BS EN 12390-1:2012

BSI Standards Publication

Testing hardened concrete

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

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National foreword

This British Standard is the UK implementation of EN 12390-1:2012. It supersedes BS EN 12390-1:2000 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/517/1, Concrete production and testing.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Published by BSI Standards Limited 2012

ISBN 978 0 580 76920 7

ICS 91.100.30

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 November 2012.

Amendments issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 12390-1

September 2012

ICS 91.100.30

Supersedes EN 12390-1:2000

English Version

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

Essai pour béton durci - Partie 1 : Forme, dimensions et autres exigences aux éprouvettes et aux moules

Prüfung von Festbeton - Teil 1: Form, Maße und andere Anforderungen für Probekörper und Formen

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Ref. No. EN 12390-1:2012: E

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Foreword

This document (EN 12390-1:2012) 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of an identical text or by endorsement, at the latest by March 2013, and conflicting national standards shall be withdrawn at the latest by March 2013.

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

This document supersedes EN 12390-1:2000.

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 9: Freeze-thaw resistance — Scaling (technical specification);*

— *Part 10: Determination of the relative carbonation resistance of concrete (technical specification)*;

— *Part 11: Determination of the chloride resistance of concrete, unidirectional diffusion (technical specification)*.

The following amendments have been made to the former edition:

— editorial revision;

— increases in the allowable tolerances for the dimensions of the specimens which reflect current industry practice.

This standard recognises alternative approaches towards obtaining test specimens of the correct sizes and shapes. The first is to use moulds whose life is limited and to measure the specimens to ensure conformity. The second is to cast specimens in calibrated metal moulds which meet tighter tolerances than for specimens. The use of calibrated moulds allows relaxation on the requirement for measuring the specimens.

Annex A gives the application of EN ISO 1101 to measuring the shapes of concrete test specimens and moulds.

Annex B gives a method to measure the flatness of specimens and moulds.

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, 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, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European Standard specifies the shape, dimensions and tolerances of cast concrete test specimens in the form of cubes, cylinders and prisms, and of the moulds required to produce them.

NOTE The tolerances specified in this European Standard are based on the needs of strength testing, but they can be applicable to tests for other properties.

2 Normative references

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

EN ISO 1101:2005, *Geometrical Product Specifications (GPS) — Geometrical tolerancing — Tolerances of form, orientation, location and run-out (ISO 1101:2004)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 1101:2005 and the following apply.

3.1
nominal size
commonly used description of specimen size

3.2
designated size
specimen size in millimetres, selected and declared by the user of this standard from amongst the allowed range of nominal sizes

4 Shape, dimensions and tolerances of specimens

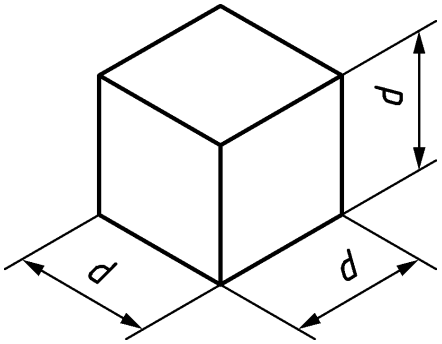
4.1 General

For application of EN ISO 1101 to the measurement of concrete test specimens and moulds in respect to flatness, perpendicularity and straightness, see Annex A.

For each shape of test specimen, cube, cylinder and prism, the nominal size d (Figures 1, 2 and 3) should be chosen to be at least three and a half times the maximum aggregate size (D_{max} according to EN 206-1) in the concrete.

4.2 Cubes

4.2.1 Nominal sizes



d, mm	100	150	200	250	300

Figure 1 — Cube – nominal sizes

4.2.2 Designated sizes

Designated sizes may be selected within ± 10 % of the nominal size

4.2.3 Tolerances

4.2.3.1 Between moulded surfaces the tolerance on the designated size (d) is 1,0 %.

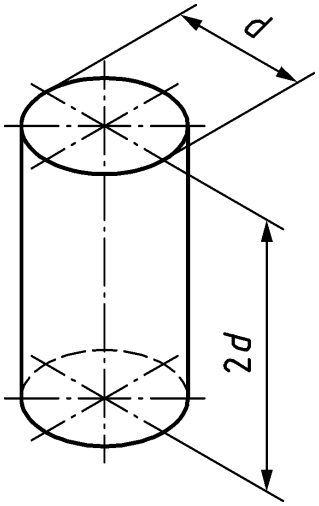
4.2.3.2 Between the top trowelled face and the moulded bottom face the tolerance on the designated size is 1,5 %.

4.2.3.3 The tolerance on the flatness of the potential load bearing surfaces is 0,0006d mm (see Annex B).

4.2.3.4 The tolerance on the perpendicularity of the sides of the cube, with reference to the base, as cast, is 0,5 mm.

4.3 Cylinders

4.3.1 Nominal sizes



d, mm	100	113 [a]	150	200	250	300
[a] This has a load-bearing area of 10 000 mm^2.						

Figure 2 — Cylinder – nominal size

4.3.2 Designated sizes

Designated sizes may be selected within ± 10 % of the nominal size.

4.3.3 Tolerances

4.3.3.1 The tolerance on the designated diameter (d) is 1,0 %.

4.3.3.2 The tolerance on the flatness of the load-bearing surface is 0,0006d mm (see Annex B).

4.3.3.3 The tolerance on the perpendicularity of the side, with reference to the end faces, is 0,007d mm.

4.3.3.4 The tolerance on the height (2d) is 5 %.

4.3.3.5 For specimens to be used for the tensile splitting strength test, the straightness tolerance on the generating line of the cylinder is 0,2 mm.

4.3.4 Applicability of tolerances

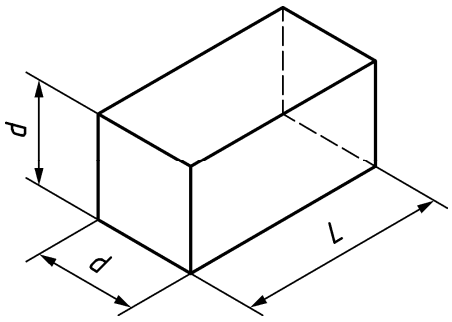
4.3.4.1 Specimens with moulded end faces, or with end faces adjusted by grinding, shall conform to 4.3.3.

4.3.4.2 Specimens with end faces adjusted using sulfur capping, high alumina cement capping, or similar capping shall conform to 4.3.3.1 before capping and to 4.3.3.2, 4.3.3.3 and 4.3.3.4 after capping.

4.3.4.3 Specimens with end faces adjusted using the sandbox method or similar methods shall conform to 4.3.3.1 and 4.3.3.4 before capping and to 4.3.3.3 after fixing the box(es).

4.4 Prisms

4.4.1 Nominal sizes



d, mm	100	150	200	250	300

$L \geq 3{,}5\ d$

Figure 3 — Prism – nominal sizes

4.4.2 Designated sizes

Designated sizes (d) may be selected within ± 10 % of the nominal sizes.

4.4.3 Tolerances

4.4.3.1 Between moulded surfaces, the tolerance on the designated size (d) is 1,0 %.

4.4.3.2 Between the top trowelled face and the bottom moulded face, the tolerance on the designated size is 1,5 %.

4.4.3.3 The tolerance on the perpendicularity of the sides of the prism with reference to the base, as cast, is 0,5 mm.

4.4.3.4 The tolerances on the straightness of the surface to be in contact with the rollers in the flexural strength test is 0,2 mm.

4.4.3.5 For specimens to be used for the tensile splitting strength test the straightness tolerance on the load bearing surface is 0,2 mm.

4.5 Measurement of dimensions and shape of specimens

4.5.1 Unless specimens have documentation to show that they had been made in calibrated moulds, they shall be measured or checked for conformity to 4.2, 4.3 or 4.4 as appropriate.

NOTE Go/no-go gauges or other suitable method can be used to check dimensions.

4.5.2 If specimens have documentation to show that they have been made in calibrated moulds, only the requirements of 4.2.3.1 and 4.2.3.2 or 4.3.3.1, 4.3.3.2 and 4.3.3.4 or 4.4.3.1, 4.4.3.2, for cubes, cylinder or prisms, respectively, shall be checked.

NOTE 1 Go/no-go gauges or other suitable method can be used to check dimensions.

NOTE 2 If a surface, calibrated with respect to flatness, is used to form the load bearing surface of cylinders, 4.3.3.2. need not be performed.

NOTE 3 Guidance on the measurement of flatness of load-bearing surfaces is given in Annex B.

5 Moulds

5.1 General

5.1.1 Moulds shall be watertight and non-absorbent.

NOTE The joints of moulds can be coated with wax, oil or grease to achieve water-tightness.

5.1.2 Moulds, other than calibrated moulds in accordance with 5.2, may be made from any material which is suitable for producing concrete specimens.

5.2 Calibrated moulds

5.2.1 Calibrated moulds shall be made of steel or cast-iron, which shall be the reference materials. If moulds are manufactured from other materials, in-use performance test data shall be available which demonstrates long-term equivalence with steel or cast-iron calibrated moulds.

5.2.2 All parts of calibrated moulds shall be sufficiently robust to prevent distortion on assembly and in use.

5.2.3 The components of the mould, with the possible exception of the base plate, shall have identification marks.

5.2.4 Calibrated moulds for cubical specimens

5.2.4.1 Moulds shall be suitable for producing specimens conforming to 4.2.

5.2.4.2 The tolerance on the designated size (d) of an assembled mould is 0,5 %.

5.2.4.3 The tolerance on the flatness of the four side faces of the mould is 0,0003d mm for new moulds and 0,000 5d mm for moulds in use.

5.2.4.4 The tolerance on the flatness of the top surface of the baseplate of the moulds is 0,0006d mm for new moulds and 0,001d mm for moulds in use.

5.2.4.5 The tolerance on the perpendicularity of the sides of a mould with respect to the adjacent sides and of the sides in relation to the base is 0,5 mm.

NOTE If necessary, the flatness tolerance can be measured with the mould disassembled (see Annex B).

5.2.5 Calibrated moulds for cylindrical specimens

5.2.5.1 Moulds shall be suitable for producing specimens conforming to 4.3.

5.2.5.2 The tolerance on the designated diameter (d) and the designated height ($2d$) is 0,5 %.

5.2.5.3 The tolerance on the flatness of a base of a mould is 0,0003d mm for new moulds and 0,000 5d mm for moulds in use.

5.2.5.4 The tolerance on the perpendicularity of the side of a mould with respect to the base is 0,5 mm.

NOTE If necessary, the flatness tolerance can be measured with the mould disassembled (see Annex B).

5.2.6 Calibrated moulds for prismatic specimens

5.2.6.1 Moulds shall be suitable for producing specimens conforming to 4.4.

5.2.6.2 The tolerance on the designated depth and width (d) of an assembled mould is 0,5 %.

5.2.6.3 The tolerance on the flatness of the internal sides is 0,001d mm for new moulds and 0,002d mm for moulds in use.

5.2.6.4 The tolerance on the flatness of the top surface of the baseplate of the mould is 0,002d mm for new moulds and 0,004d mm for moulds in use.

5.2.6.5 For mould surfaces with dimensions exceeding 150 mm, the flatness tolerances in 5.2.6.3 and 5.2.6.4 shall apply over any 150 mm length.

5.2.6.6 The tolerance on the perpendicularity of the sides of a mould with respect to the base is 0,5 mm.

NOTE If necessary, the flatness tolerance can be measured with the mould disassembled (see Annex B).

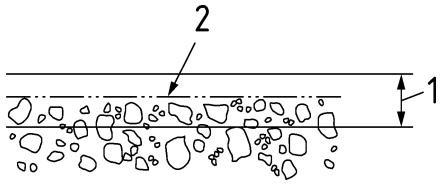
Annex A
(normative)

Application of EN ISO 1101 to concrete test specimens and moulds

A.1 General

EN ISO 1101 describes the geometric tolerancing of drawings. Figures A.1, A.2 and A.3 show particular applications of the standard to the measurement of concrete test specimens and moulds.

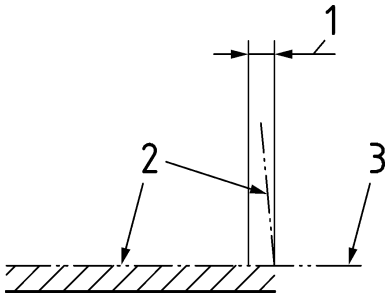
A.2 Flatness



Key
1 flatness tolerance
2 surface to which flatness tolerance applies

Figure A.1 — Measurement of flatness

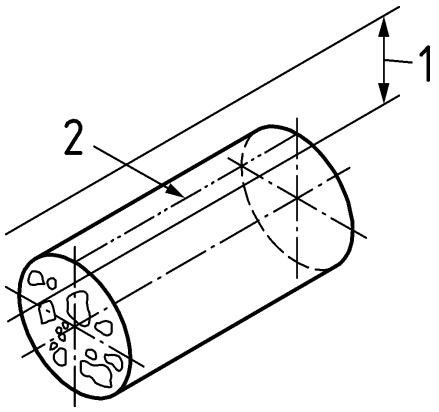
A.3 Perpendicularity



Key
1 perpendicularity tolerance
2 surfaces to which perpedicularity tolerance applies
3 adjacent surface as datum surface

Figure A.2 — Measurement of perpendicularity

A.4 Straightness



Key
1 straightness tolerance on the load-bearing surface
2 surface to which the straightness tolerance is applied

Figure A.3 — Measurement of straightness

Annex B
(normative)

Assessment of flatness of specimens and moulds

For the purpose of this European Standard, flatness shall be assessed by the measurement of straightness in four positions, as shown in Figure B.1, for circular or rectilinear surfaces. Other methods giving at least the same degree of accuracy may be used:

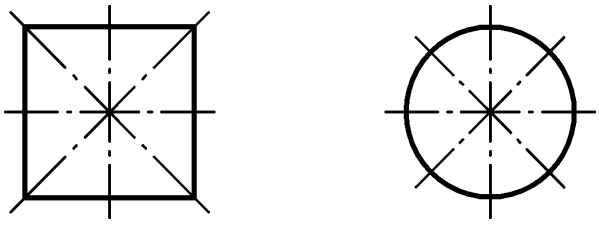


Figure B.1 — Measurement pattern for flatness of circular and rectilinear surfaces

The tolerance on straightness shall be equal to the tolerance on the flatness specified in 4.2, 4.3 or 4.4 as appropriate, for specimens, and in 5.2.4, 5.2.5 and 5.2.6, as appropriate, for moulds.

NOTE A steel straight-edge of rectangular section, and feeler gauges, with blades 0,03 mm to 1,00 mm thick, are considered suitable for this measurement, which characteristics might be defined on a national level.

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