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Mazdoor Kisan Shakti Sangathan
“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”
Jawaharlal Nehru
“Step Out From the Old to the New”

Indian Standard
TEXTILES — DETERMINATION OF SPIRALITY AFTER LAUNDERING
PART 2 WOVEN AND KNITTED FABRICS

ICS 59.080.01
NATIONAL FOREWORD

This Indian Standard (Part 2) which is identical with ISO 16322-2 : 2005 ‘Textiles — Determination of spirality after laundering — Part 2: Woven and knitted fabrics’ issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of the Physical Methods of Test Sectional Committee and approval of the Textile Division Council.

Since ISO 16322 has been published in three parts, this standard has also been published in three parts. Other parts in this series are:

Part 1 Percentage of wale spirality change in knitted garments
Part 3 Woven and knitted garments

The text of ISO Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words ‘International Standard’ appear referring to this standard, they should be read as ‘Indian Standard’.

b) Comma (,) has been used as a decimal marker while in Indian Standards the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards which are to be substituted in their respective places are listed below along with their degree of equivalence for the editions indicated:

<table>
<thead>
<tr>
<th>International Standard</th>
<th>Corresponding Indian Standard</th>
<th>Degree of Equivalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 139 Textiles — Standard atmospheres for conditioning and testing</td>
<td>IS 6359 : 1971 Method for conditioning of textiles</td>
<td>Technically Equivalent</td>
</tr>
</tbody>
</table>

Technical corrigendum 1 published in 2007 to the above International Standard has been given at the end of this publication.

In reporting the result of a test or analysis 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)’.
1 Scope

This part of ISO 16322 specifies three procedures (diagonal marking, inverted-T marking and mock-garment marking) to measure the spirality or torque of woven and knitted fabrics after laundering.

The results obtained from different procedures may not be comparable.

This part of ISO 16322 is not intended to measure the spirality of fabrics as manufactured, but rather the spirality after laundering.

NOTE Some fabric constructions, such as denim, can have spirality intentionally introduced during manufacturing. Fabrics made on circular knitting machines can have inherent nonverticality of wale alignment.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 139, Textiles — Standard atmospheres for conditioning and testing

ISO 6330, Textiles — Domestic washing and drying procedures for textile testing

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 spirality  torque (in textiles) fabric condition, wherein filling yarns or knitted courses are angularly displaced from a line perpendicular to the edge or side of a fabric or garment

4 Principle

Test specimens are cut, prepared, marked, and laundered according to specified procedures. Spirality is measured in millimetres, percentage of a marked distance, or angle of nonverticality.
5 Apparatus

5.1 **Automatic washing machine**, as described in ISO 6330, the type agreed upon between parties.

5.2 **Automatic drying machine**, as described in ISO 6330, and agreed upon between parties.

5.3 **Calibrated ruler**, at least 500 mm in length, with 1 mm graduated marks.

5.4 **Conditioning rack**.

5.5 **Sewing machine**.

5.6 **Inverted T-square**, at least 500 mm in length.

5.7 **Marking template**, of dimensions (380 × 380) mm, (530 × 510) mm or (680 × 380) mm.

6 Conditioning

Condition the fabric or garments in the standard atmosphere for testing in accordance with ISO 139, for a minimum of 4 h before cutting, sewing or measuring the fabric specimens.

7 Test specimen preparation and marking procedures

7.1 **Procedure A — Diagonal marking**

7.1.1 **Test specimen preparation**

Prepare three specimens for marking from appropriate locations across a fabric sample. Cut three 380 mm × 380 mm single-layer fabric specimens aligned with the selvedge or tubular fold line in selected locations with different length and width yarns.

7.1.2 **Diagonal marking procedure**

Mark two pairs of 250 mm benchmark sets parallel to the length, and two pairs of 250 mm benchmark sets perpendicular to the width, to make a square.

Draw a line through each of the four sets of adjacent benchmarks to denote the square formed.

Label the corners A, B, C and D in a clockwise direction starting at the lower left corner (see Figure 1).

7.2 **Procedure B — Inverted-T marking**

7.2.1 **Test specimen preparation**

This marking procedure is particularly suited to narrow-width fabrics.

Cut three 680 mm × 380 mm specimens with the long dimensions aligned with the selvedge, or folded edge if the samples are a tubular knit.

7.2.2 **Inverted-T marking**

Draw a line, YZ, across the width of the specimen 75 mm above the edge of the specimen.

Place benchmark A perpendicular to the YZ line midway along the horizontal line.

Using a T-square device, mark point B 500 mm above point A on the vertical line (see Figure 4).
7.3 Procedure C — Mock-garment marking

7.3.1 Test specimen preparation

Fold the fabric with the selvedge edges together.

Place a 580 mm × 510 mm template on the fabric with the long direction parallel to the selvedge.

Cut a double thickness.

NOTE The underlayer may not be aligned with a warp or wale line nor will the 510 mm dimension necessarily be aligned with weft or course lines. However, pattern pieces for apparel assembly are typically aligned with selvedges rather than with warp or wale yarn lines.

7.3.2 Mock-garment marking

Place face sides together so that the two 580 mm long edges are even, as well as the shorter 510 mm edges.

Sew a 12 mm over-edged seam along each long direction and one short direction. Turn seams to the inside, forming an open-ended bag or pillowcase-type specimen to simulate a garment panel.

Stitch the unsewn edges of specimen to make a hemmed edge.

Measure and record distances along the seamed edges, lines AB and CD, of each specimen (see Figure 6).

8 Laundering

8.1 Laundering conditions

Select laundering conditions, according to ISO 6330, that correspond to those to which the item will be exposed, or to those intended to be on the care label of garments made from the fabric.

8.2 Laundering cycles

Perform the selected number of laundering cycles agreed upon between the parties concerned.

8.3 Conditioning

After the final laundering cycle, condition specimens according to ISO 139.

9 Assessment

9.1 General

Lay the specimens on a flat smooth surface and remove any major creases.

9.2 Assessment by procedure

9.2.1 Procedure A — Diagonal marking

9.2.1.1 Normal assessment

After laundering, measure and record distances AC and BD in millimetres (see Figure 2).
Calculate the percentage spirality ($\lambda$) for each specimen to the nearest 0,1 % as follows:

$$\lambda = 100 \left[ \frac{2(AC - BD)}{(AC + BD)} \right]$$

where

- $AC$ is the diagonal distance across the specimen from point A to point C;
- $BD$ is the diagonal distance across the specimen from point B to point D.

Calculate and report the mean percentage spirality for the specimens tested.

**NOTE** This formula assumes that the angle between the two diagonals remains a right angle after laundering. In reality, due to shrinkage during laundering, this angle does not remain a right angle. Hence, the spirality results obtained by this equation are an approximation of the actual spirality.

### 9.2.1.2 Alternative assessment option

An alternative assessment option is to extend line AD in each direction across the width of the specimen (see Figure 1).

Place the horizontal leg of a right-angle device along line AD so that the second leg is perpendicular downward from point B.

Draw benchmarks $A'$ and $D'$ to intersect line AD (see Figure 3).

Measure and record the length of lines $AA'$, $DD'$, $AB$, and $CD$ to the nearest millimetre.

Calculate the percentage spirality ($\lambda$) to 0,1 % for each specimen as follows:

$$\lambda = 100 \left( \frac{AA' + DD'}{AB + CD} \right)$$

Calculate and report the mean percentage spirality for the specimens tested.

The mean distance of $AA'$ or $DD'$ to the nearest millimetre may also be reported as the spirality distance, if desired.

### 9.2.2 Procedure B — Inverted-T marking

After laundering, place the horizontal leg of a right angle device along line YZ and the second leg on a perpendicular downward from point B. Place a benchmark on line YZ that corresponds to point $A'$ in Figure 5.

Measure and record the length of lines $AA'$ and $AB$ to the nearest millimetre.

Calculate the percentage spirality ($\lambda$) to 0,1 % for each specimen as follows:

$$\lambda = 100 \left( \frac{AA'}{AB} \right)$$

Calculate and report the mean percentage spirality for the specimens tested. The mean distance of $AA'$ to the nearest millimetre may also be reported as the spirality distance, if desired.
9.2.3 Procedure C — Mock-garment marking

After laundering, measure and record the distances of lines AA', DD', AB and CD of the specimen to the nearest millimetre (see Figure 7).

Calculate the mean percentage spirality ($\lambda$) to the nearest 0.1 % for each specimen as follows:

$$\lambda = 100 \frac{(AA' + DD')}{(AB + CD)}$$

Calculate and report the mean percentage spirality for the specimens tested.

The mean distance of AA' or DD' to the nearest millimetre may also be reported as the spirality distance, if desired.

10 Test report

The test report shall contain the following:

a) reference to this part of ISO 16322, i.e. ISO 16322-2:2005;

b) details of sample tested;

c) mean percentage spirality, or spirality distance (millimetres);

d) marking procedure used;

e) laundering procedure and type washer used;

f) number of laundering cycles.
Figure 1 — Fabric specimen with diagonal marking before laundering
NOTE The spirality direction in the figure is for illustration only. Spirality can be in either direction.

Figure 2 — Fabric specimen with diagonal marking after laundering
NOTE The spirality direction in the figure is for illustration only. Spirality can be in either direction.

Figure 3 — Fabric specimen with diagonal marking after laundering, optional procedure
Figure 4 — Fabric specimen with inverted-T marking before laundering
Figure 5 — Fabric specimen with inverted-T marking after laundering
Figure 6 — Fabric mock garment before laundering

Key
1 over-edged seam line
Key
1 original specimen
2 fabric after laundering

NOTE The spirality direction in the figure is for illustration only. Spirality can be in either direction.

Figure 7 — Fabric mock garment after laundering
Bibliography

[1] AATCC Test Method 179 — Skewness Change in Fabric and Garment Twist Resulting from Automatic Home Laundering
TECHNICAL CORRIGENDUM 1

Technical Corrigendum 1 to ISO 16322-2:2005 was prepared by Technical Committee ISO/TC 38, Textiles, SC 2, Cleansing, finishing and water resistance tests.

Page 2, 5.7
Replace 5.7 with the following:

5.7 Marking template, of dimensions (380 × 380) mm, (680 × 380) mm or (580 × 510) mm.

Page 3, 7.3.1
At the end of the second paragraph, add "[see Figure 6 a])" so that the sentence reads:

Place a 580 mm × 510 mm template on the fabric with the long direction parallel to the selvedge [see Figure 6 a]).
Page 3, 7.3.2

After the second sentence of second paragraph, add “[see Figure 6 b])” so that the sentence reads:

‘Turn seams to the inside, forming an open-ended bag or pillowcase-type specimen to simulate a garment panel [see Figure 6 b].

Replace the third paragraph with the following:

‘Fold and stitch the unsewn edge of the specimen to make a 12 mm hemmed edge [see Figure 6 c]).

At the end of the fourth paragraph, add “[see Figure 6 c])” so that the sentence reads:

‘Measure and record distances along the seam lines, AB and CD, of each specimen [see Figure 6 c]).

Page 4, 9.2.1.2

In the first sentence of the first paragraph, change “(see Figure 1)” to “(see Figure 3)”.

Replace the second and third paragraphs by the following:

‘Place the horizontal leg of a right-angle device along line AD so that the second leg is perpendicular downward from point B. Mark point A’. Move the right-angle device horizontally along line AD and mark point D’ downward from point C (see Figure 3).
Page 6, Figure 1

Change the dashed lines (AB, BC, CD, DA) to solid lines to denote marking instructions in 7.1.2 to form a marked square and change the title to “Fabric specimen for marking procedure A before laundering”.

![Figure 1 — Fabric specimen for marking procedure A before laundering](image)

Page 7, Figure 2

Change the title to “Fabric specimen for marking procedure A after laundering”.

Page 8, Figure 3

Change the title to “Fabric specimen for marking procedure A, alternative assessment option after laundering”.

16
Page 9, Figure 4

Change the long dimension from “650 mm” to “680 mm” as stated in 7.2.1 and change the title to read “Fabric specimen for marking procedure B before laundering”.

Figure 4 — Fabric specimen for marking procedure B before laundering
Page 10, Figure 5

Add under the figure:

**NOTE**  The spirality direction in the figure is for illustration only. Spirality can be in either direction.

Change the title to read “Fabric specimen for marking procedure B after laundering”.

Page 11, Figure 6

Replace the existing Figure 6 with Figures 6 a), b) and c).

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**a)** Fabric mock-garment specimen (2 layers) for marking procedure C before laundering

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*Figure 6 (continued)*
b) Fabric mock-garment specimen (2 layers) for marking procedure C with seams before laundering

**Figure 6 (continued)**
c) Fabric mock-garment specimen for marking procedure C with seams turned inside and open edge hemmed before laundering

Figure 6 — Fabric mock-garment specimen for marking procedure C before laundering
Replace the existing Figure 7 with the following.

Figure 7 — Fabric mock-garment specimen for marking procedure C after laundering

Key
1 new side edges of the specimen
2 side seam on the front of the specimen
3 side seam displaced to the back of the specimen

NOTE The spirality direction in the figure is for illustration only. Spirality can be in either direction.
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This Indian Standard has been developed from Doc No.: TXD 01 (0989).

Amendments Issued Since Publication

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