BRITISH STANDARD

BS EN
12504-2:2001

Testing concrete in structures —

Part 2: Non-destructive testing — Determination of rebound number

The European Standard EN 12504-2:2001 has the status of a British Standard

ICS 91.100.30

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National foreword

This British Standard is the official English language version of EN 12504-2:2001. It supersedes BS 1881-202:1986 which is withdrawn.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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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 August 2001

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.

The BSI copyright date displayed in this document indicates when the document was last issued.

Amendments issued since publication

Amd. No.	Date	Comments

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ISBN 0 580 36911 0

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 12504-2

June 2001

ICS 91.100.30

English version

Testing concrete in structures - Part 2: Non-destructive testing - Determination of rebound number

Essais pour béton dans les structures - Partie 2: Essais non destructifs - Détermination de l'indice de rebondissement

Prüfung von Beton in Bauwerken - Teil 2: Zerstörungsfreie Prüfung - Bestimmung der Rückprallzahl

This European Standard was approved by CEN on 17 April 2000.

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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 December 2001, and conflicting national standards shall be withdrawn at the latest by December 2003.

This standard is one of a series of test methods for concrete.

It is based on the International Standard ISO (DIS) 8045 – Concrete, hardened -Determination of rebound number using the rebound hammer, and reference has been made to ASTM C805 – Rebound number of hardened concrete.

The standard has been framed around the use of a Type N, spring driven steel hammer, originally designed by Schmidt.

A draft for this standard was published in 1996 for CEN enquiry as prEN 12398. 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)

This series EN 12504 includes the following parts where the brackets give the numbers under which particular test methods were published for CEN enquiry:

EN 12504 Testing concrete in structures

Part 1: Cored specimens - Taking, examining and testing in compersion (former prEN 12504: 1996)
Part 2: Non-destructive testing - Determination of rebound number (former prEN 12398: 1996)
Part 3: Determination of pull-out force (former prEN 12399: 1996)
Part 4: Determination of ultrasonic pulse velouty (former prEN 12396: 1998)

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.

1 Scope

This standard specifies a method for determining the rebound number of an area of hardened concrete using a spring-driven steel hammer.

NOTE 1: The rebound number determined by this method can be used to assess the uniformity of concrete in situ, to delineate zones or areas of poor quality or deteriorated concrete in structures.

NOTE 2: The test method is not intended as an alternative for the compressive strength determination of concrete (EN 12390-3), but with suitable correlation, it can provide an estimate of in situ strength.

2 Normative references

Not applicable.

3 Principle

A mass propelled by a spring strikes a plunger in contact with the surface and the test result is expressed in terms of the rebound distance of the mass.

4 Apparatus

4.1 Rebound hammer, consisting of a spring-loaded steel hammer which, when released, strikes a steel plunger in contact with the concrete surface. The rebound distance of the steel hammer from the steel plunger shall be measured on a linear scale attached to the frame of the instrument.

NOTE: Several types and sizes of rebound hammers are commercially available for testing various strength classes and types of concrete. Each type and size of hammer should be used only with the strength class and type of concrete for which it is intended.

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4.2 Calibration anvil, steel anvil for verification of the hammer, defined with a hardness of minimum 52 HRC and a mass of (16 ± 1) kg and a diameter of approximately 150 mm.

NOTE: Verification on an anvil will not guarantee that different hammers will yield the same results at other points on the rebound scale.

4.3 Abrasive stone, a medium-grain texture silicon carbide stone or equivalent material.

5 Test area

5.1 Selection

Concrete elements to be tested shall be at least 100 mm thick and fixed within a structure. Smaller specimens may be tested provided they are rigidly supported. Areas exhibiting honeycombing, scaling, rough texture, or high porosity should be avoided.

In selecting an area to be tested the following factors should be considered:

a) the strength of the concrete;

b) type of surface;

c) type of concrete;

d) moisture condition of the surface;

e) carbonation (if appropriate);

f) movement of the concrete under test;

g) direction of test;

h) other appropriate factors.

A test area shall be approximately 300 mm x 300 mm.

5.2 Preparation

Using the abrasive stone, grind heavily textured or soft surfaces, or surfaces with loose mortar, until they are smooth. Smooth-formed or trowelled surfaces may be tested without grinding.

Remove any water present on the surface of the concrete.

6 Procedure

6.1 Preliminary preparation

6.1.1 Use the hammer in accordance with the manufacturer's instructions for its operation.

6.1.2 Activate it at least three times before taking any readings, to ensure that it is working correctly.

6.1.3 Before a sequence of tests on a concrete surface, take and record readings using the steel reference anvil and check to ensure that they are within the range recommended by the manufacturer. If they are not, clean and/or adjust the hammer.

6.1.4 The hammer should be operated at a temperature within the range 10 °C to 35 °C.

6.2 Operations

Hold the hammer firmly in a position that allows the plunger to impact perpendicularly to the surface being tested.

Gradually increase the pressure on the plunger until the hammer impacts [see 6.1.1].

After impact, record the rebound number.

Use a minimum of nine readings to obtain a reliable estimate of the rebound number for a test area.

Record the position and orientation of the hammer for each set of readings.

Ensure that no two impact points are closer than 25 mm and none are within 25 mm of an edge.

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NOTE: It is preferable to draw a regular grid of lines 25 mm to 50 mm apart and take the intersections of the lines as the test points.

Examine each impression made on the surface after impact and if the impact has crushed or broken through a near-to-surface void, discount the result.

6.3 Reference checking

After tests, take readings using the steel anvil, record them and compare them with those taken prior to the test (see 6.1.3). If the results differ, clean and/or adjust the hammer and repeat the test.

7 Test result

The result shall be taken as the median of all the readings, adjusted if necessary to take into account the orientation of the hammer in accordance with the manufacturer's instructions and expressed as a whole number.

If more than 20 % of all the readings differ from the median by more than 6 units the entire set of readings shall be discarded.

NOTE: If more than one hammer is to be used, a sufficient number of tests should be made on similar concrete surfaces, to determine the variation in the results obtained.

8 Test report

The report shall include:

a) identification of the concrete structure/element;

b) location of test area(s);

c) identification of the rebound hammer;

d) description of preparation of test area(s);

e) details of concrete and its condition;

f) date/time of performance of the test;

g) test result (median value) and hammer orientation for each test area;

h) test results adjusted for hammer orientation. (if appropriate);

i) any deviation from the standard test method;

j) 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 i).

NOTE: The report can include individual rebound hammer readings, if required.

9 Precision

There are no precision data available for this test.

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