

English Version

Testing hardened concrete - Part 4: Compressive strength - Specification for testing machines

Essais pour béton durci - Partie 4 : Résistance à la
compression - Caractéristiques des machines d'essai

Prüfung von Festbeton - Teil 4: Bestimmung der
Druckfestigkeit - Anforderungen an Prüfmaschinen

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (prEN 12390-4:2023) has been prepared by Technical Committee CEN/TC 104 “Concrete and related products”, the secretariat of which is held by SN.

This document will supersede EN 12390-4:2019.

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 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;*
- *Part 10: Determination of the carbonation resistance of concrete at atmospheric levels of carbon dioxide;*
- *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;*
- *Part 17: Determination of creep of concrete in compression.*

prEN 12390-4:2023 contains the following significant changes with respect to EN 12390-4:2019:

- Reference to compliance with EN ISO 7500-1
- insertion of Table 2 of EN ISO 7500-1
- creation of two classes of machines

Introduction

The requirements for testing machines set out in this document have been formulated to satisfy the needs of those compressive tests on concrete specimens which are specified in EN 206:2013+A2:2021. 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 document 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 document specifies the requirements for the performance of compression testing machines for the measurement of the compressive strength of 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 ISO 6507-1, *Metallic materials - Vickers hardness test - Part 1: Test method (ISO 6507-1)*

EN ISO 7500-1:2018, *Metallic materials - Calibration and verification of static uniaxial testing machines - Part 1: Tension/compression testing machines - Calibration and verification of the force-measuring system (ISO 7500-1:2018)*

EN ISO 21920-2, *Geometrical product specifications (GPS) - Surface texture: Profile -Part 2: Terms, definitions and surface texture parameters (ISO 21920-2)*

3 Terms and definitions

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

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

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1

auxiliary platen

separate platen usually of a size equal to the designated size of the specimen being tested

3.2

contact area

part of the platen that comes into contact with the specimen

3.3

indicated force

force indicated on the machine scale(s) or display

3.4

indication range

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

3.5

machine platens

lower platen and upper platen both centred on the central vertical axis of the machine and where the upper platen is spherically seated

3.6

measuring range

part of an indication range over which the machine conforms with the accuracy values specified in EN ISO 7500-1

3.7

spacing block

metal block to adjust the space available to test specimens

3.8

true force

force indicated on a calibrated force proving device

4 Construction of machines

4.1 General

Machines shall conform to EN ISO 7500-1:2018 with the following specifications:

4.2 Machine platens, auxiliary platens and spacing blocks

NOTE The use of auxiliary platens is optional.

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

4.2.2 Machine and auxiliary platens shall have a hardness value of at least 570HV30 (or 53HRC) when tested in accordance with EN ISO 6507-1.

4.2.3 The flatness tolerance for machine platens and auxiliary platens shall be 0,03 mm for the area in contact with the specimen.

NOTE For the purpose of this document, flatness can be assessed by the measurement of straightness in four positions (see EN 12390-1:2012, Annex B).

4.2.4 The roughness value (R_a) for the surface texture of machine and auxiliary platens shall be in the range 0,4 μm to 3,2 μm , when assessed in accordance with EN ISO 21920-2 for the area in contact with the specimens.

4.2.5 Platens are rectangular, square or circular. The dimensions of the surface of the machine platens and auxiliary platens in contact with the specimen shall surpass the dimensions of the specimen as placed in the machine'.

4.2.6 The two contact faces of an auxiliary platen shall be produced to be parallel to a tolerance of 0,05 mm.

4.2.7 Auxiliary platens shall be at least 23 mm thick.

4.2.8 Spacing blocks may be used if there is a requirement to reduce the distance between the machine platens.

For stability reasons, the total number of spacing blocks shall not exceed four. Spacing blocks shall be precisely centred along the machine axis.

4.2.9 A spacing block may be either circular or square in section and shall be rigidly supported from below.

A minimum diameter or length of side of 200 mm is recommended for spacing blocks.

4.2.10 Spacing blocks shall comply with the flatness and parallelism tolerances required for auxiliary platens (see 4.2.3 and 4.2.6).