

# Australian Standard<sup>®</sup>

AS 3706.7—2014

## Geotextiles—Methods of test

### Method 7: Determination of pore-size distribution—Dry-sieving method

#### FOREWORD

Due to the importance of pore-size distribution in the design of geotextiles for use as filters and separators, this test method is for measuring the size of openings in geotextiles. The method is an index test only. For critical projects, the designer may also consider geotextile soil interaction tests.

In this method, calibrated quartz sand is used to obtain an apparent opening size distribution curve similar to a grain size distribution curve for soils. For large pore sizes, the sand grains may be replaced by glass beads; however, for the measurement of fine pores, the sieving of glass beads could be affected by electrostatic forces and their use is not recommended. Difficulties are encountered in the dry sieving of sand through thick non-wovens due to the particles being trapped in the material, but no practical alternative dry methods of determining pore sizes for these types of fabrics are available at the present time.

#### METHOD

##### 1 SCOPE

This Standard sets out the method for determining the pore-size distribution and apparent opening size (AOS) of a geotextile using the dry sieving method, and, in consequence, the equivalent opening size (EOS).

This method is applicable to geotextiles having an EOS not less than 53  $\mu\text{m}$ .

##### NOTES:

- 1 Thicker fabrics or those with finer openings may need to be tested by other pore-size distribution tests.
- 2 For fabrics with larger pore sizes, optical methods may be preferable (e.g. over 2 mm, or over 0.6 mm if suitable sand is hard to obtain).

## 2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

- |        |                                                                                                            |
|--------|------------------------------------------------------------------------------------------------------------|
| 1152   | Specification for test sieves                                                                              |
| 2758   | Aggregates and rock for engineering purposes                                                               |
| 2758.1 | Part 1: Concrete aggregates                                                                                |
| 3704   | Geotextiles—Glossary of terms                                                                              |
| 3706   | Geotextiles—Methods of test                                                                                |
| 3706.1 | Method 1: General requirements, sampling, conditioning, basic physical properties and statistical analysis |

## 3 PRINCIPLE

Several fractions of clean quartz sand of known particle size are successively sieved through a screen made of the fabric being tested. After 10 min of shaking, a graph of the percentage of sand retained by the fabric against the particle size is plotted and, from this graph, the apparent opening size or equivalent opening size (or both) is determined.

NOTES:

- 1 Some international authorities use glass beads and a shaking time of 20 min; however, because of differences in generation of static electricity and differences in shape, glass beads give different results from natural sand.
- 2 Natural quartz sand may be difficult to obtain in all required grading sizes. Variations from pure quartz sand should be noted in the report.
- 3 As a result of the manufacturing process, some fabrics may be coated with a thin film of water-soluble lubricant. Soaking the specimen in water followed by drying prior to testing may be appropriate in such a case.

## 4 DEFINITIONS

For the purpose of this Standard, the definitions given in AS 3704 apply.

## 5 APPARATUS AND MATERIALS

### 5.1 Apparatus

The following apparatus is required:

- (a) A receiver of 200 mm diameter, cover, and 4.75 mm mesh sieve complying with AS 1152.  
NOTE: An internal detachable ring of 170 mm minimum internal diameter for securing the geotextile specimen is recommended, so that the sieving area is not unduly restricted.
- (b) Mechanical sieve shaker, with—
  - (i) a frequency of 50 Hz to 60 Hz; and
  - (ii) predominantly vertical sieve motion capable of maintaining a 1.5 mm amplitude (3 mm swing height) over the period of the test.
- (c) A balance of not less than 100 g capacity and accuracy of 0.01 g.

### 5.2 Material

Clean quartz sand, not less than 100 g, rounded to irregular particle shape, in accordance with AS 2758.1, in each of the grading ranges given in Table 1, oven-dried at 105°C to 110°C constant mass, and stored in airtight containers until the test is started.

**TABLE 1**  
**GRADING RANGES**

| Smaller size, $\mu\text{m}$ |         | Larger sizes, mm   |
|-----------------------------|---------|--------------------|
| $\geq 53$                   | $< 75$  | $\geq 0.6 < 1.18$  |
| $\geq 75$                   | $< 106$ |                    |
| $\geq 106$                  | $< 125$ |                    |
| $\geq 125$                  | $< 150$ | $\geq 1.18 < 2.36$ |
| $\geq 150$                  | $< 212$ |                    |
| $\geq 212$                  | $< 300$ |                    |
| $\geq 300$                  | $< 425$ | —                  |
| $\geq 425$                  | $< 600$ |                    |

NOTE: The above sizes are Australian Standard sieve sizes (see AS 1152).

## 6 PREPARATION OF TEST SPECIMENS

### 6.1 Sampling

A minimum of five test specimens shall be sampled in accordance with AS 3706.1. Each specimen shall be circular with a minimum diameter of 200 mm.

### 6.2 Conditioning

The specimens shall be dry-conditioned in accordance with AS 3706.1.

## 7 TEST CONDITIONS

The test atmosphere shall be in accordance with AS 3706.1.

## 8 PROCEDURE

The procedure shall be as follows:

- Secure the specimen in the sieve.
- Measure out a  $50 \pm 0.01$  g sample of one of the coarser-graded sand fractions and place it on the specimen. Ensure that the sand is dry and cool prior to use.  
NOTE: The size should be chosen so that not less than 90% and as close to but not exceeding 99% is retained by the specimen. For some geotextiles, this may not be possible because of the size of openings. Some trial runs may be required to determine the required size.
- Place the receiver and sieve set on the sieve shaker and shake for 10 min. Ensure the clamps holding the sieve in place are firmly tightened.
- Measure and record the mass of sand collected in the receiver to within 0.01 g. Deduct this from the original quantity to determine the mass retained.
- Collect the sand retained by the geotextile together with the sand passing, for re-use.  
Where sand is contaminated with other sand fractions and is required for re-use, it shall be re-sieved and oven-dried prior to use.
- Repeat Steps (a) to (e) while successively increasing sand grading sizes in accordance with Table 1 until less than 50% of the sample of sand is retained by the specimen.
- Repeat Steps (a) to (f), until a minimum of five specimens have been tested.  
NOTE: Further testing may be required in accordance with Step (h) and Clause 9.3.
- Reject any abnormal results in accordance with AS 3706.1, and test other specimens from the same roll.