimensions, tolerances, relevant physical properties, special test methods, and special aspects of transport, erection and connection.

Informative Annex A gives a review of common types of linear precast concrete structural elements.

## 2 Normative references

Specific reference is made to the following standards.

- ENV 1992 Eurocode 2 Design of concrete structures
- ENV 1992-1-1 Part 1-1 General rules and rules for buildings
- ENV 1992-1-2 Part 1-2 Structural fire design
- ENV 1992-1-3 Part 1-3 Precast concrete elements and structures
- ENV 10080 Steel for the reinforcement of concrete - weldable ribbed reinforcing steel B 500
- EN 10138 Prestressing steel
  - Part 1 : General requirements
  - Part 2 : Stress relieved cold drawn wire
  - Part 3 : Strand
  - Part 4 : Hot rolled and processed bars
- ENV 206 Concrete - Performance, production, placing and compliance criteria
- EN zzzz Execution of concrete structures



### 3 Definitions

#### 3.1 Linear structural elements

**3.1.1 Beam:** Element, usually horizontal, for carrying loads primarily by flexure

**3.1.2 Lintel:** A beam spanning an opening, usually a door or a window

**3.1.3 Girder:** Large beam providing principal support for floors, roofs, bridges, etc...

**3.1.4 Rafter:** A beam extending from eaves to ridge in a sloping roof

**3.1.5 Cantilever:** A beam supported at one end only

**3.1.6 Column:** A vertical bearing element subject mainly to compression

**3.1.7 Folded element:** Element composed of two or more segments with different directions, monolithic at their intersections

**3.1.8 Flange:** The upper and/or lower part of an I, L, T or hollow section

**3.1.9 Web:** The intermediate part of a section monolithic with any flanges present

**3.1.10 Corbel:** A short bracket projecting from a column to support a load

#### 3.2 Structural systems

**3.2.1 Frame:** Structure composed of two or more structural members joined together to be stable

**3.2.2 Plane frame:** A frame which is two dimensional and stable in its own plane

**3.2.3 Space frame:** A frame which is three dimensional and stable in all directions

**3.2.4 Portal:** Frame composed of two columns connected by a beam across the top

**3.2.5 Multi-span portal:** Series of portals connected by joints

**3.2.6 Multi-storey (frame):** Frame comprising several levels of floors and roof

**3.2.7 Sway (unbraced) frame:** Frame in which stability against horizontal forces is provided by monolithic connections of columns

**3.2.8 Braced frame:** Frame in which stability against horizontal forces is provided by diagonal bracings, shear walls or similar

**3.2.9 Span:** Distance between supports of beam

**3.2.10 Continuous beam:** A multispan beam which is monolithic over supports

**3.2.11 Wet joint:** Joint between elements incorporating insitu concrete, mortar or grout

**3.2.12 Dry joint:** Joint made without wet materials

Some types of structures made of beams and columns, with some possible folded element, are shown in figure 0.1

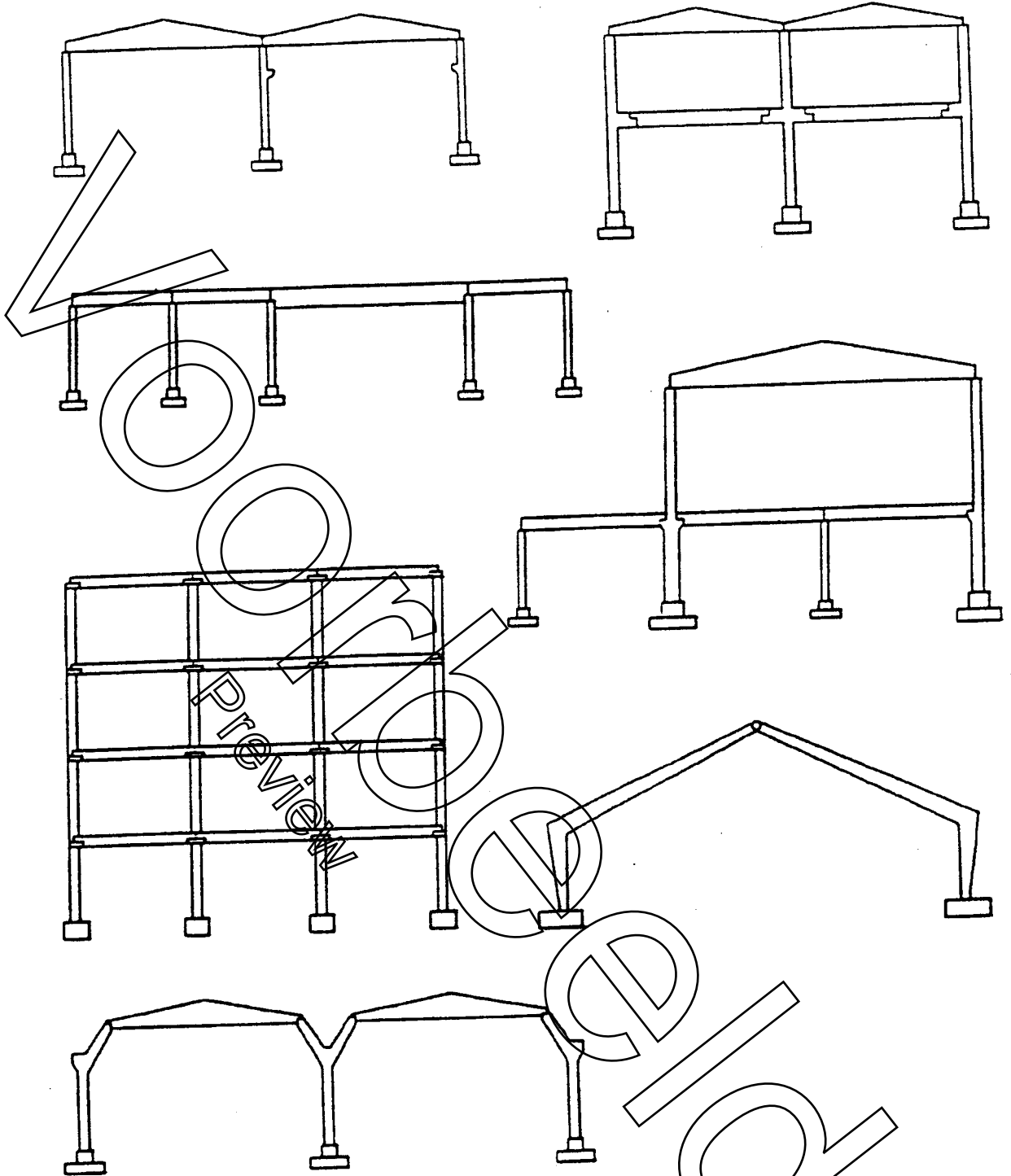


Figure 0.1

## 4 Requirements

### 4.1 Material requirements

#### 4.1.1 General

An effective system of continuous *quality control* is required for the production of the component materials, both concrete (see 4.2.2) and steel (see 4.1.7 - 4.1.8). This is independent from the type of conformity attestation of the products.

In the case of a material supplied from another producer, some or all of the operations for its quality control may be replaced by the *conformity attestation* documented by the supplier.

Chapter 3 of ENV 1992-1-1 and ENV 1992-1-3 applies, together with special complementary specifications given in the following points.

For *connection materials* and *lifting devices* reference is made to ENV 1992-1-3 Clauses 3.5 and 3.6. In Annex A9 additional indications are given.

Special devices for connections and lifting may be used in accordance with relevant recognised *National Regulations*.

#### 4.1.7 Reinforcing steel

The standard properties for reinforcing steel (bars, coils and welded fabric) are given in *ENV 10080*. Design requirements are given in Clause 3.2 of ENV 1992-1-1.

Other types of ribbed reinforcing steel may be used according to relevant European recognised *National Standards*, provided they are fit for the intended purpose and have *adequate ductility*.

Welded connection of reinforcing bars may only be used when the *weldability* of the steel is fully documented.

Only products with a *statistical quality control* can be used in precast reinforced concrete production of linear structural elements.

#### 4.1.8 Prestressing steel

The required properties for prestressing steel (wire, bars and strand) are given in EN 10138, which includes the *statistical quality control procedures*. Design requirements are given in Clause 3.3 of ENV 1992-1-1.

For relevant properties of the prestressing steel see also the Informative Annex A3 of ENxxxx (1).

---

(1) Any reference to ENxxxx "Common rules" of CEN/TC 229/WG4 is made conditional on a consistent resolution of the competent Group. Otherwise it will be dropped together with the connected statement.

# Bestelformulier

# NEN

## Stuur naar:

NEN Uitgeverij  
t.a.v. afdeling Marketing  
Antwoordnummer 10214  
2600 WB Delft

## NEN Uitgeverij

Postbus 5059  
2600 GB Delft

Vlinderweg 6  
2623 AX Delft

T (015) 2 690 390  
F (015) 2 690 271

[www.nen.nl/normshop](http://www.nen.nl/normshop)

## Ja, ik bestel

\_\_ ex. NEN-EN 13225:1998 Ontw. en Vooraf vervaardigde balkvormige  
constructieve elementen van beton € 46.90

**Wilt u deze norm in PDF-formaat? Deze bestelt u eenvoudig via  
[www.nen.nl/normshop](http://www.nen.nl/normshop)**

Stel uw vraag aan  
Klantenservice via:

[@NEN\\_webcare](https://twitter.com/NEN_webcare)

## Gratis e-mailnieuwsbrieven

Wilt u op de hoogte blijven van de laatste ontwikkelingen op het gebied van normen,  
normalisatie en regelgeving? Neem dan een gratis abonnement op een van onze  
e-mailnieuwsbrieven. [www.nen.nl/nieuwsbrieven](http://www.nen.nl/nieuwsbrieven)

## Retourneren

Fax: (015) 2 690 271  
E-mail: [marketing@nen.nl](mailto:marketing@nen.nl)  
Post: NEN Uitgeverij,  
t.a.v. afdeling Marketing  
Antwoordnummer 10214,  
2600 WB Delft  
(geen postzegel nodig).

## Gegevens

Bedrijf / Instelling

T.a.v. \_\_\_\_\_ O M O V

E-mail

Klantnummer NEN

Uw ordernummer \_\_\_\_\_ BTW nummer \_\_\_\_\_

Postbus / Adres

Postcode \_\_\_\_\_ Plaats \_\_\_\_\_

Telefoon \_\_\_\_\_ Fax \_\_\_\_\_

**Factuuradres** (indien dit afwijkt van bovenstaand adres)

Postbus / Adres

Postcode \_\_\_\_\_ Plaats \_\_\_\_\_

Datum \_\_\_\_\_ Handtekening \_\_\_\_\_

## Voorwaarden

- De prijzen zijn geldig tot 31 december 2015, tenzij anders aangegeven.
- Alle prijzen zijn excl. btw, verzend- en handelingskosten en onder voorbehoud bij o.m. ISO- en IEC-normen.
- Bestelt u via de normshop een pdf, dan betaalt u geen handeling en verzendkosten.
- Meer informatie: telefoon (015) 2 690 391, dagelijks van 8.30 tot 17.00 uur.
- Wijzigingen en typfouten in teksten en prijsinformatie voorbehouden.
- U kunt onze algemene voorwaarden terugvinden op: [www.nen.nl/leveringsvoorwaarden](http://www.nen.nl/leveringsvoorwaarden).