

Testing hardened concrete —

Part 4: Compressive strength — Specification for testing machines

The European Standard EN 12390-4:2000 has the status of a
British Standard

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National foreword

This British Standard is the official English language version of EN 12390-4:2000. It will supersede BS 1881-115:1986, which will be withdrawn in 2003 when the full package of the related concrete package is available.

The UK participation in its preparation was entrusted by Technical Committee B/517, Concrete, to Subcommittee B/517/1, Production and testing, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 15 and a back cover.

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Druckfestigkeit – Anforderungen an Prüfmaschinen

This European Standard was approved by CEN on 1 November 1999.

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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.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 104, Concrete (performance, production, placing and compliance criteria), 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of an identical text or by endorsement, at the latest by October 2000, and conflicting national standards shall be withdrawn at the latest by December 2003.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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

During the 1980s a number of countries found it necessary to introduce standards to specify more precisely the performance of compression machines for testing concrete specimens. This standard has been written to continue this movement and to overcome the present lack of a European Standard.

A draft for this standard was published in 1996 for CEN enquiry as prEN 12390. It was one of a series of individually numbered test methods for fresh or hardened concrete. For convenience it has now been decided to combine these separate draft standards into three new standards with separate parts for each method, as follows:

- Testing fresh concrete (EN 12350);
- Testing hardened concrete (EN 12390);
- Testing concrete in structures (EN 12504).

This series, EN 12390, includes the following parts where the brackets give the numbers under which the particular test methods were published for CEN enquiry:

- Part 1: Shape, dimensions and other requirements of specimens and moulds (former prEN 12356:1996);
- Part 2: Making and curing specimens for strength tests (former prEN 12379:1996);
- Part 3: Compressive strength of test specimens (former prEN 12394:1996);
- Part 4: Compressive strength – Specification for testing machines (former prEN 12390:1996);
- Part 5: Flexural strength of test specimens (former prEN 12359:1996);
- Part 6: Tensile splitting strength of test specimens (former prEN 12362:1996);
- Part 7: Density of hardened concrete (former prEN 12363:1996);
- Part 8: Depth of penetration of water under pressure (former prEN 12364:1996).

Three classes of testing machines are currently recognized, corresponding to scale accuracies of 1 %, 2 % and 3 %. It is evident that these accuracy classes have a direct impact upon the accuracy of the test result and it is a matter for each country to decide whether to limit the range of machine classes to, for example, 1 % and 2 %.

The requirement in this standard for the manner of force transfer is also important with regard to the effect upon measured compressive strength. However, the requirement can be difficult to satisfy on some older testing machines. It is therefore a matter for each country to decide whether, at present, this requirement shall apply only to new machines as written in this standard or whether it shall apply immediately to all machines.

The requirements for testing machines set out in this standard have been formulated to satisfy the needs of those compressive tests on concrete specimens which are specified in EN 206. Machines conforming to this standard can be suitable for other uses, but this needs to be carefully considered on an individual test basis. Particular care needs to be taken before using machines conforming to this standard for compressive tests on small specimens, e.g. those with lateral dimensions significantly less than 100 mm. The main concern is that the ball-seating fitted to the upper platen can be too large to align satisfactorily on the top of such small specimens and special adaptations can be required. Another concern is the ability to accurately determine the failure load of small or low strength specimens.

1 Scope

This standard specifies the requirements for the performance of compression testing machines for the measurement of the compressive strength of concrete.

2 References

This European Standard incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN ISO 7500-1: 1999

Metallic materials – Verification of static uniaxial testing machines – Part 1: Tension/compression testing machines; verification and calibration of the force-measuring system (ISO 7500-1:1999).

EN 10002-3

Metallic materials – Tensile testing – Part 3: Calibration of force proving instruments for the verification of uniaxial testing machines.

prEN 12390-1:1999

Testing hardened concrete – Part 1: Shape, dimensions and other requirements of specimens and moulds.

ISO 6507-1

Metallic materials – Vickers hardness test – Part 1: Test method.

ISO 4287: 1997

Geometrical Product Specification (GPS) – Surface texture: Profile method – Terms, definitions and surface texture parameters.

3 Definitions

For the purposes of this standard the following definitions apply.

3.1 auxiliary platen

separate platen used to protect the machine platens, usually of a size equal to the designated size of the specimen being tested

3.2 contact area

the part of the platen that comes into contact with the specimen

3.3 indicated force

the force indicated on the machine scale(s) or display

3.4 indication range

the total force range, from zero to maximum, displayed on the machine

3.5 machine platens

lower platen and upper platen with spherical seating both centred on the central vertical axis of the machine

3.6 measuring range

that part of an indication range over which the machine conforms with the accuracy values specified in this standard

3.7 relative accuracy error of

3.7.1 true force

the difference between the average indicated force and the true force expressed as a percentage of the true force

3.7.2 indicated force

the difference between the average true force and the indicated force expressed as a percentage of the indicated force

3.8 relative repeatability error of

3.8.1 true force

the greatest difference between the indicated forces corresponding to repeated applications of a true force expressed as a percentage of the true force

3.8.2 indicated force

the greatest difference between the true forces corresponding to repeated applications of an indicated force expressed as a percentage of the indicated force

3.9 resolution of force

the smallest increment of force that can be assessed, estimated, or read on any force indication range (see annex B)

3.10 spacing block

metal block used to adjust the space available to test specimens

3.11 true force

the force indicated on a calibrated force proving device

4 Construction of machines

4.1 Machine platens, auxiliary platens and spacing blocks

NOTE 1: The use of auxiliary platens is optional.

4.1.1 Machine and auxiliary platens shall be made of a material which shall not deform irreversibly when the machine is used.