IS 13162-3 (1992): Geotextiles - Methods of Test, Part 3: Determination of Thickness at Specified Pressures [TXD 30: Geotextiles and Industrial Fabrics]

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Indian Standard

GEOTEXTILES — METHODS OF TEST

PART 3 DETERMINATION OF THICKNESS AT SPECIFIED PRESSURES

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Price Group 2

FOREWORD

This Indian Standard (Part 3) was adopted by the Bureau of Indian Standards, after the draft finalized by the Geotextiles Sectional Committee had been approved by the Textile Division Council.

The use of geotextiles has been recognized in foundation engineering, embankment construction for roads and railways, dam engineering, canals, etc. Their increasing importance is due to their versatility based on their specific properties. They are produced in many different ways, partly using traditional textile processes and partly using processes not commonly recognized as textile processes. They are required to perform the following four functions primarily:

a) Separation;
b) Filteration;
c) Reinforcement; and
d) Drainage

For all the above functions, it is desired that the geotextiles maintain integrity during the course of its life and do not tear, split and deteriorate under constructional or post constructional stresses. From the view point of applications of geotextiles, the thickness is one of the significant properties to be evaluated.

In reporting the results of a test made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

Indian Standard

GEOTEXTILES — METHODS OF TEST

PART 3 DETERMINATION OF THICKNESS AT SPECIFIED PRESSURES

1 SCOPE

1.1 This standard (Part 3) prescribes two methods for determination of the thickness of geotextiles at specified pressures and defines at which pressure the nominal thickness is determined. Method A (Loading each set of specimens) shall be used when using an apparatus the construction of which causes a high degree of time and/or labour when changing the pressure, otherwise Method B — (Incremental loading of individual specimens) shall be used.

1.2 The method is applicable to all types of geotextiles.

NOTES

1 Since the geotextiles are compressible, the thickness measure will depend upon the pressure applied. For this reason it may be desirable to measure thickness at a series of pressures and to study the general relationship between thickness and pressure.

2 Normally the thickness of geotextiles should be determined by measuring one layer of the geotextile. In cases when two or more layers are used on top of the each other in a design, a test may be made in accordance with this standard with the agreed number of layers instead of one. In such case when testing structured geotextiles consideration should be paid to the relevance of such findings.

2 REFERENCE

2.1 The following Indian Standard is a necessary adjunct to this standard:

IS No.	*Title*
6359 : 1971	Method for conditioning of textiles

3 DEFINITIONS

For the purpose of this standard, the following definitions shall apply:

3.1 Thickness (of Geotextiles)

The distance between a reference plate on which the specimen rests and a parallel pressure-foot applying a given pressure to the specimen.

3.2 Nominal Thickness (of Geotextiles)

The thickness determined when applying a pressure of 2 ± 0·01 kPa to the specimen.

4 PRINCIPLE

4.1 The thickness of a number of specimens of geotextiles are measured as the distance between the reference plate on which the specimen rests and a parallel circular presser-foot exerting pressures on an area of defined size within a larger area of geotextile.

4.2 The result of the test is given as the average of the results obtained at each specified pressure.

5 APPARATUS

5.1 Thickness Tester

Incorporating the following elements.

5.1.1 *Interchangeable Presser-Foot*

Having a circular and plane surface with an area of 25 cm² for testing materials of uniform thickness. For determination of the overall thickness of materials of non-uniform thickness or other parts of such materials, the size of the presser-foot shall be agreed upon and the size shall be given in the test report.

The presser-foot shall be capable of exerting a pressure of 2 kPa, 20 kPa, 200 kPa within a tolerance of 0·5 percent normal to the plane of the specimen.

NOTE — To assure the parallelity between the presser-foot surface and the reference plate when determining the overall thickness of geotextiles of non-uniform thickness, the presser-foot should be supported in at least three points evenly distributed over the presser-foot surface, which normally will require that a presser-foot with an area of more than 25 cm² is chosen.

5.1.2 *Reference Plate*

With a plane surface of minimum dimension greater than twice the diameter of the presser-foot surface for testing material of uniform thickness. When testing thinner areas in material of non-uniform thickness, the reference plate or a substituting supporting device can be chosen as small as the area of the presser-foot agreed upon to assure contact with the lower surface.

5.1.3 *Gauge*

For registering the distance between the reference plate and the presser-foot to an accuracy of 1 percent for geotextiles over 0·05 mm in thickness and to 0·001 mm for

geotextiles not exeeding 0·05 mm in thickness.

5.2 Suitable timing device.

6 PREPARATION OF TEST SPECIMENS

6.1 Cut from each roll selected (*see* **9.1** and **9.2**) over its full width perpendicular to roll length direction, a suitable sample of length necessary for obtaining the required number of test specimens. Cut from all such samples, required number of test specimens of minimum dimension greater than twice the diameter of the presser-foot surface.

6.2 The number of specimens shall be not less than 10. If new specimens are used for testing at each pressure then not less than 30 specimens will be required.

6.2.1 Specimens from a roll shall be cut from positions evenly distributed over the full width and length of the sample, but not closer than 100 mm to the selvedges.

6.2.2 Specimens shall not contain dirt, irregular spots, creases, holes or other visible faults.

6.2.3 Any two specimens shall not contain the same longitudinal or transversal position. If it is not possible, it shall be reported.

6.3 Before cutting structured geotextiles, exact instructions for cutting shall be laid down, and those shall be followed with great care.

6.4 If the cutting causes fragments of geotextile to loosen and if this cannot be avoided causing influence on test results, this fact shall be reported.

6.5 The specimens shall be kept free from dust, dry, at ambient temperature, in dark and protected against chemical and physical damage until the test is performed.

7 PROCEDURE

7.1 Conditioning of Test Specimens

7.1.1 Condition the specimens in the standard atmosphere of 65 ± 2 percent relative humidity and 27 ± 2°C temperature to moisture equilibrium from the dry side (*see* also IS 6359 : 1971). When the specimens have been left in such an atmosphere so that both the faces are exposed to the standard atmosphere as far as possible for 24 hours, they shall be deemed to have reached the state of moisture equilibrium.

7.2 Measurement of Thickness

7.2.1 When determining the thickness of material of non-uniform thickness, e.g. material in which strands or similar features are present, the part of the material to be tested shall be a matter of prior agreement between the buyer and the seller. The part tested shall be specified in the test report.

7.2.2 The thickness is determined by using the procedure specified in either **7.3** or **7.4** applying pressures of 2 kPa, 20 kPa and 200 kPa to an accuracy of 0·5 percent.

NOTE — Other values of pressure may be also used as agreed to between the buyer and the seller. If a pressure of more than 2·01 kPa is applied, a new conditioned specimen should be used for each test.

7.3 Method A

7.3.1 Place a specimen between the clean surfaces of the reference plate and presser-foot specified in **4**. Lower gently the presser-foot applying a pressure of 2 ± 0·01 kPa to the specimen and note the gauge reading after 30 seconds, unless some other time is specified.

NOTE — Such other time should be selected so that no appreciable change in fabric thickness is indicated by the instrument during a lapse of a further 20 percent of that time.

7.3.2 Remove the pressure and the specimen.

7.3.3 Repeat the procedure specified in **7.3.1** and **7.3.2** until at least 10 specimens are tested.

7.3.4 Repeat the procedure specified in **7.3.1** to **7.3.3** using the same specimens or a corresponding number of new specimens applying a pressure of 20 ± 0·1 kPa.

7.3.5 Repeat the procedure in **7.3.1** to **7.3.3** using the same specimens applying a pressure of 200 ± 1 kPa.

7.4 Method B

7.4.1 Perform the procedure in **7.3.1** and **7.3.2** without removing the specimen.

7.4.2 Lower gently the presser-foot applying a pressure of 20 ± 0·1 kPa to the same specimen and note the gauge reading after 30 seconds or as specified alternatively in **7.3.1** and **7.3.2** without removing the specimen.

7.4.3 Repeat the procedure in **7.4.2** applying a pressure of 200 ± 1 kPa. Remove the specimen.

7.4.4 Repeat the procedure in **7.4.1** to **7.4.3** until at least 10 specimens are tested.

8 TEST REPORT

8.1 The test report shall include the following particulars:

a) The roll number, roll width, roll length and colour of roll;

b) The number of specimens tested at each pressure given in **7.2**, **7.3** and **7.4**;

c) The conditioning atmosphere and the time of relaxation (*see* **7.3.1**);

d) The presser-foot size. If applicable the reason for not using the 25 cm^2 presser-foot size;

e) The average value of the thickness at each pressure given in 7.2, 7.3 and 7.4 expressed in mm to an accuracy of 1 percent for geotextile thickness over 0·05 mm and to the nearest 0·001 mm for geotextile thickness not exceeding 0·05 mm.

NOTES

1 Upon request the single results of each individual test can be given.

2 Upon request a graph showing the curve of the mean values of thickness corresponding to the applied pressure can be given. The *X*-axis should be logrithmical for applied pressures. The *Y*-axis should be linear for the thickness.

9 SAMPLING

9.1 A random sample shall be selected from the lot. The sample selected should be homogeneous and representative of the lot.

9.2 The number of rolls to be selected from a lot shall be in accordance with the procedure laid down in the relevant material specification or as agreed to between the buyer and the seller.

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