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

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

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EN 12390-1

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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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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of an identical text or by endorsement, at the latest by April 2001, and conflicting national standards shall be withdrawn at the latest by December 2003.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 for test methods for testing hardened concrete.

It is based on the draft International Standard ISO 1920 - Concrete tests - Dimensions, tolerances and applicability of test specimens. However “applicability” has been omitted as not being appropriate and the special rules for calculating test results have also been omitted, both these items being covered in the relevant standards.

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.

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

Informative annex B gives guidance on the measurement of flatness of specimens and moulds.

A draft for this standard was published in 1996 for CEN enquiry as prEN 12356. 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)

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

EN 12390 Testing hardened concrete

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)

1 Scope

This 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 standard are based on the needs of strength testing, but they can be applicable to tests for other properties.

2 Normative References

This European Standard incorporates by dated or 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 (including amendments).

ISO 1101, *Technical drawings – Geometric tolerancing – Tolerancing of form, orientation, location and run-out – Generalities, definitions, symbols, indications on drawings.*

3 Terms and definitions

For the purposes of this standard, the terms and definitions set out in ISO 1101 apply, together with the following:

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

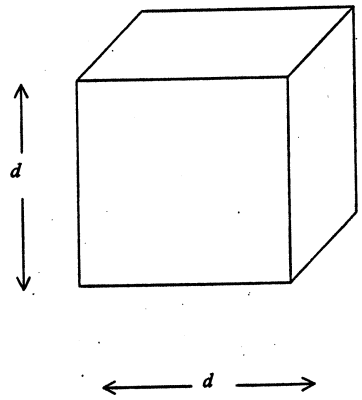
4 Shape, Dimensions and Tolerances of Specimens

4.1 General

For each shape of test specimen, cube, cylinder and prism, the basic dimension *d* should be chosen to be at least three and a half times the nominal size of the aggregate 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 shall not be different from nominal sizes

4.2.3 Tolerances

4.2.3.1 Between moulded surfaces the tolerance on the designated size (*d*) shall be less than ± 0,5 %.

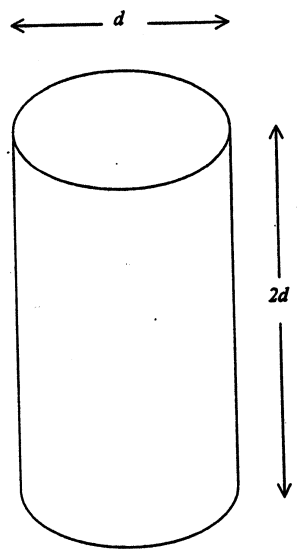
4.2.3.2 Between the top trowelled face and the moulded bottom face the tolerance on the designated size shall be less than ± 1,0 %.

4.2.3.3 The tolerance on the flatness of the potential load-bearing surfaces shall be less than ± 0,0006*d*, in millimetres. (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, shall be less than 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 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 ± 0,5 %.

4.3.3.2 The tolerance on the flatness of the load-bearing surfaces is ± 0,0006*d*, in millimetres. (See annex B).

4.3.3.3 The tolerance on the perpendicularity of the side, with reference to the end faces, is ± 0,5 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

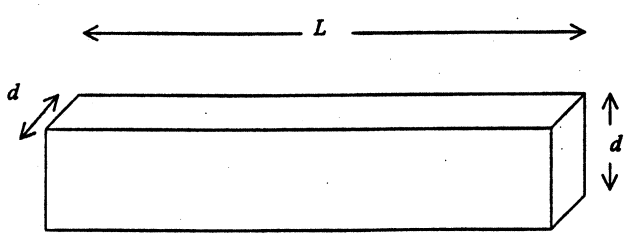
4.3.4.1 Specimens with moulded end faces, or with end faces adjusted by grinding, shall conform to 4.3.3.

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



L ≥ 3,5 d

d, mm	100	150	200	250	300

Figure 3 - Prism - nominal sizes

4.4.2 Designated sizes shall not be different from nominal sizes.

4.4.3 Tolerances

4.4.3.1 Between moulded surfaces, the tolerance on the designated size (*d*) is ± 0,5 %.

4.4.3.2 Between the top trowelled face and the bottom moulded face, the tolerance on the designated size is ± 1,0 %.

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 for conformity to 4.2, 4.3 or 4.4 as appropriate.

NOTE Go/no-go gauges 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, cylinders or prisms, respectively, shall be checked.

NOTE 1 Go/no-go gauges can used to check dimensions.

NOTE 2 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 a calibrated mould 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 4.2.1 and 4.2.2.

5.2.4.2 The tolerance on the designated size (*d*) of an assembled mould is ± 0,25 %.

5.2.4.3 The tolerance on the flatness of the four side faces of the mould shall be ± 0,0003*d*, for new moulds and ± 0,0005*d* for moulds in use.

5.2.4.4 The tolerance on the flatness of the top surface of the baseplate of the mould shall be ± 0,0006*d* for new moulds and ± 0,0010*d* 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 shall be ± 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 4.3.1 and 4.3.2.

5.2.5.2 The tolerance on the designated diameter (*d*) and the designated height (*2d*) is ± 0,25 %.

5.2.5.3 The tolerance on the flatness of a base of a mould shall be ± 0,0003*d*, for new moulds and ± 0,0005*d* 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 4.4.1 and 4.4.2.

5.2.6.2 The tolerance on the designated depth and width (*d*) of an assembled mould is ± 0,25 %.

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

5.2.6.4 The tolerance on the flatness of the top surface of the baseplate of the mould shall be ± 0,002*d* for new moulds and 0,0040*d* 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 shall be ± 0,5 mm.

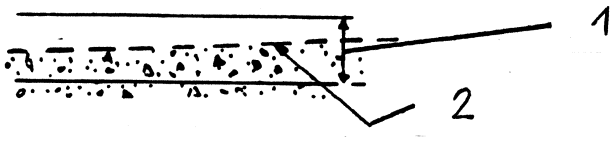
NOTE If necessary, the flatness tolerance can be measured with the mould disassembled. (see annex B).

Annex A
(Informative)

Application of ISO 1101 to concrete test specimens and moulds

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.

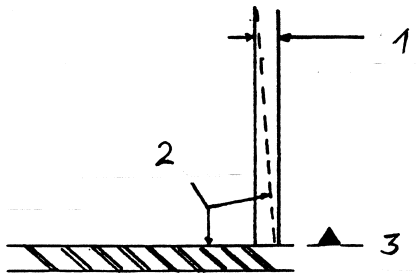
A.1 Flatness



Key
1 Flatness tolerance
2 Surface to which flatness tolerance applies

Figure A.1 - Measurement of flatness

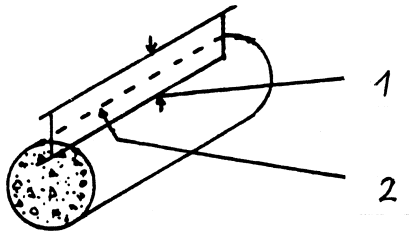
A.2 Perpendicularity



Key
1 Perpendicularity tolerance
2 Surfaces to which perpendicularity tolerance applies
3 Adjacent surface as datum surface

Figure A.2 - Measurement of perpendicularity

A.3 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
(Informative)

Assessment of flatness of specimens and moulds

For the purpose of this European Standard, flatness can be assessed by the measurement of straightness in four positions, as shown in Figure B.1, for circular or rectilinear surfaces:

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.