

Australian/New Zealand Standard™

**Masonry units, segmental pavers and flags—
Methods of test****Method 14: Determining water absorption
properties**

This Standard incorporates Amendment No. 1 (August 2004) and Amendment No. 2 (September 2009). The changes required by the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.

1 SCOPE

This Standard sets out the method for determining the water absorption properties of masonry units, segmental pavers and flags.

2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS/NZS

4456	Masonry units, segmental pavers and flags—Methods of test
4456.0	Part 0: General introduction and list of methods
4456.1	Method 1: Sampling for testing
4456.2	Method 2: Assessment of mean and standard deviation

3 DEFINITIONS

For the purpose of this Standard, the definitions given in AS/NZS 4456.0 apply.

4 PRINCIPLE

The increase in weight of any oven-dried test specimen, caused by the absorption of water under specified conditions, is determined and expressed as a percentage of the initial oven-dry weight of the specimen.

5 APPARATUS

The following is required:

- A well-ventilated drying oven with a cubic capacity not less than 3 times the total volume of the specimens being dried, and capable of maintaining a temperature of $110 \pm 8^\circ\text{C}$.
- A balance capable of weighing the mass of the saturated test specimen to an accuracy of 0.05%.
- An urn or a boiler-tank of sufficient size to hold the specimens without them touching each other and of sufficient depth to ensure that the specimens will be completely immersed in water for the full duration of the test, to a depth of at least 25 mm.

The boiler shall be capable of maintaining that volume of water at boiling point for at least 5 h at a time. It shall have a grid to support the specimens at least 50 mm above the heat source and ensure free circulation of water between the specimens and the bottom of the boiler.

- (d) Damp paper, damp cloth or damp sponge.

6 CONDITION OF SAMPLE

The age of a manufactured concrete sample, from the time of manufacture to the time of preparation of test specimens, shall be not less than 14 days. The products shall not have been subjected to any previous testing which would affect the absorptive properties of the material.

7 PREPARATION OF TEST SPECIMENS

Specimens accumulated from continuous sampling shall be deemed to meet the requirements of this method, provided that the number of specimens accumulated is at least 10. For assessment of an individual lot, select 10 units in accordance with AS/NZS 4456.1.

Where the dimensions of masonry units, segmental pavers or flags do not exceed 400 mm they shall be tested as whole units. Where at least one dimension exceeds 400 mm, specimens may be prepared from units as follows:

- (a) Cut specimens from units with a dry saw. The cut surfaces shall be clean, smooth and planar, and opposite faces shall be parallel with one another.
- (b) Specimens so prepared shall be taken from the units in such a manner that they are representative of the units used in practice, and oriented for testing in the same orientation as would entire units. They shall contain at least one side that is normally, in service, exposed to air.
- (c) Specimens so prepared shall measure a minimum 190 mm in length, 100 mm in width and 30 mm in thickness. The external dimensions shall be recorded and included in the report.

8 NOTATION

The following notation is used in this Standard:

m_1 = mass of dried specimen, in grams

m_2 = mass of immersed surface dried specimen, in grams

m_3 = mass of boiled surface dried specimen, in grams

w_i = percentage cold water immersion water absorption of the specimen

w_b = percentage boiling water absorption of the specimen

9 TEST PROCEDURE

9.1 Determination of dry mass (m_1)

Dry the specimen at $110 \pm 8^\circ\text{C}$ in the drying oven until consecutive weighings of the specimen, when made at intervals of not less than 4h, show a change in mass of not greater than 0.1%. For materials adversely affected by temperatures of $110 \pm 8^\circ\text{C}$, lower temperatures may be used. Where lower temperatures are used, they shall be reported. For dimensioned stone, a temperature of $65 \pm 3^\circ\text{C}$ is appropriate. Record the lowest value determined at room temperature as the dry mass (m_1), to the nearest gram.

Each consecutive weighing required may be carried out either—

- (a) by first allowing the specimen to cool from oven temperature to room temperature and then weighing; or
- (b) by weighing the hot specimen within 1 min of its removal from the oven then, if no further drying is required, cooling it to room temperature and reweighing it as soon as possible. Record the latter reading as the dry mass (m_1).

9.2 Cold water 24 h immersion test

The procedure shall be as follows:

- (a) Without preliminary partial immersion, immerse the specimen completely in cold potable water at ambient temperature for 24 h.
- (b) At the end of the immersion procedure, remove the specimen from the urn, allow it to drain for not more than 1 min, then remove any remaining water on the surface with damp paper, damp cloth or damp sponge.
- (c) Within 3 min of removing the specimen from the water, weigh the specimen in this saturated surface-dry condition and record the mass as (m_2), to the nearest gram.
- (d) Calculate the cold water absorption (percent) of each test specimen from the following equation:

$$w_i = 100(m_2 - m_1)/m_1 \quad \dots 1$$

- (e) Calculate the average percentage water absorption of the sample in accordance with AS/NZS 4456.2.

9.3 Five-hour boiling test

The procedure shall be as follows:

- (a) On completion of the step in Clause 9.1(b) or 9.2(c) place the specimen on the grid in the urn so that no part of the specimen is closer to a direct source of heat than 50 mm. Introduce potable water into the urn at room temperature until all surfaces of the specimen are covered by at least 25 mm of water.
- (b) When the specimen has been covered to the required depth, heat the water rapidly to 100°C in approximately 1 h and maintain it at that temperature for 5 h, keeping the specimen covered with water throughout. At the end of this period, cool the specimen uniformly over a period not less than 2 h to 20 ±5°C.
- (c) Leave the specimens in the tank for not less than 3 h after the water has reached ambient temperature.
- (d) Remove the specimen from the water and allow it to drain for not more than 1 min. Remove surface moisture with a damp paper, damp cloth or damp sponge, and within 3 min of removing the specimen from the water, determine the mass of the specimen (m_3) to the nearest gram.
- (e) Calculate the boiling water absorption (percent) of each test specimen from the following equation:

$$w_b = 100(m_3 - m_1)/m_1 \quad \dots 2$$

- (f) Calculate the average percentage water absorption of the sample in accordance with AS/NZS 4456.2.