

Australian/New Zealand Standard™

**Masonry units, segmental pavers and flags—
Methods of test****Method 7: Determining core percentage and
material thickness**

This Standard incorporates Amendment No. 1 (August 2004). 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 material thickness and the core volume percentage of masonry units.

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 PRINCIPLE

The core percentage for masonry units is calculated from the ratio of the core and gross volumes of the unit.

The material thickness of a hollow masonry unit is obtained by dividing the net volume of material in the unit by the area of one vertical face of the unit.

4 DEFINITIONS

For the purpose of this Standard, the definitions in AS/NZS 4456.0 and those below apply:

4.1 Volume**4.1.1 Core volume**

The volume of void within the cross-section of a unit.

4.1.2 Core volume percentage

The volume of the core expressed as a percentage of the gross volume.

4.1.3 Gross (bulk) volume

The volume of the solid material, plus the volume of the sealed and open pores, core holes and other significant indentations such as a frog in a pressed brick.

4.1.4 *Net Volume*

Net volume equals the gross volume minus the core volume.

4.2 **Vertical face area**

For the purpose of calculating the equivalent thickness, the area of one vertical face of the unit is the product of its length and height.

5 **APPARATUS**

The following is required:

- (a) A gauge or calliper, accurate to 0.5 mm.
- (b) A glass measuring cylinder with an appropriate capacity (e.g., 500 mL) and graduated in increments of 5 mL or less.
- (c) A sheet of smooth paper, not less than 600 × 600 mm.
- (d) Clean, fine, dry, washed sand.
- (e) Straightedge.
- (f) Compressible mat, not more than 3 mm thick.
- (g) Brush.

6 **TEST SAMPLE**

6.1 **Selection of test specimens**

Three test specimens shall be selected in accordance with AS/NZS 4456.1.

6.2 **Preparation of test specimens**

All loose particles shall be thoroughly removed from all specimens, by brushing if necessary.

7 **PROCEDURE**

7.1 **Determination of core volume by direct measurement**

The core volume of units with regular shaped core holes shall be determined by direct measurements with the aid of a gauge or calliper.

7.2 **Determination of core volume (*V*) by sand filling**

The procedure shall be as follows:

- (a) Place the unit to be tested bed down (cores vertical) on a sheet of paper that has been spread over the mat on the flat surface.
- (b) Fill the cores with sand to fall naturally. Do not work the sand into the cores. Using the straightedge, screed the level of the sand in the cores down to the top of the unit. With the brush, remove all excess sand from the top of the unit and from the paper sheet.
- (c) Lift up the unit and allow all of the sand in the cores to fall on the sheet of paper.
- (d) Transfer the sand from the sheet of paper to the graduated cylinder, allowing the sand to fall naturally. Do not shake or vibrate the cylinder. Level the sand in the cylinder without compacting it. Read and record the sand level to the nearest 5 mL.

7.3 **Determination of core volume (*V*) by immersion weighing**

The procedure shall be as follows:

- (a) Immerse the specimen in potable water for 2 h.

- (b) After soaking, remove the specimen, allow it to drain for not more than 1 min, then remove any remaining water from the surface with absorbent paper or cloth. Within 3 min of removing the specimen from the water, weigh the specimen and record the mass as m_1 , to the nearest gram.
- (c) After weighing, return the specimen to the water bath.
- (d) Remove the specimen from the water, immediately insert it into the basket and lower it into the water bath, which has been positioned beneath the balance hook. Ensure that the specimen and basket will remain immersed during weighing, and that they will not touch the sides of the bath.
- (e) Determine the mass of the specimen to the nearest gram and record as m_2 , making sure that the balance has been initially tared off to correct for the mass of the basket when immersed in water.

7.4 Determination of gross volume

The gross volume shall be calculated from the average dimensions (see Figure 1).

8 CALCULATIONS

8.1 Core volume percentage

The core volume percentage of each unit shall be calculated from the following equations:

$$\text{Gross volume} \dots V_1 = L \times W \times H \text{ (mm}^3\text{)} \quad \dots 1$$

$$\text{Core volume} \dots V_2 = V \times 1000 \text{ (mm}^3\text{)} \quad \dots 2$$

$$\text{Core volume percentage} \dots V_{pp} = 100 \times V_2/V_1 \quad \dots 3$$

where

- V = core volume, in millilitres
- V_1 = gross volume, in cubic millimetres
- V_2 = core volume, in cubic millimetres
- V_{pp} = core volume percentage
- L = length of unit, in millimetres
- W = width of unit, in millimetres
- H = height of unit, in millimetres

8.2 Material thickness

The material thickness of each unit shall be calculated from the following equation:

$$t_m = \frac{V_1 - V_2}{L \times H} \quad \dots 4$$

The average material shall be calculated in accordance with AS/NZS 4456.2.

9 RECORDING

The following information shall be recorded:

- (a) Reference to this test method, i.e., AS/NZS 4456.7.
- (b) Description of the marking, location and identification of the lot.
- (c) Sample and specimen identification.
- (d) Date of sample and test.
- (e) Work sizes for the lot.