1. SCOPE AND FIELD OF APPLICATION

This NORDTEST method is intended for the determination of the density of test specimens of concrete made from normally occurring types of rock-type aggregate. The aim of the method is to determine the density of the concrete with an accuracy within ± 20 kg/m³.

- as received
- after the concrete has been stored in water
- after drying at 105 °C.

The density, expressed in kg/m³, is the ratio between the weight (the mass) of a given sample of the concrete and its volume.

In the main, the method agrees with ISO 6275. With regard to any deviations, see Comments.

2. REFERENCES

NT BUILD 200  CONCRETE, HARDENED: DIMENSIONS OF TEST SPECIMENS
ISO 6275-1982 Concrete, hardened - Determination of density
3. **SAMPLING**

The manner in which the samples have been taken shall be stated in the test report.

The volume of the test specimen shall be at least $50 \times d^3$, still at least 0.75 l, where $d$ is the nominal maximum particle size in the concrete.

4. **METHOD OF TEST**

4.1 **Principle**

The weight of the test specimen is determined, either as received or, when so is requested, after the storing in water or after the drying at 105 °C, to the closest value of the constant weight.

The volume of the test specimen is determined through measuring if the specimen has a sufficiently regular form, otherwise through weighing under water.

4.2 **Apparatus**

*Balance* with an accuracy within ±0.1 % of the weight of the test specimen.

*Tank* for the keeping of the test specimens under water, (when the density is determined after storing the samples in water).

*Oven*, well ventilated, with a thermostatically controlled device for regulating the temperature between 105 ± 5 °C. (When the density is determined after drying).

*Calliper rule* (when the density of the test samples is determined through measuring).

A balance for weighing the specimens under water (especially if its shape is irregular) see Fig. 1.
4.3 Procedure

4.3.1 The weight of the test specimen

If the density of the test specimen shall be determined as received, the specimen is weighed at the time of reception (weight $m_0$).

If the density shall be determined after storing in water, the specimen should be immersed in water at a temperature of $20 \pm 2 \, ^\circ\text{C}$ for so long a time that its weight does not increase with more than 0.2 % during 24 hours. Prior to the weighing, the specimen should be dried so that all free water on the surfaces is removed. Then the specimen is weighed (weight $m_1$).

If the density shall be determined after drying, the test specimen should be dried in the oven at the temperature of $105 \pm 5 \, ^\circ\text{C}$ for so long a time that its weight does not decrease with more than 0.2 % during 24 hours. Then the specimen is weighed after cooling (weight $m_2$).
4.3.2 The volume of the test specimen

If the test specimen has been manufactured, and if needed, ground so that the demands on the test specimen acc. to NT BUILD 200 are met, it should be measured by means of the calliper rule acc. to the same method. The volume \( V \) is then calculated.

A test specimen that does not have a sufficiently regularly shaped form acc. to the previous paragraph, should be immersed in water acc. to 4.3.1. Afterwards the volume may be determined under the water which should have a temperature of 20 ± 2 °C.

The basket in which the test specimen should be placed, is lowered into the water. The weight \( m_3 \) is then read or the scale is readjusted to zero \( (m_3=0) \). The water stored test specimen should be placed in the basket in such a manner that it is covered with water and in such a way that no air is attached to its surfaces. The weight \( m_4 \) is then read when any oscillations have ceased.

Volume \( V \) is calculated acc. to the formula

\[
V = \frac{(m_1 + m_3 - m_4)}{\rho_W}, \quad \text{where}
\]

\( \rho_W \) is the density of the water = 1000 kg/m³.

4.4 Expression of Results

The density is expressed in kg/m³ with the single unit rounded off to 0.

The density at the reception is expressed as

\[
\rho_0 = \frac{m_0}{V}
\]

The density after water saturation is expressed as

\[
\rho_1 = \frac{m_1}{V}
\]
The density after drying is expressed as

$$\rho_2 = \frac{m_2}{V}.$$  

4.5 Test Report

If a test report is submitted, it should contain at least the following information:

a) Name and address of the testing laboratory
b) Date and identification symbols of the report
c) Test method (number and title)
d) Any deviation from the test method
e) Name and address of the person or institution who ordered the test
f) Name and address of the person performing the test
g) Name and address of the manufacturer of the concrete
h) The identification symbols of the concrete. The composition of the concrete should also be noted
i) Date when the test was performed, and the sample was received
j) Test results
k) Any other information of importance for the evaluation of the test results
l) Evaluation of the test results, if this is required in the request for the test.

Comments

The method deviates from ISO 6275 with regard to the editing and the content of the test report and on the following points:

Point 1 ISO states that the method is also valid for concrete with light and heavy aggregate

Point 2 ISO states that the volume of the test specimen shall be at least 1 dm$^3$