



# SLOVENSKI STANDARD

## SIST EN 13670:2010

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SIST ENV 13670-1:2003

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**Izvajanje betonskih konstrukcij**

Execution of concrete structures

Ausführung von Tragwerken aus Beton

Exécution des structures en béton

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**Ta slovenski standard je istoveten z: EN 13670:2009**

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**ICS:**

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**Execution of concrete structures**

Exécution des structures en béton

Ausführung von Tragwerken aus Beton

This European Standard was approved by CEN on 17 September 2009.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
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EUROPÄISCHES KOMITEE FÜR NORMUNG

**Management Centre: Avenue Marnix 17, B-1000 Brussels**

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## Foreword

This document (EN 13670:2009) has been prepared by Technical Committee CEN/TC 104 "Concrete and related products", the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by June 2010, and conflicting national standards shall be withdrawn at the latest by June 2010.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes ENV 13670-1:2000.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EC Directive(s).

Because of the close connection between design rules and rules for execution, CEN/TC 104/SC 2 has developed this standard in liaison with CEN/TC 250/SC 2, and CEN TC 229

According to the CEN/CENELEC Internal Regulations, the national standards 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 the United Kingdom.

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## Introduction

This European Standard applies to the execution of concrete structures to achieve the intended level of safety and serviceability during its service life, as given by EN 1990, *Eurocode – Basis of structural design*, EN 1992, *Eurocode 2 – Design of concrete structures* and EN 1994, *Eurocode 4 – Design of composite steel and concrete structures*, with the Nationally Determined Parameters (NDPs) applicable in the place of use.

This European Standard has three functions:

- to transfer the requirements set during design to the constructor i.e. to be a link between design and execution;
- to give a set of standardized technical requirements for the execution when ordering a concrete structure;
- to serve as a check list for the designer to ensure that he provides the constructor with all relevant technical information for the execution of the structure (see Annex A).

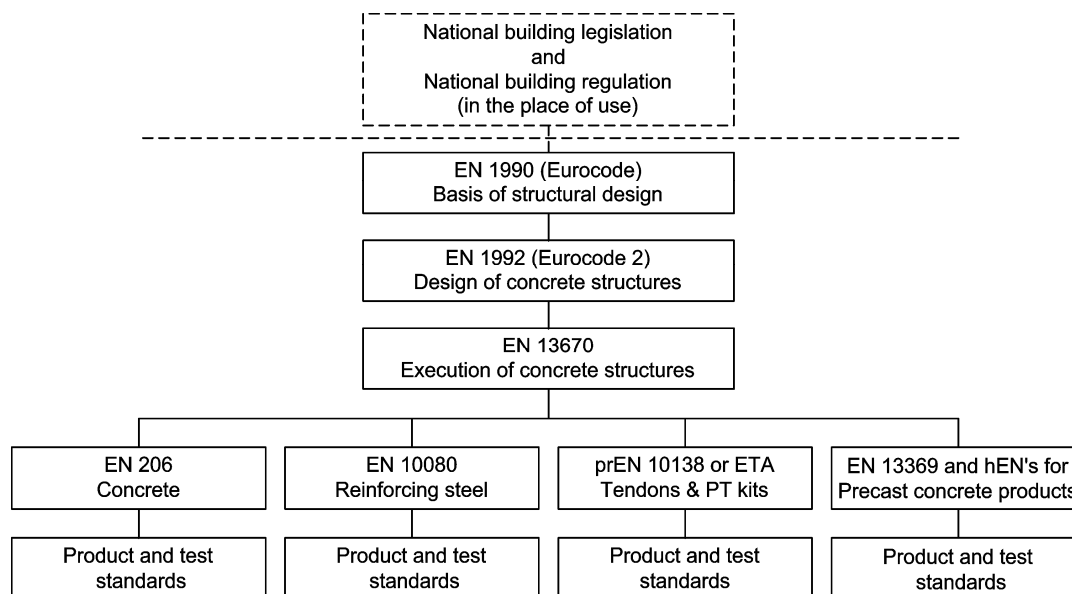
In order to achieve these objectives, the design shall result in a set of documents and drawings giving all information required for the execution of the work in accordance with the plans. This set of documents is, in this European Standard, referred to as the "execution specification". This standard leaves a number of items open to be decided in the execution specification.

In areas where national provisions shall apply these should be referred to in the execution specification.

It is recognised in this European Standard that areas such as detailed requirements for competence of personnel, and details related to the Quality Management are within the competence of the Member States.

If the national CEN member publishes a National Annex to this standard, it may refer to national standards approved and published by the CEN member or national provisions, which supplement this standard, alternatively the supplementing rules can be given directly in the National Annex

A detailed overview of the system of European Standards related to concrete works is shown in Figure 1.



**Figure 1 — System of European Standards as basis for design, execution and materials selection for concrete works (only main modules)**



## 1 Scope

- (1) This European Standard gives common requirements for execution of concrete structures, it applies to both in-situ works and construction using prefabricated concrete elements.
- (2) This standard expects the execution specification to state all the specific requirements relevant to the particular structure.
- (3) This standard is applicable to permanent as well as temporary concrete structures.
- (4) Additional or different requirements should be considered and, if required, given in the execution specification when using:
  - a) lightweight aggregate concrete;
  - b) other materials (e.g. fibres) or constituent materials;
  - c) special technologies/innovative designs.
- (5) This standard does not apply to concrete members used only as equipment or construction aids for the execution.
- (6) This standard does not cover the specification, production and conformity of concrete.
- (7) This standard is not applicable to the production of precast concrete elements made in accordance with product standards.
- (8) This standard does not cover safety and health aspects of execution, or third party safety requirements.
- (9) This standard does not cover contractual issues or responsibilities for the identified actions.

NOTE It is within the concept of this standard that supplementing requirements can be given for the individual project in the execution specification, on a national level in a national annex, or on a general basis in European standards for special applications e.g. standards for special geotechnical works.

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 206-1, *Concrete — Part 1: Specification, performance, production and conformity*

EN 446, *Grout for prestressing tendons — Grouting procedures*

EN 447, *Grout for prestressing tendons — Basic requirements*

EN 523, *Steel strip sheaths for prestressing tendons — Terminology, requirements, quality control*

EN 10080, *Steel for the reinforcement of concrete — Weldable reinforcing steel — General*

EN ISO 17660-1, *Welding — Welding of reinforcing steel — Part 1: Load-bearing welded joints (ISO 17660-1:2006)*

EN ISO 17660-2, *Welding — Welding of reinforcing steel — Part 2: Non load-bearing welded joints (ISO 17660-2:2006)*

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ETAG 013, *Guideline for European Technical Approval of Post-tensioning kits for prestressing of structures*  
*These are commonly called post-tensioning systems*<sup>1)</sup>

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

#### 3.1

##### **backpropping**

propping installed at levels below the slab that supports the falsework in order to distribute the load to suitable support

#### 3.2

##### **chair for reinforcement**

device used to secure the position between reinforcement layers e.g. supporting top reinforcement in a slab

#### 3.3

##### **construction works**

everything that is constructed or results from construction operations

[EN 1990]

NOTE The term covers both building and civil engineering works. It refers to the complete construction works comprising structural and non-structural and geotechnical elements.

#### 3.4

##### **constructor**

organization executing the works

#### 3.5

##### **erection specification**

documents covering all drawings, technical data and requirements required for the safe erection of precast elements

#### 3.6

##### **execution**

all activities carried out for the physical completion of the work, i.e. procurement, scaffolding, formwork, reinforcing, concreting, curing, erection of precast elements etc., and the inspection and documentation thereof

#### 3.7

##### **execution class**

classified set of requirements specified for the execution of the works as a whole or an individual component

#### 3.8

##### **execution specification**

documents covering all drawings, technical data and requirements necessary for the execution of a particular project

NOTE The execution specification is not one document but signifies the total sum of documents required for the execution of the work as provided by the designer to the constructor. It includes the project specification prepared to supplement and qualify the requirements of this European Standard, as well as referring to the national provisions relevant in the place of use.

1) Available free online at [www.eota.be](http://www.eota.be)

**3.9****falsework**

temporary support for a part of a structure while it is not self-supporting and for associated service load

**3.10****formwork**

structure, permanent or temporary, for containing poured concrete, moulding it to the required dimensions and supporting it until it is able to support itself

NOTE Formwork consists of the face contact material and the bearers directly supporting the face contact material.

**3.11****inspection**

conformity evaluation by observation and judgement accompanied as appropriate by measurement, testing or gauging

[EN ISO 9000]

**3.12****method statement**

documentation describing the methods and procedures to be used to perform the work

**3.13****permitted deviation**

permitted algebraic differences between the limits of size and the corresponding reference size

[Adapted from ISO 1803:1997, 3.8]

**3.14****precast concrete element**

concrete element cast and cured in a place other than the final location of use (factory produced or site manufactured)

NOTE 1 Precast concrete element manufactured in compliance with relevant European product standard is called precast concrete product.

NOTE 2 In this standard the shorter terms "precast element" and "precast product" are used.

**3.15****project specification**

project specific document describing the requirements applicable for the particular project

**3.16****quality plan**

document specifying which procedures and associated resources shall be applied by whom and when to a specific project, product, process or contract

[EN ISO 9000:2005, 3.7.5]

NOTE Guidance might be found in EN ISO 9000 concerning the content of a quality plan.

**3.17****reference line**

line defined in the execution specification to which positions are related

**EN 13670:2009 (E)****3.18****secondary line**

any line used for the purpose of setting-out the proposed building and for checking and compliance of the building or building parts

[ISO 4463-1:1989, 4.4]

**3.19****spacer**

device used to secure correct spacing between the formwork and the reinforcement

**3.20****surface finish**

description of the appearance of the concrete surface including aspects of geometry, texture, colour etc.

**3.21****temporary structure**

structure designed for a short design working life

**3.22****tolerance**

difference between upper limit of size and the lower limit of size

[ISO 1803:1997, 3.11]

NOTE 1 Geometrical tolerances for precast concrete elements are subdivided as follows:

- a) production tolerances as defined in the product standards;
- b) erection tolerances i.e. geometrical tolerances relating to location, verticality, horizontality or other characteristics of the construction assembly;
- c) construction tolerances i.e. geometrical tolerances that are a combination of production, site construction and erection tolerances.

NOTE 2 Tolerance is an absolute value without sign, it is however commonly expressed by "the sum of the  $\pm$  permitted deviation" so that the value of the tolerance is implicit.

**3.23****normal tolerances**

basic limits for geometrical deviations that ensures that the structure:

- a) satisfies the design assumptions;
- b) achieves other functional requirements of the construction works.

NOTE In this standard, normal tolerances are referred to as tolerance class 1.

**3.24****special tolerances**

other tolerances than normal tolerances

**3.25****works**

parts of the construction works that are structural concrete work and are described in the execution specification

## 4 Execution management

### 4.1 Assumptions

(1) This European standard assumes:

- a) the availability of a comprehensive design of the structure;
- b) a project management in charge of the supervision of the works which will enable the execution of a conforming structure;
- c) a site management which will take charge of the organisation of the works and enable the correct and safe use of the equipment and machinery, the required quality of materials, the execution of a conforming structure and its safe use up to the delivery of the works.

(2) When precast elements are used, the following additional assumptions are made:

- a) the availability of a specific design of the precast elements conforming to the relevant standards;
- b) the availability of a design coordination between precast elements and site manufactured components;
- c) a technical specification of the precast structure with requirements for installation;
- d) there is an erection management to direct the erection team.

(3) This European standard presupposes that the work is carried out with the necessary skill and adequate equipment and resources to perform the work in accordance with this European Standard and the requirements of the execution specification.

NOTE In some countries, there are special requirements regarding the level of knowledge, training and experience of personnel involved in the various tasks.

(4) It is assumed that the constructor will comply with national regulations and standards e.g. with respect to:

- a) quality management;
- b) qualifications for the personnel doing the various activities covered by this standard;
- c) health and safety aspects of construction;
- d) environmental aspects.

(5) This standard assumes that the structure after completion is used as intended in the design and submitted to the planned inspection and maintenance necessary to achieve the intended design working life and to detect weaknesses or any unexpected behaviour.

### 4.2 Documentation

#### 4.2.1 Execution specification

(1) Before commencement of execution of any part of the works, the execution specification relevant to that part of the works shall be complete and available.

(2) The following items shall be included in the execution specification:

- a) a reference to this European standard and, if published, and its National Annex;

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- b) a reference to other relevant European standards and ETA's;
- c) a reference to relevant national regulations and standards;
- d) a project specification giving information and requirements for the particular project prepared to supplement and qualify the requirements of the above listed documents;
- e) drawings and other technical documents needed for the execution.

NOTE Informative Annex A, Table A.1 contains a checklist of requirements and information that may have to be included in the execution specification as appropriate. Informative Annex H gives guidance on the content of a national annex to this standard, a national annex may cover any of the areas referred to as open for specification by the execution specification.

(3) In addition where relevant, procedures shall be established for:

- a) making alterations to previously agreed requirements;
- b) the distribution, the filing and recording of technical documents used for the works.

**4.2.2 Quality Plan**

(1) Where a quality plan is required by the execution specification, it shall be available at site.

(2) There may be one quality plan covering all activities or one overall plan supplemented by separate plans for the various phases and activities to be performed.

**4.2.3 Execution documentation**

(1) A record shall be made giving the required information as specified for the Execution Class in Tables 1, 2 and 3.

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**4.2.4 Special record documentation**

(1) If special documentation is required, the type and extent of the documentation shall be stated in the execution specification.

**4.3 Quality Management****4.3.1 Execution classes**

(1) Supervision and inspection of the work shall verify that the construction is completed in accordance with the execution specification.

(2) Inspection in this context refers to verifying conformity of the properties of products and materials to be used as well as inspection of the execution of the works.

(3) Requirements for quality management are specified using one of the following 3 classes, for which the required strictness increases from class 1 to class 3:

- a) Execution Class 1;
- b) Execution Class 2;
- c) Execution Class 3.

(4) The execution class may refer to the complete structure, to components of the structure or to certain materials/technologies used for the execution.

(5) The execution class to be used shall be stated in the execution specification.

(6) This European Standard does not deal with provisions related to degree of independence of the personnel performing the inspection.

(7) Further detailing of the requirements for the quality management regime in excess of what is given in this document, may be stated in the execution specification.

NOTE Informative Annex B gives guidance on quality management.

#### 4.3.2 Inspection of materials and products

(1) The inspection requirements for conformity with the execution specification are given in Table 1.

**Table 1 — Inspection for materials and products**

Subject	Execution Class 1	Execution Class 2	Execution Class 3
Materials for scaffold, formwork and falsework <sup>a</sup>	In accordance with 5.1 and 5.2		
Reinforcing steel <sup>a</sup>	In accordance with 6.2		
Prestressing system components <sup>a</sup>	Not to be used in this class	In accordance with 7.2	
Fresh concrete; <sup>a, c</sup> ready-mixed or site-mixed	In accordance with 8.1 and 8.3 At reception of ready-mixed concrete a delivery ticket shall be present		
Other items <sup>a, b</sup>	In accordance with the execution specification		
Precast elements <sup>a</sup>	In accordance with 9.2 and 9.3		
Inspection report	Not required	Required	

<sup>a</sup> Products bearing the CE mark or certified by an approved certification body shall be checked against the delivery ticket and visually inspected. In cases of doubt, further inspection shall be undertaken to check that the product conforms to its specification. Other products shall be subject to inspection and acceptance testing as defined in the execution specification.

<sup>b</sup> For example, items such as embedded steel components etc.

<sup>c</sup> If prescribed concrete is used, the relevant properties are to be checked by tests.

#### 4.3.3 Inspection of execution

(1) The inspection requirements for conformity with the execution specification are given in Table 2 and Table 3.