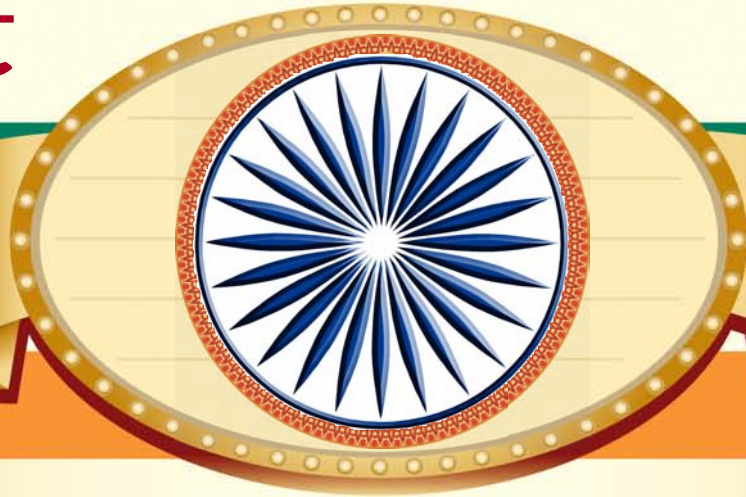


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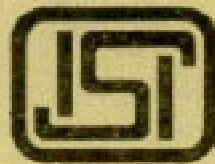


IS : 6490 - 1971

Indian Standard

METHOD FOR DETERMINATION OF
STIFFNESS OF FABRICS — CANTILEVER TEST

UDC 677.064 : 677.017.44



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May 1972

Indian Standard

METHOD FOR DETERMINATION OF STIFFNESS OF FABRICS — CANTILEVER TEST

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Indian Standard

METHOD FOR DETERMINATION OF STIFFNESS OF FABRICS — CANTILEVER TEST

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 31 December 1971 after the draft finalized by the Physical Methods of Test Sectional Committee had been approved by the Textile Division Council.

0.2 In the preparation of this standard assistance has been derived from the following:

BS 3356 : 1961 Determination of Stiffness of cloth, British Standards Institution.

ASTM Designation : D1388-64 Methods of test for stiffness of fabrics. American Society for Testing Materials.

0.3 In reporting the result 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*.

1. SCOPE

1.1 This standard prescribes a method for determination of stiffness of fabrics made from any textile fibre or a blend of two or more textile fibres.

1.2 This method of test is not suitable for fabrics which are very limp or which curl or twist badly when cut into small pieces; in general, this method is more suitable for testing woven fabrics than for testing knitted ones.

2. PRINCIPLE

2.1 The principle employed is to measure a particular length of the fabric specimen of specified dimensions which when used as a cantilever bends to a constant angle under its own weight.

3. TERMINOLOGY

3.0 For the purpose of this standard, the following definitions shall be used.

3.1 Stiffness — Resistance of fabric to bending.

3.2 Flexural Rigidity — Ratio of the small change in bending moment per unit width of the material to the corresponding small change in the curvature, expressed in milligram centimetres (mg-cm).

3.2.1 This quantity is a measure of the resistance of cloth to bending by external forces. It is related to the quality of stiffness that is appreciated when a fabric is handled; that is, the cloth having a high flexural rigidity tends to feel stiff.

3.3 Bending Length — Cube root of the ratio of the flexural rigidity (milligram-centimetres) to the weight per unit area (milligram per square centimetre) of the fabric. Bending length equals half the length of rectangular strip of fabric that will bend under its own weight to an angle of 41.5° . It is also equal to the length of a rectangular strip of materials that will bend under its own weight to an angle of 7.1° . It is expressed in centimetres.

3.3.1 This quantity is one of the factors that determines the manner in which fabric drapes. It is related to the quality of the stiffness that is appreciated by visual examination of the draped material, that is, the cloth having high bending length tends to drape stiffly.

4. SAMPLING

4.1 Follow the method of drawing the test sample from the gross sample with respect to the lot as given in the relevant specification for the material or as agreed to between the buyer and the seller.

NOTE — For cotton fabrics, IS: 3919-1966* may be followed.

5. PREPARATION OF TEST SPECIMENS

5.1 From the samples, as selected in **4.1** cut rectangular warpway and weftway test specimens of 25×200 mm size preferably with the help of a template from different portions of the sample under test. The lengthwise direction of specimens shall be parallel to the warp or weft direction for which the stiffness is to be determined. Specimens cut in each direction shall be scattered as far as possible so that no two warpway specimens contain the same set of warp yarns and no two weftway specimens contain the same set of weft yarns. Avoid selvages (within 10 cm),

*Methods for sampling cotton fabrics for determination of physical characteristics.

end portions, creased or folded places (*see* Note). The specimens shall be handled as little as possible.

NOTE — Reference to Indian Standard Method for preparing test specimens from fabric samples (*under preparation*) be made for details of preparing test specimens from fabric samples.

6. ATMOSPHERIC CONDITIONS FOR CONDITIONING AND TESTING

6.1 Prior to test, the fabrics shall be conditioned to moisture equilibrium and tested in standard atmospheric conditions of 65 ± 2 percent RH and $27 \pm 2^\circ\text{C}$ temperature as laid down in IS : 6359-1971*.

7. APPARATUS

7.1 **Stiffness Tester** — having the following parts:

a) *Horizontal Platform* — It shall have a minimum area of 40×200 mm and a flat smooth and low friction surface, such as polished metal. It shall be preferably equipped with spirit level for levelling.

b) *Indicator* — It shall be inclined at an angle of 41.5° below the plane of the platform surface from the edge of the platform.

c) *Scale* — It shall be of 25×200 mm weighing 10 ± 2 g/cm with rough bottom surface to grip the specimen and graduated in centimetres and millimetres.

8. PROCEDURE

8.1 Place the tester on a table or bench so that horizontal platform and inclined reference line are at eye level of the operator. Adjust the platform with the help of a spirit level so that it is horizontal.

8.2 Place one of the specimens on the platform with the scale on top of it lengthwise and the zero of scale coinciding with the leading edge of the specimen. Holding the scale in the horizontal plane, start pushing the specimen and the scale slowly and steadily when the leading edges project beyond the edge of the platform. An increasing part of the specimen will over hang and start bending under its own weight. Keep an eye in such a position that the two inclined line (of the inclined plane making an angle of 41.5° with the horizontal) of the tester coincide. Stop pushing the specimen when its tip reaches the level of inclined plane. If the specimen has a tendency to twist, take a reference point at the centre of the leading edge. Do not measure the specimen which twists more than 45° . Note down the length of the over-hanging portion from the scale to the nearest millimetre.

*Methods for conditioning of textiles.

8.3 Take four readings from each specimen with each side up, first at one end and then at the other.

NOTE — A typical sketch of stiffness tester is given in Fig. 1.

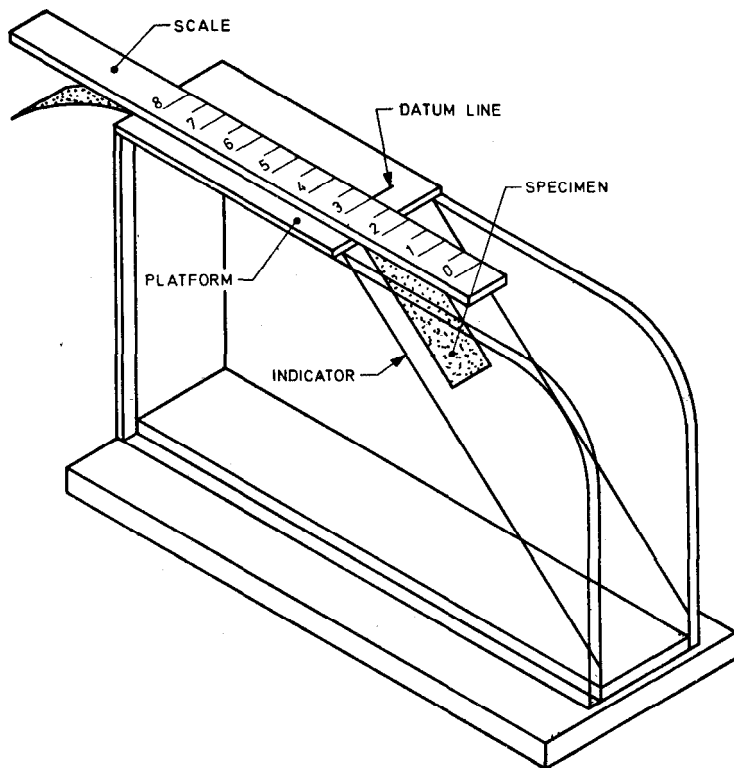


FIG. 1 APPARATUS FOR DETERMINING STIFFNESS

8.4 Similarly, test at least 4 test specimens for each warpway and weftway.

8.5 Determine the weight per unit area of the fabric according to IS : 1964-1970* and express in terms of milligrams per square centimetre. Alternatively the weight per unit area can be determined by weighing all the warpway and weftway test specimens together after completion of stiffness test.

*Methods for determination of weight per square metre and weight per linear metre of fabrics (first revision).

9. CALCULATIONS

9.1 Calculate the average of the four readings for each test specimen. Determine the average of the values for the warpway and weftway test specimens separately.

9.2 Determine the bending length, the flexural rigidity for warpway and weftway specimens and the overall flexural rigidity by the following formula:

- a) Bending length

$$C = \frac{L}{2} \text{ cm}$$

where

L = the mean length of over-hanging portion in centimetres.

- b) Flexural rigidity

$$G = W \times \left(\frac{L}{2} \right)^3 \text{ mg-cm}$$

where

W = weight per unit area of the fabric in milligrams per square centimetre.

- c) Overall flexural rigidity

$$G_o = \sqrt{G_w \times G_f}$$

where

G_w = warpway flexural rigidity, and

G_f = weftway flexural rigidity.

10. REPORT

10.1 The report shall include the following information:

- a) Type of fabric.
- b) Number of test specimens tested:
 - 1) Warpway, and
 - 2) Weftway.
- c) Bending length:
 - 1) Warpway and
 - 2) Weftway.
- d) Flexural rigidity:
 - 1) Warpway, and
 - 2) Weftway.
- e) Overall flexural rigidity, if required.

INDIAN STANDARDS

ON

Physical Methods of Test for Textiles

IS:

- 232-1967 Glossary of textile terms—natural fibres (*first revision*)
- 233-1954 Mean fibre-length of cotton and the proportion by weight of fibres of different length-grades in cotton
- 234-1952 Mean fibre weight per unit length (cotton)
- 235-1954 Mean single fibre-strength and intrinsic strength (cotton)
- 236-1968 Cotton fibre maturity (by sodium hydroxide swelling method (*first revision*))
- 237-1951 Cotton yarn count (or yarn melidity in tex)
- 239-1951 Lea-breaking load (strength) of cotton yarn and its count-lea-strength product
- 832-1964 Twist in yarn
- 1315-1959 Universal count of cotton yarn
- 1670-1970 Breaking load, elongation at break and tenacity of yarns (*first revision*)
- 1671-1960 Skein breaking load (strength), tenacity and yarn strength index of cotton yarn (by constant-rate-of traverse machine) (metric system)
- 1945-1969 Length and width of fabrics (*first revision*)
- 1963-1969 Threads for decimetre in woven fabrics (*first revision*)
- 1964-1970 Weight per square metre and weight per linear metre of fabrics (*first revision*)
- 1966-1961 Bursting strength of woven and knitted fabrics
- 1969-1968 Breaking load and elongation at break of woven textile fabrics (*first revision*)
- 2364-1963 Glossary of textile terms — fabrics made from natural fibres
- 2387-1969 Weight of jute fabrics (*first revision*)
- 2702-1964 Thermal resistance of textile fabrics, guarded hot-plate method
- 2899-1965 Percentage of modulated fibres in wool
- 3442-1966 Crimp and count of yarn removed from fabrics
- 3674-1966 Micro-naire value of cotton fibres
- 3675-1966 Bundle strength (tenacity) of cotton fibres
- 3689-1966 Conversion factors and conversion tables for yarn counts
- 4125-1967 Glossary of terms pertaining to defects in fabrics
- 4681-1968 Wrinkle recovery of fabrics (by measuring crease recovery angle)
- 4871-1968 Lint and trash content of cotton by means of mechanical-pneumatic machines