भारतीय मानक
Indian Standard

IS 16237 : 2014

भूवस्त्रादि — वेट सिविंग तकनीक द्वारा आभासी छिद्र ज्ञात करना

Geo-Synthetics — Method for Determination of Apparent Opening Size by Wet Sieving

ICS 59.080.70

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Geo-synthetics Sectional Committee, TX 30

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Geo-synthetics Sectional Committee had been approved by the Textile Division Council.

In the preparation of this standard, assistance has been taken from ISO 12956 : 1999 'Geotextiles and geo-textile related products — Determination of the characteristic opening size'.

Composition of the Committee responsible for the preparation of this standard is given in Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounding off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in the standard.

Indian Standard

GEO-SYNTHETICS — METHOD FOR DETERMINATION OF APPARENT OPENING SIZE BY WET SIEVING

1 SCOPE

1.1 This standard covers the method for determination of apparent (equivalent) opening size of geo-textiles or geo-textiles related products by wet sieving of particles through the fabric specimen.

2 REFERENCES

2.1 The following standards contain provisions, which through reference in this text, constitute provisions of this standard. At the time of publication of this standard, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards.

IS No.	*Title*
460 (Part 3) : 1985	Specification of test sieves: Part 3 Method for examination of apertures of test sieves (*third revision*)
14706 : 1999	Geo-textiles — Sampling and preparation of test specimen

3 PRINCIPLE

3.1 The particle size distribution of a graded granular material (usually soil) is determined after washing through a single layer of the geo-textiles or geo-textiles related product used as a sieve, without load. The characteristic opening size corresponds to a specialized size of the granular material passed.

4 APPARATUS AND MATERIALS

4.1 Apparatus

a) A sieving device with a frequency of 50 Hz to 60 Hz;

b) Predominantly vertical sieve motion capable of maintaining a 1.5 mm amplitude (3 mm swing height) over the period of test;

c) Water supply system;

d) Spray nozzle(s) to ensure even wetting of the test specimen, enclosed in a transparent cylinder or covering cap to avoid soil/granular material loss;

NOTE — It is recommended that the nozzle(s) be capable of a water discharge of approximately 0.5 l/min at a working pressure of about 300 kPa maximum.

e) Specimen clamping device;

f) Pan, fixed on the sieving apparatus, with a tube connection to the device for collection of the water and granular material passing through the specimen. Typical sieving equipment is represented in Fig. 1; and

g) Grid with 1 mm diameter wire and a mesh size of (10 ± 1) mm to support the specimen during the test, to avoid excessive deformation of the specimen under the weight of the granular material.

4.2 Granular Material

The granular material shall comply with the following requirements:

a) It shall be cohesionless that is particles shall not aggregate in water;

b) It shall not be gap-graded and the particles shall be essentially round, sharp-edged flaky particles to be avoided.

4.3 Filter Paper (having opening size less than 10 microns) to collect granular material.

4.4 Drying Oven capable of maintaining temperature between 50°C and 100°C.

4.5 Balance with the accuracy of 0.01 g.

4.6 Set of Sieves in accordance with IS 460 (Part 3).

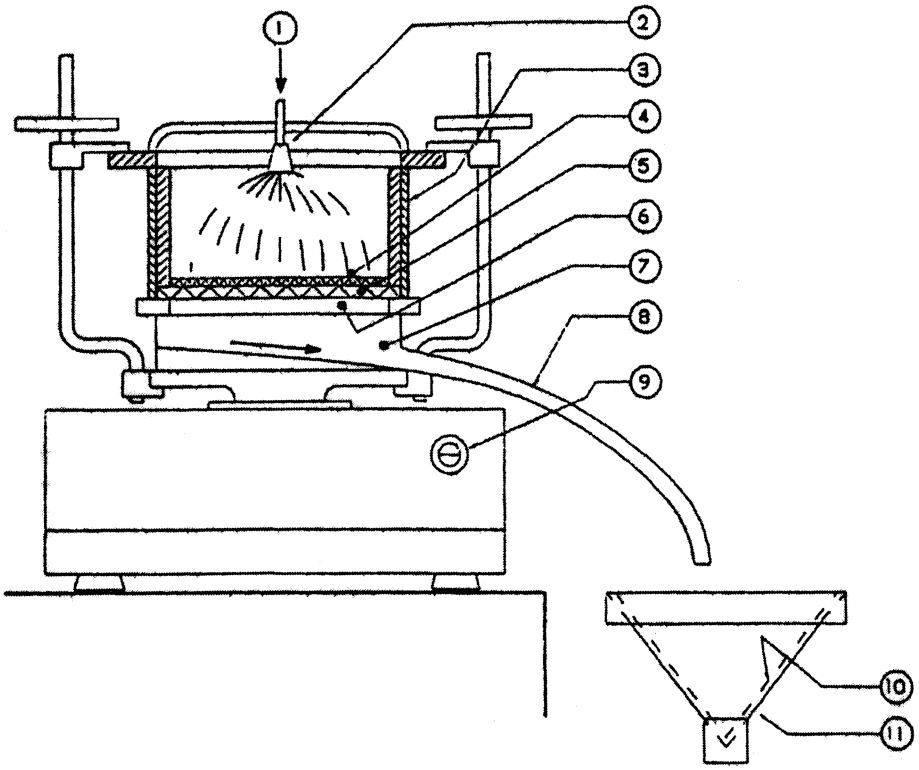
4.7 Stopwatch for measuring time to an accuracy of ± 1s.

5 PREPARATION OF SPECIMEN

5.1 The specimens of required size shall be prepared in accordance with IS 14706. The sample shall be handled as infrequently as possible and shall not be folded, in order to prevent disturbing its structure. The specimens shall be clean, free from surface deposits and without visible damage or folding marks.

6 PROCEDURE

6.1 Determine and record the mass of the dry specimen to the nearest 0.1 g. The specimen is considered dry when there is a reduction in mass of less than 0.1 percent between consecutive measurements with a time interval of 600 s. Drying shall be carried out at a temperature of 70°C or less, if the temperature affects the material.



1 — water supply
2 — spray nozzle(s)
3 — clamping device
4 — granular material
5 — specimen
6 — support grid
7 — pan
8 — connecting tube
9 — amplitude regulator
10 — filter paper
11 — collection

FIG. 1 EXAMPLE OF SIEVING DEVICE

6.2 Place the specimen under water containing a wetting agent at laboratory temperature and leave it to saturate for at least 2 h.

6.3 Remove the specimen from the water and place it flat and without tension in the clamping device. Place the clamping device on the sieving apparatus. The specimen should be horizontal to avoid accumulation of granular material at one location on the specimen.

6.4 Determine the dry mass of the granular material to the nearest 0.1 g. Use enough granular material to achieve a mass per specimen equivalent to (7.0 ± 0.1) kg/m² of exposed sieving area. However, if the amount passing during the test is insufficient then the total amount can be adapted in such a way that enough material is passed to carry out a particle size analysis.

6.5 Spread the granular material evenly on the specimen.

6.6 Open the water supply and spray water uniformly over the whole specimen. Adjust the quantity of water with a regulating valve to ensure that granular particles are completely wetted, but do not allow the water level to rise above the granular material. There shall be no standing water on the specimen. Maintain the water supply during the whole sieving operation.

6.7 Switch on the sieving device and slowly adjust the amplitude to 1.5 mm.

6.8 After a sieving time corresponding to 600 s, switch off the sieving device and turn off the water supply. Collect the granular material which passes through the specimen.

6.9 Collect the specimen together with any retained granular material.

6.10 Dry separately the passed granular materials (*see* **6.8**) and the specimen with the retained granular material (*see* **7.9**).

6.11 Obtain the dry mass of the retained granular material by weighing the specimen containing the retained granular material and subtracting the dry mass of the specimen. Determine to an accuracy of 0.1 g the dry mass of the retained granular material. Determine also the dry mass of the passed granular

material. If the combined mass of the retained and passed granular material deviates more than 1 percent from the initial total dry mass, the test is invalid and shall be repeated.

6.12 Repeat **6.1** to **6.11** until three of the five specimens have been tested.

6.13 If any of the masses of granular materials passing through the specimen vary from the average by more than 25 percent, then the two remaining specimens shall be tested.

7 CALCULATION AND EXPRESSION OF RESULTS

7.1 Plot the cumulative percentage of the passed granular material against the corresponding sieve size on a semi-logarithmic scale (*see* Fig. 2). Determine O_{90} by either mathematical or graphical means.

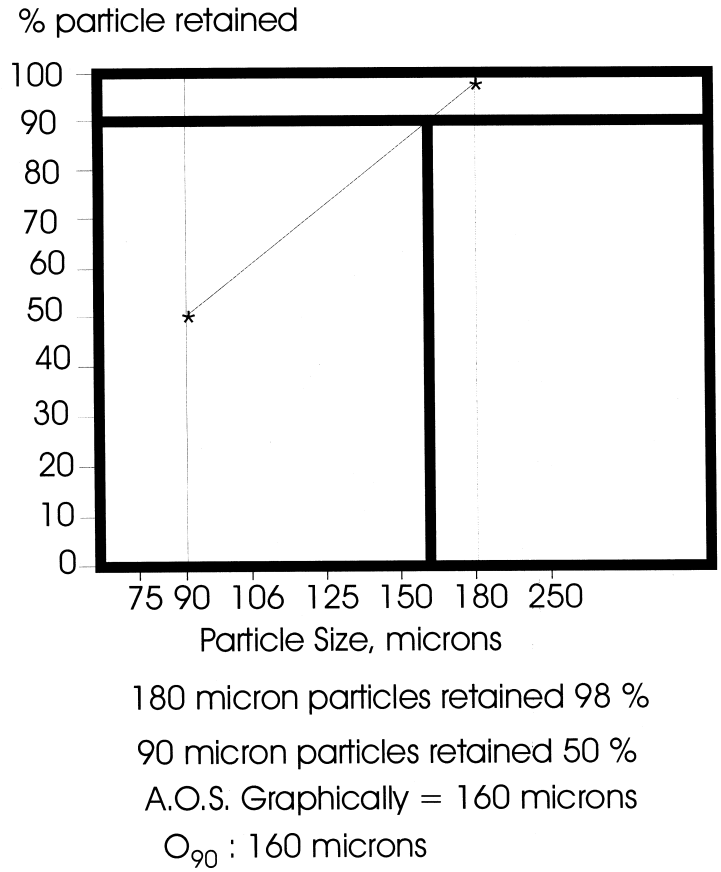


FIG. 2 CUMULATIVE PERCENTAGE OF THE PASSED GRANULAR MATERIAL AND THE CORRESPONDING SIEVE SIZE

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Geo-synthetics Sectional Committee, TX 30

Organization	*Representative(s)*
The Bombay Textile Research Association, Mumbai	Dr A. N. Desai (***Chairman***) Shri V. K. Patil (*Alternate*)
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Member Secretary
Shri J. K. Gupta
Scientist 'C' (TXD), BIS

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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