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Natural stone test method — Determination of water absorption at atmospheric pressure

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Foreword

Rwanda Standardsarepreparedby Technical Committees and approved by Rwanda Standards Board (RSB) Board of Directors in accordance with the procedures of RSB, in compliance with Annex 3 of the WTO/TBT agreement on the preparation, adoption and application of standards.

The main task of technical committees is to prepare national standards. Final Draft Rwanda Standards adopted by technical committees are ratified by members of RSB Board of Directors for publication and gazettment as Rwanda Standards.

DRS549 was prepared by Technical Committee RSB/TC 9, *Civil engineering and building materials.*

In the preparation of this standard, reference was made to the following standard (s):

1) BS EN 13755:2008: Natural stone test methods - Determination of water absorption at atmospheric pressure

The assistance derived from the above source is hereby acknowledged with thanks.

DRS549 consists of the following parts, under the general title *Natural stone test methods - Determination of water absorption at atmospheric pressure*:

Committee membership

The following organizations were represented on the Technical Committee on *Civil engineering and Building materials*(RSB/TC 9) in the preparation of this standard.

A+Construction Group Ltd

Africeramics Ltd

Consultants Engineers Group (CEG) Ltd

D&D Resources Ltd

Dutureheza Ltd

Enabel Rwanda

Greenpack Africa Ltd

Integrated Polytechnic Regional Centre (IPRC) - Musanze

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Standards for Sustainability (SfS)

Stonecraft Industries Ltd

University of Rwanda - College of Science and Technology (UR - CST)

Rwanda Standards Board(RSB) – Secretariat

Natural stone test methods - Determination of water absorption at atmospheric pressure

1 Scope

This Draft Rwanda standard specifies a method for determining the water absorption of natural stone – see DRS 515 for terminology and DRS 5278 for denomination - by immersion in water at atmospheric pressure.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the editioncited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

DRS 528, Natural stone test methods: Denomination criteria

DRS 515, Natural stone – Terminology

3 Terms and definitions

For the purposes of this standard, the terms and definitions given inDRS 515 and DRS 528apply.

4 Principle

After drying to a constant mass, each specimen is weighed and then immersed in water at atmospheric pressure for a specified period of time. Determination of the water absorption at atmospheric pressure, expressed as a percentage, by the ratio of the mass of the saturated specimen (obtained at constant mass) to the mass of the dry specimen.

5 Symbols

m_d mass of the dry specimen, in grams;

m_i successive masses of the specimen during testing, in grams;

m_s mass of the saturated specimen (after immersion in water until constant mass is reached), in grams;

A_b water absorption at atmospheric pressure, expressed as a percentage.

6 Apparatus

5.1 A tank with flat base comprising small non-oxidising and non-absorbent supports for the specimens.

5.2 A ventilated oven which can maintain a temperature of (70 ± 5) °C.

5.3 A weighing instrument with an accuracy of 0.01 g.

7 Preparation of the specimens

7.1 Sampling

The sampling is not under the responsibility of the test laboratory except where especially requested.

At least six specimens shall be selected from a homogenous batch.

7.2 Test specimens

The test specimens shall have the form of a cylinder, cube or prism (70 ± 5) mm or (50 ± 5) mm and shall be obtained by diamond sawing or coring. Their apparent volume calculated by geometrical measurements shall be at least 60 ml. In addition, the surface area to volume ratio shall be between 0,08 mm-1 and 0,20 mm-1.

NOTE The specimens prepared for the determination of compressive or flexural strength can be used if they satisfy the surface/volume ratio.

7.3 Drying the specimens

The test specimens are to be dried to constant mass at a temperature of (70 ± 5) °C. Constant mass is reached when the difference between two successive weighings at an interval of (24 ± 2) h is not greater than 0,1 % of the first of the two masses.

The specimens shall be kept in a desiccator until room temperature (20 ± 5) °C is attained.

8 Test procedure

Weigh the specimens after drying (md) to an accuracy of 0,01 g. Place the specimens in the tank on the supports provided. Each specimen needs to be at least 15 mm from adjacent specimens. Then add tap water at (20 ± 10) °C up to half the height of the specimens (time t0). At time t0 + (60 ± 5) min add tap water until the level of the water reaches three-quarter of the height of the specimens.

At time t0 + (120 ± 5) min add tap water until the specimens are completely immersed to a depth of (25 ± 5) mm of water.

At time t0 + (48 ± 2) h the specimens are taken out of the water, quickly wiped with a damp cloth and then weighed within 1 min to an accuracy of 0.01 g (mi).

Immerse the specimens again in water and continue the test. Every (24 ± 2) h the specimens are taken out of the water, quickly wiped with a damp cloth and then weighed within 1 min to an accuracy of 0.01 g.

Note the successive masses of the specimens (mi).

Continue the test up to constant mass of the specimens. Constant mass is reached when the difference between two successive weighing is not greater than 0,1 % of the first of the two masses.

The result of the last weighing is the mass of the saturated specimen (m_s).

9 Expression of results

The water absorption at atmospheric pressure Ab of each specimen is calculated by the equation:

$$A_b = \frac{m_s - m_d}{m_d} x100$$

The result shall be expressed as a percentage to the nearest 0.1 %.

10 Test report

The test report shall contain the following information:

a) unique identification number of the report;

b) the number, title and date of issue of this Rwanda Standard,

c) the name and address of the test laboratory and the address where the test was carried out if different from the test laboratory;

d) the name and address of the client;

e) it is the responsibility of the client to supply the following information:

- the petrographic name of the stone;
- the commercial name of the stone;
- the country and region of extraction;
- the name of the supplier;
- the direction of any existing plane of anisotropy (if relevant to the test) to be clearly indicated on the sample or on each specimen by means of two parallel lines;
- the name of the person or organisation which carried out the sampling;
- the surface finish of the specimen (if relevant to the test);

f) the date of delivery of the sample or of the specimens;

g) the date when the specimens were prepared (if relevant) and the date of testing;

h) the number of specimens in the sample;

i) the dimensions of the specimens;

j) for each specimen the water absorption at atmospheric pressure to the nearest 0.1 %;

k) the arithmetic mean of the individual values of water absorption at atmospheric pressure expressed to the nearest 0.1 %;

l) all deviations from the standard and their justification;

m) remarks.

The test report shall contain the signature(s) and role(s) of the responsible(s) for the testing and the date of issue of the report. It shall also state that the report shall not be partially reproduced without the written consent of the test laboratory.

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