



# SLOVENSKI STANDARD SIST EN 12390-3:2009

01-julij-2009

BUXca Yý U  
SIST EN 12390-3:2002

---

DfYg\_i ýUbY'ghfYbY[ UVYfcbU!" "XY. H'U bUfXbcghdfYg\_i ýUbWj

Testing hardened concrete - Part 3: Compressive strength of test specimens

Prüfung von Festbeton - Teil 3: Druckfestigkeit von Probekörpern

**iTeh STANDARD PREVIEW**  
Essais pour béton durci - Partie 3: Résistance à la compression des éprouvettes  
(standards.iteh.ai)

**Ta slovenski standard je istoveten z: EN 12390-3:2009**

<https://standards.iteh.ai/catalog/standards/sist/ed9fe872-c8a6-49ad-98ee-2879e24de618/sist-en-12390-3-2009>

---

**ICS:**

91.100.30      Beton in betonski izdelki      Concrete and concrete products

**SIST EN 12390-3:2009**

**en,fr,de**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 12390-3:2009

<https://standards.iteh.ai/catalog/standards/sist/ed9fe872-c8a6-49ad-98ee-2879e24de618/sist-en-12390-3-2009>

EUROPEAN STANDARD

**EN 12390-3**

NORME EUROPÉENNE

EUROPÄISCHE NORM

February 2009

ICS 91.100.30

Supersedes EN 12390-3:2001

English Version

## Testing hardened concrete - Part 3: Compressive strength of test specimens

Essais pour béton durci - Partie 3: Résistance à la compression des éprouvettes

Prüfung von Festbeton - Teil 3: Druckfestigkeit von Probekörpern

This European Standard was approved by CEN on 27 December 2008.

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.

**iTeh STANDARD PREVIEW**

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.

[SIST EN 12390-3:2009](https://standards.iteh.ai/catalog/standards/sist/ed9fe872-c8a6-49ad-98ee-2879e24de618/sist-en-12390-3-2009)

<https://standards.iteh.ai/catalog/standards/sist/ed9fe872-c8a6-49ad-98ee-2879e24de618/sist-en-12390-3-2009>



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

Management Centre: Avenue Marnix 17, B-1000 Brussels

**Contents**

Page

Foreword.....	3
1 Scope .....	5
2 Normative references .....	5
3 Principle .....	5
4 Apparatus .....	5
5 Test specimens .....	5
6 Procedure .....	6
7 Expression of results .....	7
8 Test report .....	7
9 Precision .....	10
Annex A (normative) Adjustment of test specimens .....	11
Annex B (normative) Procedure for testing specimens with dimensions which are outside the tolerances of the designated sizes of EN 12390-1 .....	16
Bibliography .....	19

ITeH STANDARD PREVIEW  
(standards.iteh.ai)

SIST EN 12390-3:2009

<https://standards.iteh.ai/catalog/standards/sist/ed9fe872-c8a6-49ad-98ee-2879e24de618/sist-en-12390-3-2009>

## Foreword

This document (EN 12390-3:2009) 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 August 2009, and conflicting national standards shall be withdrawn at the latest by August 2009.

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 EN 12390-3:2001.

It is recognised good practice to include measurement of density prior to the determination of compressive strength.

The methods for adjusting the ends of test specimens, given in Annex A, have been validated in a laboratory inter-comparison, part-funded by the EC under the Measurement and Testing Programme; contract MATI-CT-94-0043.

This standard is one of a series concerned with testing concrete.

The series EN 12390 includes the following parts:

EN 12390 Testing hardened concrete – [SIST EN 12390-3:2009](https://standards.iteh.ai/catalog/standards/sist/ed9fe872-c8a6-49ad-98ee-2879e24d-618/sist-en-12390-3-2009)

Part 1: Shape, dimensions and other requirements for specimens and moulds;

Part 2: Making and curing specimens for strength tests;

Part 3: Compressive strength of test specimens;

Part 4: Compressive strength - Specification for testing machines;

Part 5: Flexural strength of test specimens;

Part 6: Tensile splitting strength of test specimens;

Part 7: Density of hardened concrete;

Part 8: Depth of penetration of water under pressure.

The following amendments have been made to the 2001-12 edition of this standard:

- editorial revision
- the compressive strength to be expressed to the nearest 0,1 MPa (N/mm<sup>2</sup>) instead of 0,5 MPa (N/mm<sup>2</sup>)
- the loading rate has been changed from between 0,2 MPa/s and 1,0 MPa/s to 0,6 ± 0,2 MPa/s
- the allowable tolerance for specimens which do not meet the tolerance given in EN 12390-1 for designated size has been increased

**EN 12390-3:2009 (E)**

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.

## **iTeh STANDARD PREVIEW (standards.iteh.ai)**

SIST EN 12390-3:2009

<https://standards.iteh.ai/catalog/standards/sist/ed9fe872-c8a6-49ad-98ee-2879e24de618/sist-en-12390-3-2009>

## 1 Scope

This European Standard specifies a method for the determination of the compressive strength of test specimens of hardened concrete.

## 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 197-1, *Cement — Part 1: Composition, specifications and conformity criteria for common cements*

EN 12350-1, *Testing fresh concrete — Part 1: Sampling*

EN 12390-1, *Testing hardened concrete - Part 1: Shape, dimensions and other requirements for specimens and moulds*

EN 12390-2, *Testing hardened concrete — Part 2: Making and curing specimens for strength tests*

EN 12390-4, *Testing hardened concrete — Part 4: Compressive strength — Specification for testing machines*

EN 12504-1, *Testing concrete in structures — Part 1: Cored specimens — Taking, examining and testing in compression*

ISO 3310-1, *Test sieves; technical requirements and testing — Part 1: Test sieves of metal wire cloth*

<https://standards.iteh.ai/catalog/standards/sist/ed9fe872-c8a6-49ad-98ee-2879e24de618/sist-en-12390-3-2009>

## 3 Principle

Specimens are loaded to failure in a compression testing machine conforming to EN 12390-4. The maximum load sustained by the specimen is recorded and the compressive strength of the concrete is calculated.

## 4 Apparatus

Compression testing machine, conforming to EN 12390-4.

## 5 Test specimens

### 5.1 Requirement

The test specimen shall be a cube, cylinder or core meeting the requirements of EN 12350-1, EN 12390-1, EN 12390-2, or EN 12504-1. If the dimension of the test specimen does not conform to the tolerances for designated size in EN 12390-1, it can be tested in accordance with the procedure given in Annex B.

NOTE Damaged specimens or specimens which are badly honeycombed should not be tested.

**EN 12390-3:2009 (E)****5.2 Adjustment of test specimens**

Where the dimensions or shapes of test specimens do not conform to the requirements given in EN 12390-1 because they exceed the respective tolerances, they shall be rejected, adjusted or tested in accordance with Annex B.

One of the methods given in Annex A shall be used to adjust specimens.

**6 Procedure****6.1 Specimen preparation and positioning**

Wipe all testing machine bearing surfaces clean and remove any loose grit or other extraneous material from the surfaces of the specimen that will be in contact with the platens.

Do not use packing, other than auxiliary platens or spacing blocks (see EN 12390-4) between the specimen and the platens of the testing machine.

Wipe the excess moisture from the surface of the specimen before placing in the testing machine.

Position the cube specimens so that the load is applied perpendicularly to the direction of casting.

Centre the specimen with respect to the lower platen to an accuracy of 1 % of the designated size of cubic, or designated diameter of cylindrical specimens.

If auxiliary platens are used, align them with the top and bottom face of the specimen.

With two-column testing machines, cubic specimens should be placed with the trowelled surface facing a column.

iTeH STANDARD PREVIEW  
(standards.iteh.ai)  
SIST EN 12390-3:2009  
<https://standards.iteh.ai/catalog/standards/sist/ed9fe872-c8a6-49ad-98ee-2879e24de618/sist-en-12390-3-2009>

**6.2 Loading**

Select a constant rate of loading within the range  $0,6 \pm 0,2$  MPa/s (N/mm<sup>2</sup>-s). After the application of the initial load, which does not exceed approximately 30% of the failure load, apply the load to the specimen without shock and increase continuously at the selected constant rate  $\pm 10$  %, until no greater load can be sustained.

When using manually controlled testing machines, correct any tendency for the selected rate of loading to decrease, as specimen failure is approached by appropriate adjustment of the controls.

Record the maximum load indicated in kN.

NOTE Further guidance on loading rates for high and low strength concrete e.g. above 80 MPa and below 20 MPa cube strengths, may be given in national Annex NA

**6.3 Assessment of type of failure**

Examples of the failure of specimen showing that the tests have proceeded satisfactorily are given in Figure 1 for cubes and in Figure 3 for cylinders.

Examples for unsatisfactory failure of specimens are shown in Figure 2 for cubes and in Figure 4 for cylinders.

If failure is unsatisfactory this shall be recorded with reference to the pattern letter according to Figure 2 or 4 closest to that observed.

NOTE Unsatisfactory failures can be caused by:



insufficient attention to testing procedures, especially positioning of the specimen;

a fault with the testing machine.

For cylindrical specimens, failure of the capping before the concrete is an unsatisfactory failure.

## 7 Expression of results

The compressive strength is given by the equation:

$$f_c = \frac{F}{A_c}$$

where

$f_c$  is the compressive strength, in MPa (N/mm<sup>2</sup>);

$F$  is the maximum load at failure, in N;

$A_c$  is the cross-sectional area of the specimen on which the compressive force acts, calculated from the designated size of the specimen (see EN 12390-1) or from measurements on the specimen if tested according to Annex B, in mm<sup>2</sup>.

The compressive strength shall be expressed to the nearest 0,1 MPa (N/mm<sup>2</sup>).

(standards.iteh.ai)

## 8 Test report

SIST EN 12390-3:2009

The report shall include: <https://standards.iteh.ai/catalog/standards/sist/ed9fe872-c8a6-49ad-98ee-2879e24de618/sist-en-12390-3-2009>

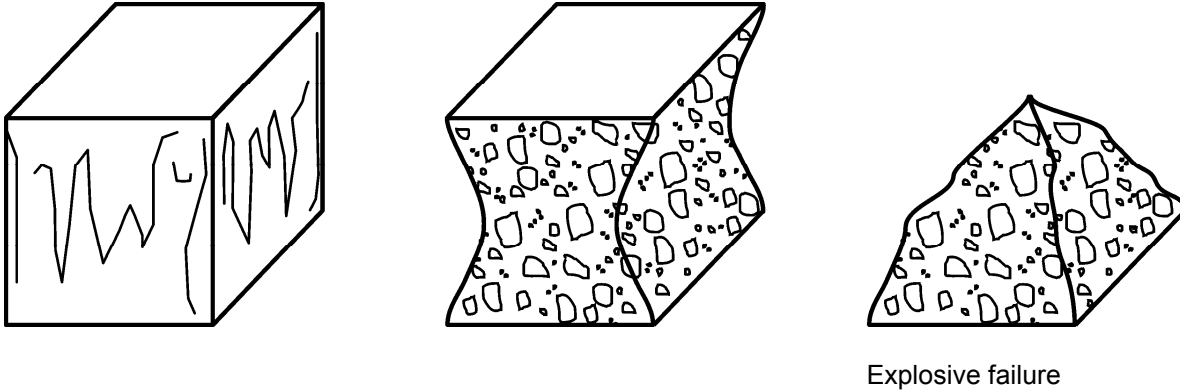
- a) identification of the test specimen;
- b) designated dimensions of the specimen or if tested in accordance with Annex B, actual dimensions;
- c) details of adjustment by grinding/capping (if appropriate);
- d) date of test;
- e) maximum load at failure, in kN;
- f) compressive strength of specimen, to the nearest 0,1 MPa (N/mm<sup>2</sup>);
- g) unsatisfactory failure (if appropriate) and if unsatisfactory the closest type;
- h) any deviations from the standard method of testing;
- i) a declaration from the person technically responsible for the test that it was carried out in accordance with this document, except as detailed in item h).

The report may include:

- j) mass of the specimen;
- k) apparent density of specimen, to the nearest 10 kg/m<sup>3</sup>;
- l) condition of the specimen on receipt;

## EN 12390-3:2009 (E)

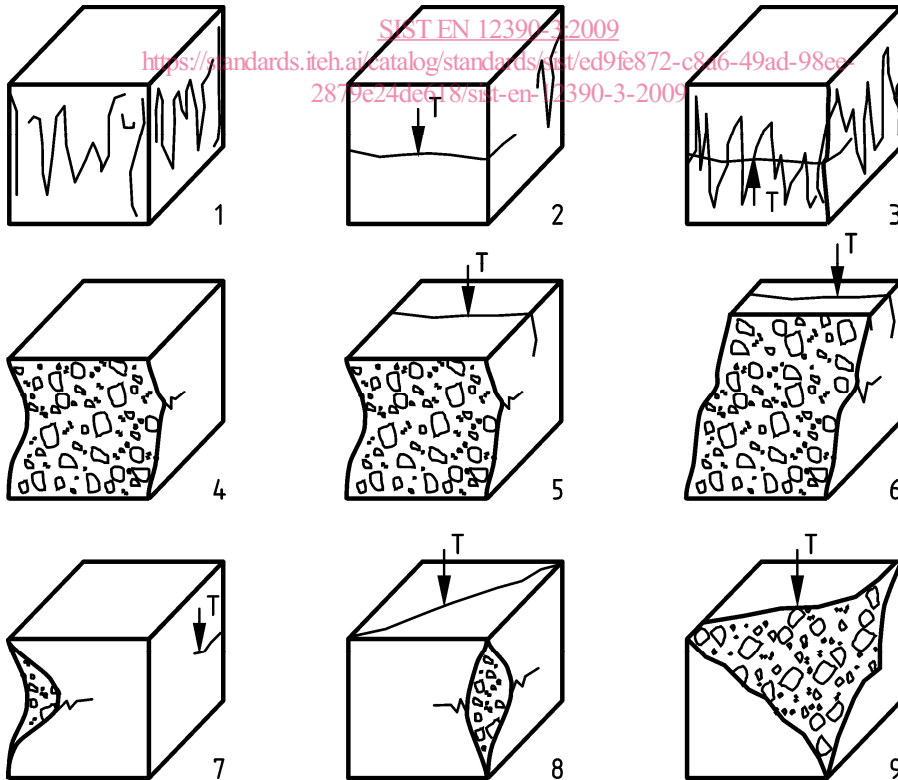
- m) curing conditions since receipt;
- n) time of test (if appropriate);
- o) age of specimen at time of test (if known).



NOTE All four exposed faces are cracked approximately equally, generally with little damage to faces in contact with the platens.

Figure 1 — Satisfactory failures of cube specimens

iTeh STANDARD PREVIEW  
(standards.iteh.ai)



NOTE T = tensile crack

Figure 2 — Some unsatisfactory failures of cube specimens

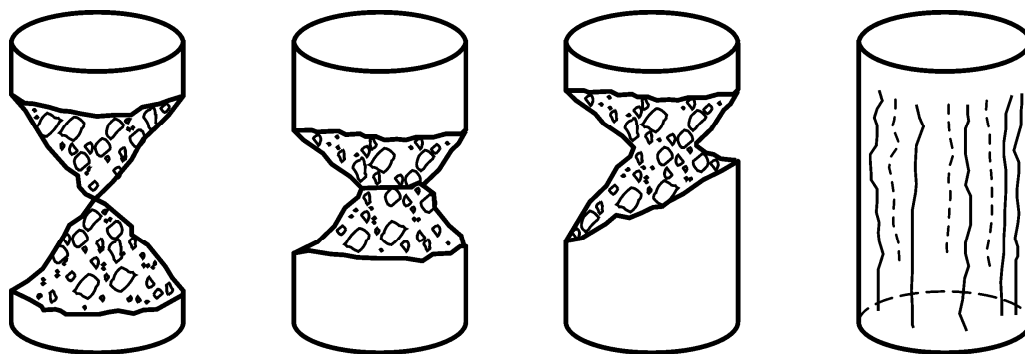


Figure 3 — Satisfactory failure of cylinder specimen

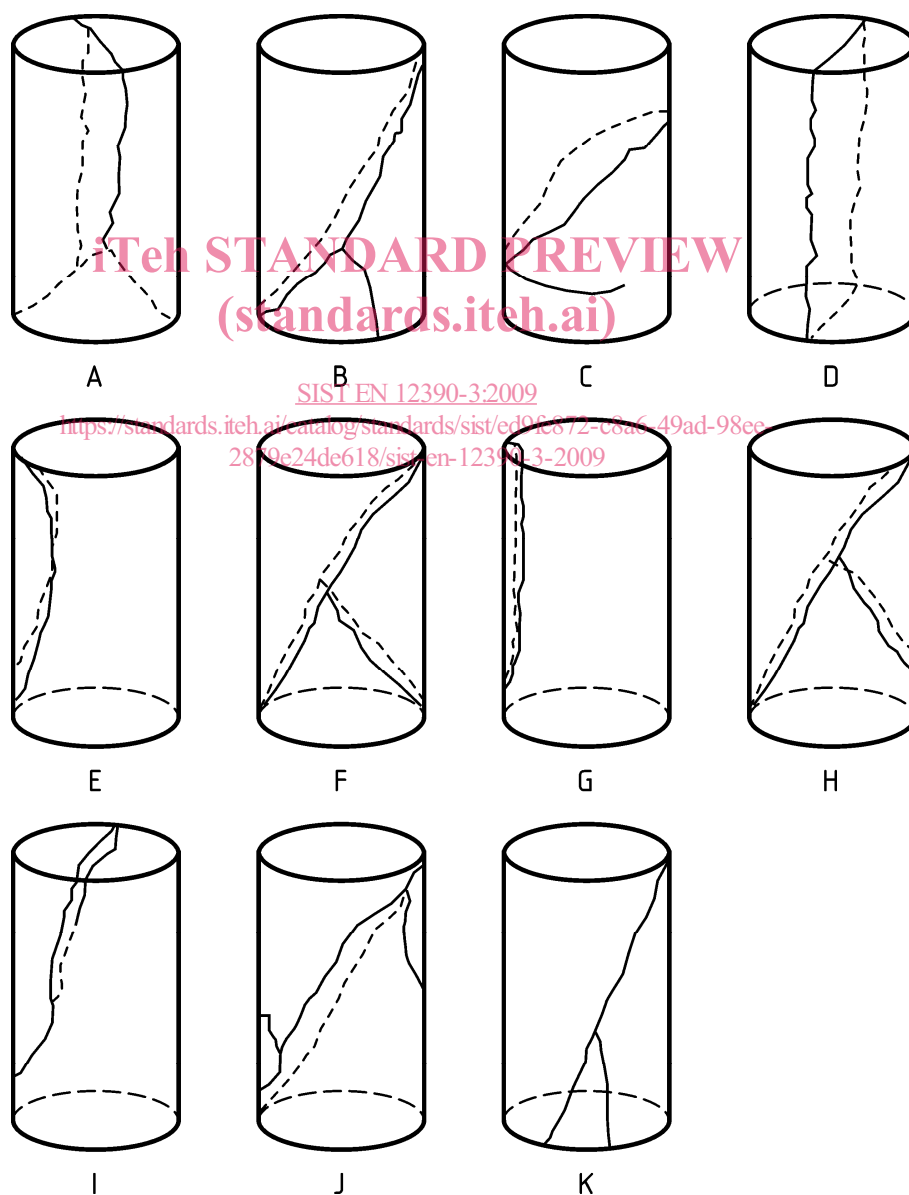


Figure 4 — Some unsatisfactory failures of cylinder specimens