



SLOVENSKI STANDARD
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Determination of the dry density of lightweight aggregate concrete with open structure

Bestimmung der Trockenrohddichte von haufwerksporigem Leichtbeton

Détermination de la masse volumique sèche d'un béton de granulats légers a structure ouverte

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ICS:

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CEN

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Contents	Page
Foreword	2
1 Scope	2
2 Normative References	2
3 Principle	2
4 Apparatus	2
5 Test specimens	3
5.1 Sample	3
5.2 Shape and size of test specimens	3
5.3 Number of test specimens	3
5.4 Preparation of the test specimens	3
6 Procedure	3
6.1 Determination of the volume	3
6.2 Determination of the dry mass	3
7 Calculation of the dry density and expression of test results	4
8 Test report	4

Foreword

This European Standard has been prepared by the Technical Committee CEN/TC 177 "Prefabricated reinforced components of autoclaved aerated concrete or light-weight aggregate concrete with open structure", of which the secretariat is held by DIN.

In order to meet the performance requirements as laid down in the product standard for prefabricated components of lightweight aggregate concrete with open structure a number of standardized test methods are necessary.

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of an identical text or by endorsement, at the latest by November 1995 and conflicting national standards shall be withdrawn at the latest by November 1995.

According to the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies a method of determining the dry density of lightweight aggregate concrete with open structure (LAC).

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.

prEN 1520 Prefabricated components of lightweight aggregate concrete with open structure

3 Principle

The dry density is determined on test specimens taken from prefabricated components according to prEN 1520 as the ratio between mass of the concrete after drying to constant mass and its volume.

4 Apparatus

- a) a straight edge and feeler gauges;
- b) calipers, allowing readings with an accuracy of 0,1 mm;
- c) a ventilated drying oven, maintainable at a temperature of $(105 \pm 5) ^\circ\text{C}$;

- d) a balance allowing the determination of the mass of the specimens with an accuracy of 0,1 %;
- e) equipment for drilling cores with water cooled diamond bit and sufficiently rigid so that the cores can be obtained with straight sides and a minimum of surface irregularities;
- f) a saw with water cooled rotating carborundum or diamond blade for cutting test specimens or cutting test specimens to length.

5 Test specimens

5.1 Sample

The sample for the preparation of the test specimens shall be taken in such a manner that it is representative of the product to be investigated.

NOTE: The test specimens may be prepared from prefabricated reinforced components. Alternatively, they may be taken from prefabricated unreinforced components of the same mould.

5.2 Shape and size of test specimens

The test specimens shall be cores with a diameter of approximately 100 mm. The cores shall be drilled perpendicular to the plane of floor slabs, roof slabs, and wall slabs and in vertical direction in the case of lintels. The cores shall extend over the whole thickness (height) of the component. Alternatively, test specimens may be prisms or cubes with a minimum dimension of at least 50 mm and a volume of at least $0,5 \times 10^{-3} \text{ m}^3$. As for the rest, the same requirements apply as for cores. In the case of hollow core components the top layer and the bottom layer shall be cut from the test specimens, and only this material shall be tested. In the case of multilayer components the individual layers shall be separated by cutting the test specimens perpendicular to their axis, and the dry density of the different layers shall be determined separately (see NOTE).

NOTE: In the case of top and bottom layers thinner than 20 mm, this method gives only a rough approximation for the density.

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5.3 Number of test specimens

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A test set shall consist of at least 3 test specimens with a combined volume of at least $2 \times 10^{-3} \text{ m}^3$ for solid components and $0,75 \times 10^{-3} \text{ m}^3$ for the individual layers of multilayer or hollow core components.

5.4 Preparation of the test specimens

The test specimens shall not be taken before the concrete has sufficiently hardened to ensure that a regular surface of the specimens can be obtained. They are preferably taken at points not near to joints or edges of the components, and with no or little reinforcement. If the inclusion of reinforcement cannot be avoided, the mass and the volume of the bars shall be considered in the calculation of the dry density of the LAC.

The deviations of the surfaces of the test specimens from regular shape shall be small enough to enable the determination of the volume from the measured dimensions with an error not exceeding 1 %.

6 Procedure

6.1 Determination of the volume

The dimensions from which the volume of the test specimens is calculated shall be measured with calipers to the nearest 0,1 mm

6.2 Determination of the dry mass

The test specimens are placed in a drying oven at $(105 \pm 5) ^\circ\text{C}$ until constant mass is attained. Normally, drying shall be started not before an age of 7 d. The mass of the individual test specimens shall be determined immediately after removal from the drying oven. The error in determining the mass shall not exceed 0,1 % of the mass of the test specimen. The mass of the test specimen is considered constant if after 24 h of further drying it has not changed by more than 0,2 %.

7 Calculation of dry density and expression of test results

The dry density is calculated as follows

$$\rho = m_c / V_c$$

where:

- ρ is the dry density, in kilograms per cubic metres;
- m_c is the mass of the dried test specimen minus the mass of the reinforcement, in kilograms;
- V_c is the volume of the test specimen minus the volume of the reinforcement, in cubic metres;
The volume of the reinforcement may be determined by dividing its mass by its density (in the case of steel reinforcement $7,85 \times 10^3 \text{ kg/m}^3$).

The dry density of each individual test specimen shall be expressed to the nearest 5 kg/m^3 , and the mean value shall be rounded to the nearest 10 kg/m^3 .

In the case of multilayer components the mean dry density of the individual layers shall be determined separately.

8 Test report

The test report shall include the following

- a) identification of the product;
- b) date of manufacture or other code;
- c) date of sampling;
- d) place and date of testing, testing institute and person responsible for testing;
- e) number and date of edition of this European Standard;
- f) shape and size of the test specimens;
- g) dry density of each individual test specimen and mean value (in the case of multilayer components for each layer of interest);
- h) observations on the appearance of the test specimens, e.g. included reinforcement, irregularities of the structure.