BRITISH STANDARD

BS EN
12350-2:2000

Testing fresh concrete —

Part 2: Slump test

The European Standard EN 12350-2:1999 has the status of a British Standard

ICS 91.100.30

National foreword

This British Standard is the English language version of EN 12350-2:1999. It supersedes BS 1881-102:1983 which is withdrawn.

The UK participation in its preparation was entrusted by Technical Committee B/517, Concrete, to Subcommittee B/517/1, Concrete 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.

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

Cross-references

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 5 and a back cover.

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This British Standard, having been prepared under the direction of the Sector Committee for Building and Civil Engineering, was published under the authority of the Standards Committee and comes into effect on 15 January 2000

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EUROPEAN STANDARD

NORME EUROPÉENNE

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EN 12350-2

October 1999

ICS 91.100.30

English version

Testing fresh concrete — Part 2: Slump test

Essais pour béton frais —
Partie 2: Essais d'affaissement

Prüfung von Frischbeton —
Teil 2: Setzmaß

This European Standard was approved by CEN on 5 September 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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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Ref. No. EN 12350-2:1999 E

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 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 fresh concrete.

It is based on the International Standard ISO 4109: *Fresh Concrete — Determination of the consistency — Slump test.*

A draft for this standard was published in 1996 for CEN enquriy as prEN 12382. 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 methods, as follows:

— *Testing fresh concrete* (EN 12350:1999);
— *Testing hardened concrete* (prEN 12390:1999);
— *Testing concrete in structures* (prEN 12504:1999).

This series EN 12350 includes the following parts where the brackets give the numbers under which particular test methods were published for CEN enquiry:

EN 12350 *Testing fresh concrete*

Part 1: Sampling (former prEN 12378:1996).

Part 2: Slump test (former prEN 12382:1996).

Part 3: Vebe test (former prEN 12350:1996).

Part 4: Degree of compactability.
(former prEN 12357:1996).

Part 5: Flow table test (former prEN 12358:1996).

Part 6: Density (former prEN 12383:1996).

Part 7: Air content — Pressure methods
(former prEN 12395:1996).

CAUTION. When cement is mixed with water, alkali is released. Take precautions to avoid dry cement entering the eyes, mouth and nose whilst mixing concrete. Prevent skin contact with wet cement or concrete by wearing suitable protective clothing. If cement or concrete enters the eye, immediately wash it out thoroughly with clean water and seek medical treatment without delay. Wash wet concrete off the skin immediately.

Contents

1 Scope

This European standard specifies a method for determining the consistency of fresh concrete by the slump test.

The slump test is sensitive to changes in the consistency of concrete which correspond to slumps between 10 mm and 200 mm. Beyond these extremes the measurement of slump can be unsuitable and other methods of determining the consistency should be considered.

If the slump continues to change over a period of 1 min after de-moulding, the slump test is not suitable as a measure of consistency.

The test is not suitable when the maximum size of aggregate in the concrete is greater than 40 mm.

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.

EN 12350-1:1999, *Testing fresh concrete — Part 1: Sampling.*

3 Principle

The fresh concrete is compacted into a mould in the shape of a frustum of a cone. When the cone is withdrawn upwards, the distance the concrete has slumped provides a measure of the consistency of the concrete.

4 Apparatus

4.1 *Mould to form the test specimen*, made of metal not readily attacked by cement paste and not thinner than 1,5 mm. The interior of the mould shall be smooth and free from projections, such as protruding rivets and shall be free from dents. The mould shall be in the form of a hollow frustum of a cone having the following internal dimensions:

— diameter of base: (200 ± 2) mm;

— diameter of top: (100 ± 2) mm;

— height: (300 ± 2) mm.

The base and the top of the mould shall be open and parallel to each other and at right angles to the axis. The mould shall be provided with two handles near the top and fixing clamps or foot pieces near the bottom to hold it steady. A mould which can be clamped to the base is acceptable provided the clamping arrangement can be fully released without movement of the mould or interference with the slumping concrete.

4.2 *Compacting rod*, of circular cross-section, straight, made of steel, having a diameter of (16 ± 1) mm and length of (600 ± 5) mm in length, and with rounded ends.

4.3 *Funnel (optional)*, made of non-absorbent material not readily attacked by cement paste and having a collar to enable the funnel to be located on the mould specified in **4.1**.

4.4 *Rule*, graduated from 0 mm to 300 mm, at intervals not exceeding 5 mm, the zero mark being at the extreme end of the rule.

4.5 *Base plate/surface*, non-absorbent, rigid, flat, plate or other surface on which to place the mould.

4.6 *Remixing container*, flat tray of rigid construction and made from a non-absorbent material not readily attacked by cement paste. It shall be of appropriate dimensions such that the concrete can be thoroughly re-mixed, using the square-mouthed shovel.

4.7 *Shovel*, with square mouth

NOTE The square mouth is required to ensure proper mixing of material on the remixing container.

4.8 *Moist cloth.*

4.9 *Scoop*, approximately 100 mm in width.

4.10 *Timer*, or clock capable of measuring to 1 s.

5 Test sample

The sample of the concrete shall be obtained in accordance with EN 12350-1:1999.

The sample shall be re-mixed using the remixing container and the square mouthed shovel before carrying out the test.

6 Procedure

Dampen the mould and base plate and place the mould on the horizontal base plate/surface. During filling of the mould hold it firmly against the base plate/surface by clamping in place, or by standing on the two foot pieces.

Fill the mould in three layers, each approximately one-third of the height of the mould when compacted. Compact each layer with 25 strokes of the tamping rod. Uniformly distribute the strokes over the cross-section of each layer. For the bottom layer this will necessitate inclining the rod slightly and positioning approximately half the strokes spirally toward the centre. Compact the second layer and the top layer each throughout its depth, so that the strokes just penetrate into the immediately underlying layer. In filling and compacting the top layer, heap the concrete above the mould before tamping is started.

If the tamping operation of the top layer results in subsidence of the concrete below the top edge of the mould, add more concrete to keep an excess above the top of the mould at all times. After the top layer has been compacted, strike off the surface of the concrete by means of a sawing and rolling motion of the compacting rod.

Remove spilled concrete from the base plate/surface. Remove the mould from the concrete by raising it carefully in a vertical direction.

Perform the operation of raising the mould in 5 s to 10 s, by a steady upward lift, with no lateral or torsional motion being imparted to the concrete.

Carry out the entire operation from the start of the filling to the removal of the mould without interruption and complete it within 150 s.

Immediately after removal of the mould, measure and record the slump (h) by determining the difference between the height of the mould and that of the highest point of the slumped test specimen.

NOTE The consistence of a concrete mix changes with time, due to hydration of the cement and, possibly, loss of moisture. Tests on different samples should, therefore, be carried out at a constant time interval after mixing, if strictly comparable results are to be obtained.

7 Test result

The test is only valid if it yields a true slump, this being a slump in which the concrete remains substantially intact and symmetrical as shown in Figure 1(a).

If the specimen shears, as shown in Figure 1(b), another sample shall be taken and the procedure repeated.

If two consecutive tests show a portion of the concrete shearing off from the mass of the test specimen, the concrete lacks the necessary plasticity and cohesiveness for the slump test to be suitable.

Report the true slump (h), as shown in Figure 2, to the nearest 10 mm.

8 Test report

The report shall include:

a) identification of the test sample;

b) location of performance of test;

c) date of performance of test;

d) type of slump – true/shear;

e) measured true slump, to nearest 10 mm;

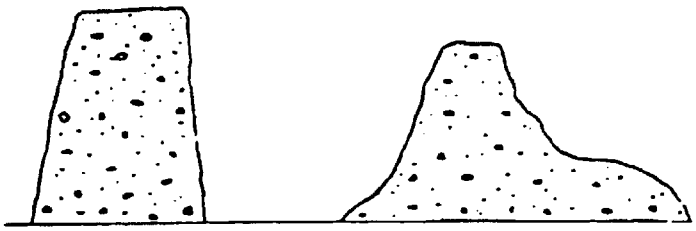
f) any deviation from standard test method;

g) a declaration by the person carrying out the test that it was carried out in accordance with this standard, except as noted in item f).

The report may include:

h) the temperature of the concrete sample at time of test;

i) time of test.



a) True slump b) Shear slump

Figure 1 — Forms of slump

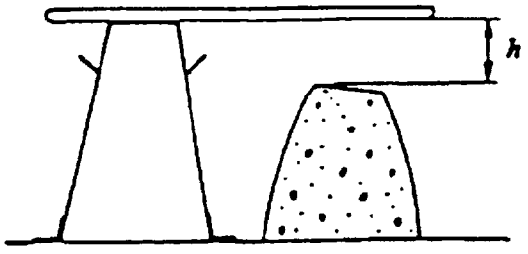


Figure 2 — Slump measurement

9 Precision

Precision data are given in Table 1. These apply to slump measurements made on concrete from the same sample and when each test result is obtained from a single slump determination. The values which apply when each test result is obtained as the average of duplicate determinations are given in Table 2.

Table 1 — Precision data for slump measurements (single determination)

Range	Repeatability conditions		Reproducibility conditions	
	S_r	r	S_R	R
(mm)	(mm)	(mm)	(mm)	(mm)
50 to 80	5,8	16	9,0	25

Table 2 — Precision data for slump measurements (duplicate determinations)

Range	Repeatability conditions		Reproducibility conditions	
	S_r	r	S_R	R
(mm)	(mm)	(mm)	(mm)	(mm)
50 to 80	4,1	11	8,0	22

NOTE 1 The precision data was determined as part of an experiment in the UK in 1987 in which precision data was obtained for several of the tests then described in BS 1881. The experiment involved 16 operators. The concretes were made using an ordinary Portland cement, Thames Valley sand, and Thames Valley 10 mm and 20 mm coarse aggregates.

NOTE 2 The difference between two test results from the same sample by one operator using the same apparatus within the shortest feasible time interval will exceed the repeatability value r on average not more than once in 20 cases in the normal and correct operation of the method.

NOTE 3 Test results on the same sample obtained within the shortest feasible time interval by two operators each using their own apparatus will differ by the reproducibility value R on average not more than once in 20 cases in the normal and correct operation of the method.

NOTE 4 For further information on precision, and for definitions of the statistical terms used in connection with precision, see ISO 5725.

BS EN 12350-2:2000

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