



NSAI
Standards

Irish Standard
I.S. EN 1992-3:2006

Eurocode 2 - Design of concrete structures - Part 3: Liquid retaining and containment structures

I.S. EN 1992-3:2006

Incorporating amendments/corrigenda issued since publication:

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Údarás um Chaighdeáin Náisiúnta na hÉireann		

National Foreword

This Irish Standard is the official English language version of EN 1992-3:2006, prepared by Technical Committee CEN TC 250 "Structural Eurocodes". This document supersedes ENV 1992-4:1998.

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 provisions 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, possible choices are given in the normative text, and a Note will qualify it as a Nationally Determined Parameter (NDP).

National choice for NDP's is normally established through the publication of a related National Annex for each EN Eurocode part, however such annexes are not deemed necessary where a Eurocode part is not relevant or where the Eurocode recommended values are being adopted in a Member State.

Following a 3 month period of public consultation the National Standards Authority of Ireland, through its National Eurocodes Advisory Committee, hereby endorses the Eurocode recommended values for the application of EN 1992-3 in Ireland.

This decision also provides for the use of the Informative Annexes K to M (inclusive) where applied for design purposes.

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

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 1992-3

June 2006

ICS 91.010.30; 91.080.40

Supersedes ENV 1992-4:1998

English Version

**Eurocode 2 - Design of concrete structures - Part 3: Liquid
retaining and containment structures**

Eurocode 2 - Calcul des structures en béton - Partie 3:
Silos et réservoirs

Eurocode 2 - Bemessung und Konstruktion von Stahlbeton-
und Spannbetontragwerken - Teil 3: Stütz- und
Behälterbauwerke aus Beton

This European Standard was approved by CEN on 24 November 2005.

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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I.S. EN 1992-3:2006 (E)

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Foreword

This European Standard (EN 1992-3:2006) 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 December 2006, and conflicting national standards shall be withdrawn at the latest by March 2010.

This Eurocode supersedes ENV 1992-4.

CEN/TC 250 is responsible for all Structural Eurocodes.

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

See EN 1992-1-1.

Eurocode programme

See EN 1992-1-1.

Status and Field of application of Eurocodes

See EN 1992-1-1.

National Standards implementing Eurocodes

See EN 1992-1-1.

Links between Eurocodes and harmonized technical specifications (ENs and ETAs) for products

See EN 1992-1-1.

Additional information specific to EN 1992-3 and link to EN 1992-1-1

The scope of Eurocode 2 is defined in 1.1.1 of EN 1992-1-1 and the scope of this Part of Eurocode 2 is defined in 1.1.2. Other Additional Parts of Eurocode 2 which are planned are indicated in 1.1.3 of EN 1992-1-1; these will cover additional technologies or applications, and will complement and supplement this Part. It has been necessary to introduce into EN 1992-3 a few clauses which are not specific to liquid retaining or containment structures and which strictly belong to Part 1-1. These are deemed valid interpretations of Part 1-1 and design complying with the requirements of EN 1992-3 are deemed to comply with the principles of EN 1992-1-1.

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It should be noted that any product, such as concrete pipes, which are manufactured and used in accordance with a product standard for a watertight product, will be deemed to satisfy the requirements, including detailing, of this code without further calculation.

There are specific regulations for the surfaces of storage structures which are designed to contain foodstuffs or potable water. These should be referred to as necessary and their provisions are not covered in this code.

In using this document in practice, particular regard should be paid to the underlying assumptions and conditions given in 1.3 of EN 1992-1-1.

The nine chapters of this document are complemented by four Informative Annexes. These Annexes have been introduced to provide general information on material and structural behaviour which may be used in the absence of information specifically related to the actual materials used or actual conditions of service.

As indicated above, reference should be made to National annexes which will give details of compatible supporting standards to be used. For this Part of Eurocode 2, particular attention is drawn to EN 206-1 (Concrete - performance, production, placing and compliance criteria).

For EN 1992-3, the following additional sub-clauses apply.

This Part 3 of Eurocode 2 complements EN 1992-1-1 for the particular aspects of liquid retaining structures and structures for the containment of granular solids.

The framework and structure of this Part 3 correspond to EN 1992-1-1. However, Part 3 contains Principles and Application Rules which are specific to liquid retaining and containment structures.

Where a particular sub-clause of EN 1992-1-1 is not mentioned in this EN 1992-3, that sub-clause of EN 1992-1-1 applies as far as deemed appropriate in each case.

Some Principles and Application Rules of EN 1992-1-1 are modified or replaced in this Part, in which case the modified versions supersede those in EN 1992-1-1 for the design of liquid retaining or containment structures.

Where a Principle or Application Rule in EN 1992-1-1 is modified or replaced, the new number is identified by the addition of 100 to the original number. Where a new Principle or Application Rule is added, it is identified by a number which follows the last number in the appropriate clause in EN 1992-1-1 with 100 added to it.

A subject not covered by EN 1992-1-1 is introduced in this Part by a new sub-clause. The sub-clause number for this follows the most appropriate clause number in EN 1992-1-1.

The numbering of equations, figures, footnotes and tables in this Part follow the same principles as the clause numbering as described above.

National annex for EN 1992-3

This standard gives values with notes indicating where national choices may have to be made. Therefore the national Standard implementing EN 1992-3 should have a National annex containing all Nationally Determined Parameters to be used for the design of liquid retaining and containment structures to be constructed in the relevant country.

National choice is allowed in EN 1992-3 through the following clauses:

7.3.1 (111)

7.3.1 (112)

7.3.3

8.10.3.3 (102) and (103)

9.11.1 (102)

Section 1 General

1.1 Scope

Replacement of clause 1.1.2 in EN 1992-1-1 by:

1.1.2 Scope of Part 3 of Eurocode 2

(101)P Part 3 of EN 1992 covers additional rules to those in Part 1 for the design of structures constructed from plain or lightly reinforced concrete, reinforced concrete or prestressed concrete for the containment of liquids or granular solids.

(102)P Principles and Application Rules are given in this Part for the design of those elements of structure which directly support the stored liquids or materials (i.e. the directly loaded walls of tanks, reservoirs or silos). Other elements which support these primary elements (for example, the tower structure which supports the tank in a water tower) should be designed according to the provisions of Part 1-1.

(103)P This part does not cover:

- Structures for the storage of materials at very low or very high temperatures
- Structures for the storage of hazardous materials the leakage of which could constitute a major health or safety risk.
- The selection and design of liners or coatings and the consequences of the choice of these on the design of the structure.
- Pressurised vessels.
- Floating structures
- Large dams
- Gas tightness

(104) This code is valid for stored materials which are permanently at a temperature between -40°C and $+200^{\circ}\text{C}$.

(105) For the selection and design of liners or coatings, reference should be made to appropriate documents.

(106) It is recognised that, while this code is specifically concerned with structures for the containment of liquids and granular materials, the clauses covering design for liquid tightness may also be relevant to other types of structure where liquid tightness is required.

(107) In clauses relating to leakage and durability, this code mainly covers aqueous liquids. Where other liquids are stored in direct contact with structural concrete, reference should be made to specialist literature.

1.2 Normative references

The following normative documents contain provisions that, though referenced in this text, constitute provisions of this European Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this European Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies.

EN 1990, Eurocode, *Basis of structural design*

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