ILNAS

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ILNAS-EN 12390-3:2019

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

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National Foreword

This European Standard EN 12390-3:2019 was adopted as Luxembourgish Standard ILNAS-EN 12390-3:2019.

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EUROPEAN STANDARD EN 12390-3

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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 29 April 2019.

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-CENELEC 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-CENELEC Management Centre has the same status as the official versions.

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

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European foreword

This document (EN 12390-3:2019) has been prepared by Technical Committee CEN/TC 104 “Concrete and related products”, the secretariat of which is held by SN.

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of an identical text or by endorsement, at the latest by December 2019, and conflicting national standards shall be withdrawn at the latest by December 2019.

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

This document supersedes EN 12390-3:2009.

It is recognized 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 on testing concrete.

EN 12390, *Testing hardened concrete*, consists of the following parts:

— *Part 1: Shape, dimensions and other requirements of 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;*

— *Part 11: Determination of the chloride resistance of concrete, unidirectional diffusion;*

— *Part 12: Determination of the potential carbonation resistance of concrete: Accelerated carbonation method (in preparation);*

— *Part 13: Determination of secant modulus of elasticity in compression;*

— *Part 14: Semi-adiabatic method for the determination of heat released by concrete during its hardening process;*

— *Part 15: Adiabatic method for the determination of heat released by concrete during its hardening process;*

— *Part 16: Determination of the shrinkage of concrete (in preparation);*

— *Part 17: Determination of creep of concrete in compression (in preparation);*

— *Part 18: Determination of the chloride migration coefficient (in preparation).*

This edition includes the following significant technical changes with respect to EN 12390-3:2009:

— editorial revision;

— technical corrections;

— clarification of acceptable tolerances of test specimen size or diameter;

— clarification of procedure from when the specimen is removed from curing until being tested for strength.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

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

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 12390-7, *Testing hardened concrete — Part 7: Density of hardened concrete*

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*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

4 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.

5 Apparatus

Compression testing machine, conforming to EN 12390-4.

6 Test specimens

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 or diameter in EN 12390-1, it shall be rejected, adjusted or tested in accordance with the procedure given in Annex B.

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

If damaged specimens or specimens which are honeycombed are tested, their condition shall be noted in the test report in Clause 9, c).

7 Procedure

7.1 Specimen preparation and positioning

The load bearing surfaces of the specimen shall be moulded in the case of cube specimens or ground or capped in accordance with Annex A in the case of cylinder, core or adjusted specimens.

After removal of the specimen from curing, the specimens shall be tested for strength as soon as practicable, but within 10 hours. The test facility shall be at a temperature of (20 ± 5) °C (or (25 ± 5) °C in hot climates). Where specimens are to be stored in the testing facility for more than 4 hours they shall be protected from moisture loss e.g. by covering with wet hessian or impermeable membrane.

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.

With two-column testing machines, cubic specimens should be placed with the trowelled surface not in contact with the platens and facing a column.

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.

7.2 Loading

Select a constant rate of loading within the range 0,6 ± 0,2 MPa/s ($N/mm^2 \cdot s$). 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 ± 10 %, until no greater load can be sustained.

The initial load should be applied as close as possible to the selected rate of loading.

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.

During the final stages of the test, the load rate can be affected by the failure mode of the specimen. Nevertheless every effort should be made to maintain the selected loading rate as close as possible.

Record the maximum load indicated in kN.

NOTE Further guidance on loading rates for high and low strength concrete e.g. above 80 MPa (N/mm^2) and below 20 MPa (N/mm^2) cube strengths, may be given in provisions valid in the place of use of the concrete.