

Testing fresh concrete—

Part 3: Vebe test

The European Standard EN 12350-3:1999 has the status of a
British Standard

ICS 91.100.30

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National foreword

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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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English version

Testing fresh concrete — Part 3: Vebe test**Essai pour béton frais —
Partie 3: Essai Vébé****Prüfung von Frischbeton —
Teil 3: Vebe-Prüfung**

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

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Ref. No. EN 12350-3:1999 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of an identical text or by endorsement, at the latest by April 2000, and conflicting national standards shall be withdrawn at the latest by December 2003.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 concrete.

It is based on the International Standard ISO 4110: *Fresh Concrete — Determination of the consistency — Vebe test*.

A draft for this standard was published in 1996 for CEN enquiry as prEN 12350. 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 12350:1999);
- *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

	Page
Foreword	2
1 Scope	3
2 Normative references	3
3 Principle	3
4 Apparatus	3
5 Sampling	3
6 Procedure	4
7 Test result	4
8 Test report	4
9 Precision	4

1 Scope

This European standard specifies a method for determining the consistency of fresh concrete by means of the Vebe time.

It is not applicable to concrete of which the maximum size of aggregate exceeds 63 mm.

If the Vebe time is less than 5 s or more than 30 s, the concrete has a consistency for which the Vebe test is unsuitable.

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 slump mould. The mould is lifted clear of the concrete and a transparent disc is swung over the top of the concrete and carefully lowered until it comes in contact with the concrete. The slump of the concrete is recorded. The vibrating table is started and the time taken for the lower surface of the transparent disc to be fully in contact with the grout, (the Vebe time), is measured.

4 Apparatus

4.1 Vebe meter (Consistometer)

4.1.1 Container, made of metal not readily attacked by cement paste, cylindrical in shape (A), having an internal diameter of $240 \text{ mm} \pm 5 \text{ mm}$ and a height of $200 \text{ mm} \pm 2 \text{ mm}$. The thickness of the wall shall be approximately 3 mm and that of the base approximately 7,5 mm. The container shall be watertight and of sufficient rigidity to retain its shape under rough usage. It shall be fitted with handles and brackets, the latter enabling it to be securely clamped to the top of the vibrating table (G) (see 4.1.4) by means of wing nuts (H).

4.1.2 Mould, 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: $200 \text{ mm} \pm 2 \text{ mm}$;
- diameter of top: $100 \text{ mm} \pm 2 \text{ mm}$;
- height: $300 \text{ mm} \pm 2 \text{ mm}$.

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, on the upper portion, with two handles at approximately two-thirds of the height, to facilitate lifting it from the moulded concrete test specimen in a vertical direction, as required by the test.

4.1.3 Disc, transparent, horizontal (C), attached to a rod (J) which slides vertically through a guide sleeve (E) mounted on a swivel arm (N) and which can be fixed in position by a screw (Q). The swivel arm also supports a funnel (D), the bottom of which coincides with the top of the conical mould when the latter is positioned concentrically in the container. The swivel arm is located by a holder (M) and can be fixed in position by a set screw (F). When in the appropriate position, the axes of the rod and of the funnel shall be coincident with the axis of the container. The transparent disc shall be $230 \text{ mm} \pm 2 \text{ mm}$ in diameter and $10 \text{ mm} \pm 2 \text{ mm}$ in thickness. A weight (P) placed directly above the disc shall be provided such that the moving assembly comprising rod, disc and weight has a mass of $2\,750 \text{ g} \pm 50 \text{ g}$. The rod shall be provided with a scale at 5 mm intervals to record the slump of the concrete.

4.1.4 Vibrating table (G), $380 \text{ mm} \pm 3 \text{ mm}$ in length and $260 \text{ mm} \pm 3 \text{ mm}$ in width and supported on four rubber shock absorbers on a hollow base, (K), which in turn rests on three rubber feet. A vibrator unit (L) is securely fixed to the bottom of the table. The vibrator shall operate at a nominal frequency of 50 Hz to 60 Hz and the vertical amplitude of the table with the empty container on top of it shall be approximately $\pm 0,5 \text{ mm}$.

4.1.5 Compacting rod, of circular cross-section, straight, made of steel, having a diameter of approximately 16 mm and length approximately 600 mm and with rounded ends.

4.1.6 Stop watch or clock, capable of recording time to an accuracy of 0,5 s.

4.1.7 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.

4.1.8 Shovel, with square mouth

NOTE The square mouth is required to ensure proper mixing of material on the re-mixing tray.

4.1.9 Scoop, width approximately 100 mm.

5 Sampling

The sample 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

Place the Vebe meter on a rigid horizontal base, ensuring that the container (A) is firmly fixed to the vibrating table (G) by means of the wing nuts (H). Dampen the mould (B) and place it in the container. Swing the funnel (D) into position over the mould and lower onto the mould. Tighten the screw (F) so that the mould cannot rise from the bottom of the container.

From the sample of concrete obtained in accordance with clause 5, 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 compacting rod, ensuring that the strokes are uniformly distributed 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 concrete throughout its whole depth, taking care not to strike the base. Compact the second layer and the top layer throughout its depth, so that the strokes just penetrate into the underlying layer. In filling and tamping the top layer, heap the concrete above the mould before tamping is started. If necessary, add further concrete to maintain an excess above the top of the mould throughout the compacting operation.

After the top layer has been tamped, loosen the screw (F) and raise the funnel (D) and swing it out of the way and tighten the screw (F) in the new position. Ensure that the mould (B) does not rise or move prematurely and concrete is not allowed to fall into the container (A).

Strike off the concrete level with the top of the mould with a sawing and rolling motion of the compacting rod. Remove the mould (B) from the concrete by raising it carefully in a vertical direction, using the handles. 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.

If the concrete shears, as shown in Figure 2b), collapses, as shown in Figure 2c), or slumps to the extent that it touches the wall of the container (A), record the fact.

If the concrete has not slumped into contact with the wall of the container (A), and a slump, as shown in Figure 2a) has been obtained, record the fact.

Swing the transparent disc (C) over the top of the concrete, loosen the screw (Q) and lower the disc very carefully until it just comes into contact with the concrete.

Provided there has been a true slump, when the disc (C) just touches the highest point of the concrete, tighten the screw (Q). Read and record the value of the slump from the scale (J). Loosen the screw (Q) to allow the disc (C) to easily slide down into the container to rest fully on the concrete.

If there has not been a true slump ensure that screw (Q) is loosened to allow the disc (C) to slide down into the container to rest on the concrete.

Start the vibration of the table and the timer simultaneously. Observe the way the concrete is remoulded through the transparent disc (C). As soon as the lower surface of the disc (C) is fully in contact with the cement grout, stop the timer and switch off the vibrating table. Record the time taken to the nearest second.

Carry out the entire operation, from the start of the filling, without interruption, and complete within 5 minutes.

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 carded out at a constant time interval after mixing, if strictly comparable results are to be obtained.

7 Test Result

Record the time read from the stop watch, to the nearest second. This is the Vebe time, expressing the consistency of the mix under test.

8 Test Report

The report shall include:

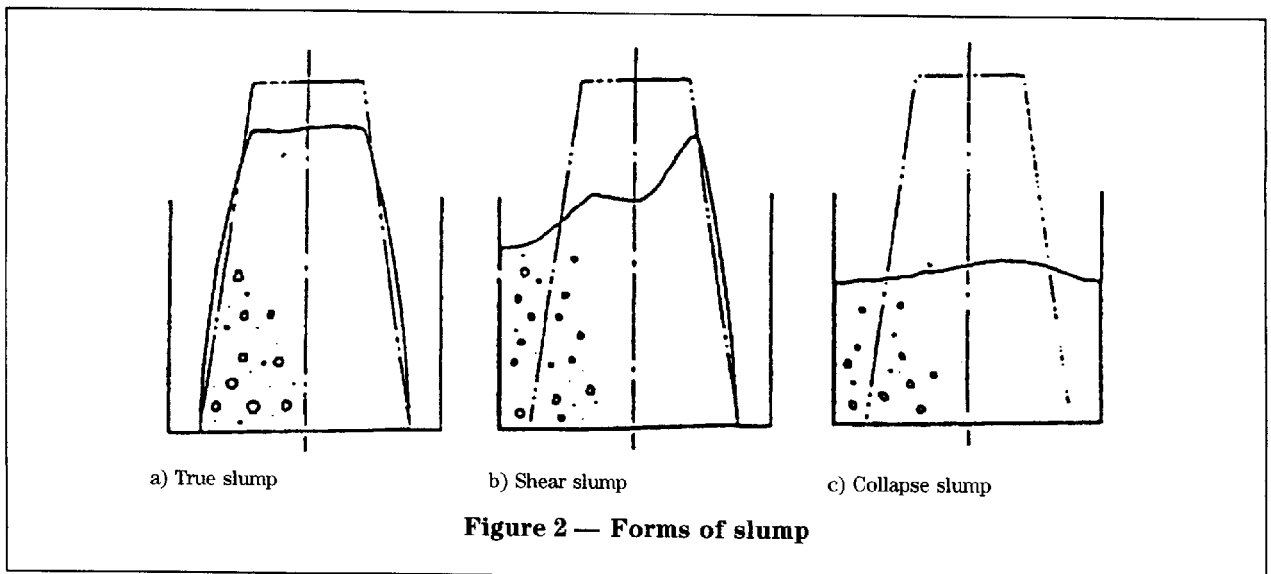
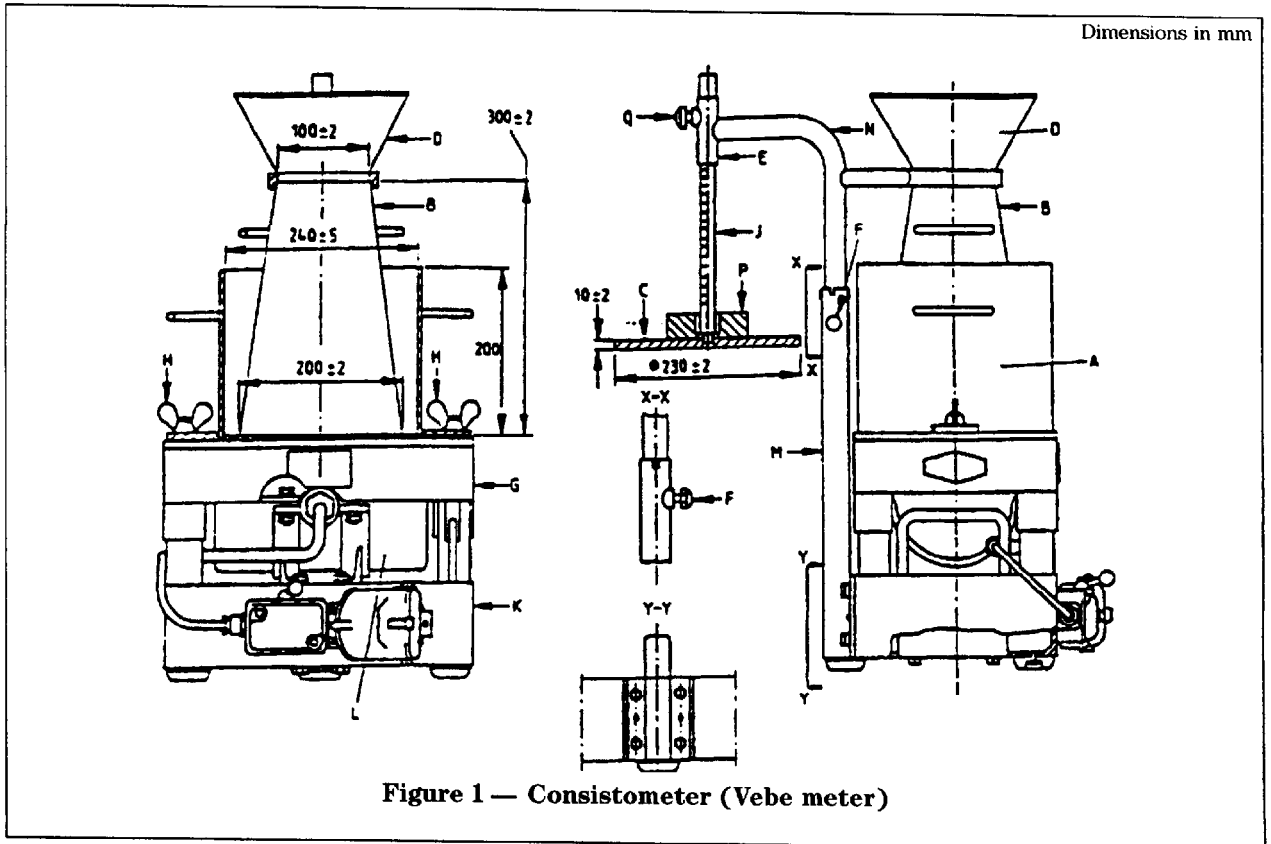
- a) identification of the test sample;
- b) location of performance of test;
- c) date of test;
- d) type of slump — true/collapse/shear;
- e) measured true slump, to nearest 10 mm (if appropriate);
- f) Vebe time in seconds;
- g) any deviation from standard test method;
- h) a declaration by the person technically responsible for the test that it was carried out in accordance with this standard, except as noted in item g).

The report may include:

- i) time of test;
- j) temperature of the concrete sample at time of test.

9 Precision

There is currently no precision data for this test.



BS EN
12350-3:2000

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