KENYA STANDARD **DKS 2802-6:2019**

ICS

Masonry units — Methods of test

Part 6:

Determination of water absorption of aggregate concrete, autoclaved aerated concrete, manufactured stone and natural stone masonry units due to capillary action and the initial rate of water absorption of clay masonry units

First Edition, 2019

KENYA STANDARD

DKS 2802-6:2019

ICS

TECHNICAL COMMITTEE REPRESENTATION

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National Housing Corporation

Kenya Clay Products Ltd

Coast Clay Works Ltd

Consumer Information Network

University of Nairobi

Kenya Industrial Research & Development Institute

Architectural Association of Kenya

M&O Consulting Engineers

Kenya Association of Manufacturers,

Kenya National Federation of Jua Kali Association

Lake Basin Development Authority

Kenya Bureau of Standards — Secretariat

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Foreword

This Kenya Standard was prepared by the Clay and Clay Products Technical Committee under the guidance of the Standards Projects Committee and in accordance with the procedures of the Kenya Bureau of Standards.

During the development of this standard, reference was made to the following documents:

> BS EN 772-11:2011 Methods of test for masonry units - Part 1: Determination of water absorption of aggregate concrete, autoclaved aerated concrete, manufactured stone and natural stone masonry units due to capillary action and the initial rate of water absorption of clay masonry units.

Acknowledgement is hereby made for the assistance received from these sources.

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Determination of water absorption of aggregate concrete, autoclaved aerated concrete, manufactured stone and natural stone masonry units due to capillary action and the initial rate of water absorption of clay masonry units

1. Scope

This Kenyan Standard specifies a method of determining the water absorption coefficient due to capillary action for aggregate concrete, autoclaved aerated concrete, natural stone and manufactured stone masonry units and the initial rate of water absorption for clay masonry units.

2. Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

DKS 2801 -1, Specification for masonry units - Part 1: Clay masonry units

EN 771-2, Specification for masonry units - Part 2: Calcium silicate masonry units

EN 771-3, Specification for masonry units - Part 3: Aggregate concrete masonry units (Dense and light• Weight aggregates)

EN 771-4, Specification for masonry units - Part 4: Autoclaved aerated concrete masonry units

EN 771-5, Specification for masonry units - Part 5: Manufactured stone masonry units

EN 771-6, Specification for masonry units - Part 6: Natural stone masonry units

DKS 2802 - 8, Methods of test for masonry units- Part 16: Determination of dimensions

3. Principle

After drying to constant mass, a face of the masonry unit is immersed in water for a specific period of time and the increase in mass is determined.

In the case of clay masonry units the initial rate of absorption of the bed face is measured. In the case of aggregate concrete, autoclaved aerated concrete, natural stone and manufactured stone masonry units the water absorption of face of the unit to be exposed is measured, as described in the relevant product standard

4. Symbols

$M_{dry,S}$ is the mass of the specimen after drying, (g);

$M_{S0,S}$ is the mass of the specimen in grams after soaking for time t, (g);

A_S is the gross area of the face of the specimen immersed in water, (mm^2):

t_{S0} is the time of soaking, (s);

NOTE Specified in the relevant part of DKS 2801.

$C_{w,s}$ is the coefficient of water absorption due to capillary action for aggregate concrete autoclaved aerated concrete, natural stone and manufactured stone masonry units;

$C_{wi,s}$ is the initial rate of water absorption for clay masonry units, [kg/(m^2 x min)].

5. Apparatus

5.1. Large tray of minimum depth of 20 mm and of plan area larger than the face of the masonry unit to be immersed fitted with a means of maintaining constant water level.

5.2. Supporting device of 400 mm^2 maximum plan area to keep each specimen clear of the base of the tray.

5.3. Stopwatch graduated in seconds.

5.4. Ventilated oven capable of maintaining a temperature of 70 °C ± 5 °C for aggregate concrete, autoclaved aerated concrete, natural stone and manufactured stone units or 105 °C ± 5 °C for clay units.

5.5. Weighing instrument capable of weighing the specimens to an accuracy of 0,1 % of their mass when dry.

6. Preparation of specimens

6.1. Sampling

The method of sampling shall be in accordance with the relevant part of DKS 2801. The minimum number of specimens shall be six, but a larger minimum number may be specified in the product specification, in which case that larger number shall be used.

6.2. Drying

Dry the test specimens to constant mass $M_{dry,s}$ in a ventilated oven (5.4) at a temperature of 70 °C ± 5 °C for aggregate concrete, autoclaved aerated concrete, natural stone and manufactured stone masonry units or 105 °C ± 5 °C for clay masonry units. Constant mass is reached, if during the drying process in two subsequent Weighing's with a 24 h interval, the loss in mass between the two determinations is not more than 0,1 % of the total mass.

7. Test procedure

Allow the specimens to cool at room temperature. When cool, measure the dimensions of the faces to be immersed in accordance with the principle incorporated in DKS 2802-8 and calculate the gross area A5. Place the specimens with their faces (bed faces in the case of clay units) supported on a supporting device (5.2) so that they are clear of the base of the tray (5.1) and immerse in water to a depth of 5 mm ± 1 mm for the duration of the test. In the case of masonry units with an extremely irregular face, raise the water level in

such a way that the complete surface just makes contact with the water surface. For natural stone masonry units record whether the test face is parallel or perpendicular to the bedding planes.

Activate the timing device. Maintain the water level constant throughout the test. For aggregate concrete, autoclaved aerated concrete, natural stone and manufactured stone units, cover the tank to avoid evaporation from the wet specimens.

After the immersion time (t50) specified in DKS 2801-1, EN 771-3, EN 771-4, EN 771-5 or EN 771-6 remove the specimens, wipe off surface water and weigh them ($M_{S0,S}$).

For natural stone masonry units, remove the specimens from the water at regular intervals, wipe off the water, weigh them, then re-immerse them. Continue this procedure until no further increase in mass is observed. For some clay masonry units the initial rate of water absorption can differ for the two bed faces, in which case it will be necessary to measure on both faces.

8. Calculation and expression of results

8.1. Coefficient of water absorption due to capillary action of aggregate concrete and manufactured stone units

Calculate the coefficient of water absorption of the masonry units due to capillary action to the nearest 0, 1 g/m^2.s using the following formula:

$$c_{w,s} = \frac{m_{so,s} - m_{dry,s}}{A_s \cdot t_{so}} \times 10^6 \left[g / \left(m^2 \cdot s \right) \right]$$

8.2. Coefficient of water absorption due to capillary action of autoclaved aerated concrete and natural stone masonry units

Calculate the coefficient of water absorption of the masonry units due to capillary action of each specimen to the nearest 1g /(m^2 x S$^{0\cdot5}$) using the following formula:

$$c_{w,s} = \frac{m_{so,s} - m_{dry,s}}{A_s \cdot t_{so}} \times 10^6 \left[g / \left(m^2 \cdot s \right) \right]$$

In the case of natural stone masonry units, plot a graph of $\frac{m_{so,s} - m_{dry,s}}{A_s}$ against the square root of the time immersed, in seconds. Calculate $C_{w,s}$ as the gradient over the initial linear portion of the graph.

8.3. Initial rate of water absorption of clay masonry units

Calculate the initial rate of water absorption of each clay masonry unit to the nearest 0, 1 kg/ (m^2 x min) using the following formula:

$$c_{w,i} = \frac{m_{so,s} - m_{dry,s}}{A_s t} \times 10^3 \left[kg / \left(m^2 \times \min \right) \right]$$

Where t = 1 min.

9. Evaluation of results

For aggregate concrete and manufactured stone masonry units calculate the mean of the coefficients of water absorption due to capillary action to the nearest 0, 1 g/(m^2 x s).

For autoclaved aerated concrete and natural stone masonry units calculate the mean of the coefficients of water absorption due to capillary action to the nearest 1 g/(m^2 x $s^{0.5}$).

For clay masonry units calculate the mean of the initial rates of water absorption to the nearest 0, 1 kg/(m^2 x min).

10. Test report

The test report shall contain the following information:

a) number, title and date of issue of this Kenyan Standard;

b) name of the organization that carried out the sampling and the method used;

c) date of testing (in the case of aggregate concrete, autoclaved aerated concrete and manufactured stone masonry units only);

d) description of the specimens to the relevant part of DKS 2801;

e) number of specimens in the sample and whether these are whole units or representative portions thereof;

f) date of receipt of the specimens in the testing laboratory;

g) for aggregate concrete and manufactured stone masonry units, the individual values of water absorption coefficient due to capillary action to the nearest 0, 1 g(m2 x s) for each unit, the length of time of immersion and the mean water absorption coefficient due to capillary action to the nearest 0, 1 g(m2 x s);

h) for autoclaved aerated concrete and natural stone masonry units, the individual values of water absorption coefficient due to capillary action to the nearest 1 g/(m2 x s 0'5) for each unit, the length of time of immersion and the mean water absorption coefficient due to capillary action to the nearest 1 g/(m^2 x $s^{0,5}$). For natural stone masonry units state whether the test face was parallel or perpendicular to the bedding planes;

i) for clay masonry units, the individual values of initial rate of water absorption to the nearest 0, 1 kg/(m^2 x min), and the mean of the initial rates of water absorption to the nearest 0,1kg/(m^2 x min);

j) remarks, if any.

Annex A

(informative)

The coefficient of water absorption of aggregate concrete and manufactured stone masonry units is now calculated to a new formula given in 8.1. In the previous edition, the formula now given in 8.2 had been applied to these types of units also.