BS EN ISO 13015:2013

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Woven fabrics — Distortion — Determination of skew and bow (ISO 13015:2013)

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee TCI/24, Physical testing of textiles.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Foreword

This document (EN ISO 13015:2013) has been prepared by Technical Committee ISO/TC 38 "Textiles" in collaboration with Technical Committee CEN/TC 248 “Textiles and textile products” the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2014, and conflicting national standards shall be withdrawn at the latest by February 2014.

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Foreword

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The committee responsible for this document is ISO/TC 38, *Textiles*, Subcommittee SC 24, *Conditioning atmospheres and physical tests for textile fabrics*.

Introduction

Textile and clothing manufacturers give a lot of importance to knowledge of the widthway distortion. In the case of woven fabrics with patterns or in which the weft threads are rather visible, the appearance of a textile article could be compromised.

With some rare exceptions, the two sets of threads in woven textile fabrics are intended to lie straight and at right angles. If a fabric does not meet either of these requirements, it is described as distorted. Difficulties in making up may then arise and the made-up article may fail to function properly. The distortion may also detract from the appearance of fabric with checked patterns or coloured weft effects such as plaids or stripes. It is therefore desirable to have a means of specifying and measuring the distortion in woven fabric in terms of bow and skew.

Woven fabrics — Distortion — Determination of skew and bow

1 Scope

This International Standard specifies a method for the determination of the distortion of a woven fabric in which the weft yarns are, in principle, perpendicular to the warp yarns.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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*

3 Terms and definitions

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

3.1
bow
curvature of the warp or weft of fabrics

3.2
skew
fabric condition where the picks, although straight, are not at right angles to the ends

4 Principle

In a piece of the woven fabric, laid on a flat surface and without tension, skew and bow are characterized as follows.

Overall skew is based on the determination of the distance between one end of a weft yarn and the point on the same edge intersected by a normal perpendicular from the other end of the weft yarn to the fabric edge, in proportion to the distance between two points at which the normal perpendicular to the fabric edge intersects both edges (woven fabric width), expressed as a percentage ratio.

Local skew is determined as the distance between one end of a weft yarn to its perpendiculars to the warp running at right angles to a portion of the fabric length.

Weft bow is determined (see Annex A) as the total perpendicular distance by which a weft yarn deviates from a straight line joining both ends of the weft yarn.

Warp bow is determined (see Annex A) as the greatest perpendicular distance between the edge of the fabric and a straight line joining two selected points on the edge.

NOTE Any special treatment of the laboratory sample, i.e. washing or cleaning, could be as agreed upon between the interested parties and be described in the test report (see Bibliography for examples of standardized methods).

5 Apparatus

5.1 **Set square**, or similar device with at least two sides at right angles, graduated in millimetres.

5.2 **Metallic ruler**, at least 100 cm long but not less than the overall width of the fabric under test, graduated in millimetres.

5.3 **Metallic ruler**, 20 cm in length, graduated in millimetres.

6 Conditioning and testing atmosphere

The conditioning and the testing shall be conducted in the standardized atmosphere according to ISO 139.

The conditioning of the woven fabric shall be at least 16 h.

7 Test specimens

7.1 When test specimens are taken from a bulk sample, take care to ensure that they are removed with the minimum stress applied.

7.2 Take full-width test specimens not less than 500 mm in length.

7.3 Do not take test specimens from within 1 m of the ends of a piece.

8 Procedure

8.1 General

Proceed with the measurement of the test specimen (excluding selvedges) and record the position of the selected weft yarn in relation to the nearest end of the test specimen.

8.2 Preparation by marking

Select a weft yarn and trace its course by marking successive points along its length, across the width of the test specimen, with a thin marker.

If the yarn is not clearly visible, lighting of the face side of the test specimen can accentuate the relief and so facilitate the tracing of the yarn's course.

Alternately mark and measure on the reverse side of the test specimen.

8.3 Preparation by fraying

If marking of the weft yarn is not possible, cut the woven fabric and fray it down to expose a complete weft yarn across the width of the test specimen.

8.4 Determination of the overall skew and local skew

8.4.1 General

From the line representing the weft yarn evolution, the line is modelled on the application of one or more triangles.

As each triangle is characterized by its height (identified as *a*) and its base (identified as *b*), the slope of each triangle can be calculated by the ratio of the height, *a,* and the base, *b*.

Then, the skew is expressed as the percentage of the slope.

When the line is modelled by several triangles, the highest skew is kept to represent the final result.

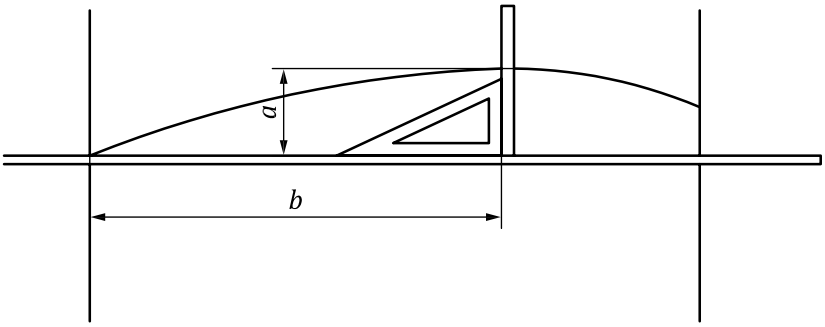
8.4.2 Measurement instructions

Measure to the nearest millimetre with the metallic ruler (5.2) the distance *b* (base) in the perpendicular direction to the warp.

Measure, with the set square and the small ruler, the distance *a* (height) in the warp direction (see Figure 1).

Note the values of the distance *a* (height) and the values of the distance *b* (base) of the related perpendicular for each slope that the line makes (see 8.4.3, 8.4.4, and 8.4.5, three examples of possible measurements in relation to the types of skew).

Measure in three different places along the length of the woven fabric in order to collect results based on three weft yarns.



Key

a height

b base

Figure 1 — Determination of the skew

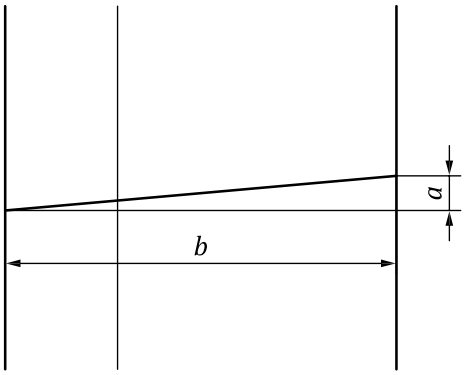
8.4.3 Overall skew

Figure 2 represents the triangle model with one triangle to determine the overall skew,

where

— *a* is the maximal distance of the top of the line, measured between the top and the normal perpendicular from the beginning of the weft yarn on one fabric edge to the opposite fabric edge;

— *b* is the distance between the orthogonal projections of the beginning of the weft yarn on one fabric edge and the top of the line on the normal perpendicular to the warp (*b* represents the useful width of the woven fabric for which the selvedges are excluded).



Key

a height

b base

Figure 2 — Principle of the measurement of the overall skew (one triangle model)

Figure 3, Figure 4, Figure 5, and Figure 6 are four examples of different configurations related to the measurement of the overall skew.

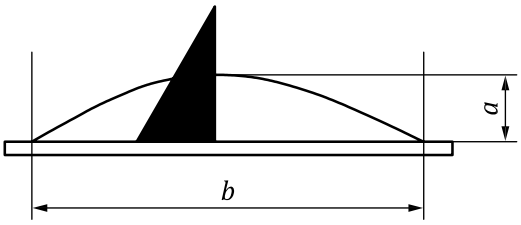


Figure 3 — Example 1 of overall skew

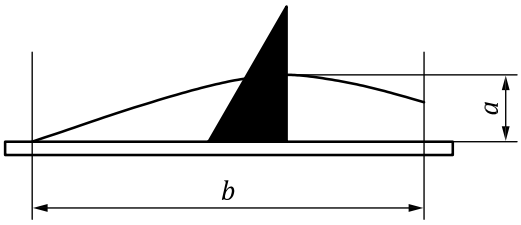


Figure 4 — Example 2 of overall skew

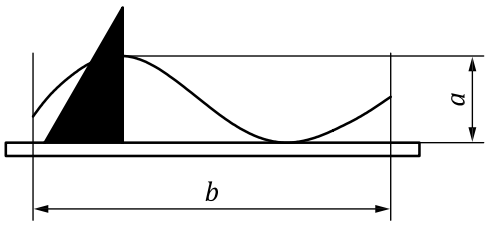


Figure 5 — Example 3 of overall skew

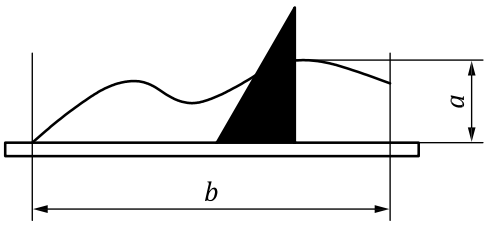


Figure 6 — Example 4 of overall skew

8.4.4 Local skew with two triangles

Figure 7 represents the triangle model with two triangles to determine the local skew,

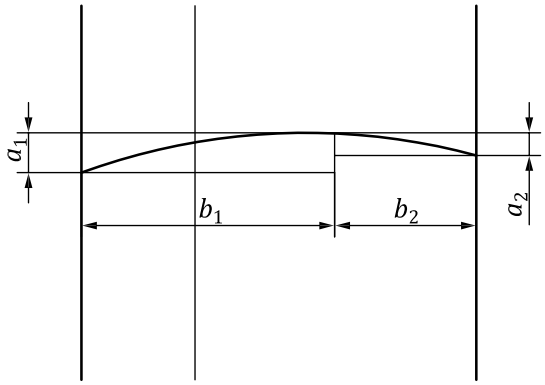
where

— a_1 is the maximal distance (height) of the top of the line, measured between the top and the straight line going by the beginning of the weft yarn on left;

— b_1 is the distance (base) between the orthogonal projections on the perpendicular to the warp of the beginning of the weft yarn on left and the top of the line;

— a_2 is the maximal distance (height) of the top of the line, measured between the top and the straight line going by the beginning of the weft yarn on right;

— b_2 is the distance (base) between the orthogonal projections on the perpendicular to the warp of the beginning of the weft yarn on right and the top of the line.



Key

a_1 height 1
a_2 height 2
b_1 base 1
b_2 base 2

Figure 7 — Local skew (model with two triangles)

8.4.5 Local skew with three triangles

Figure 8 represents the triangle model with three triangles to determine the local skew,

where

— a_1 is the maximal distance (height) of the first top of the line, measured between the top and the perpendicular to the straight line going by the beginning of the weft yarn;

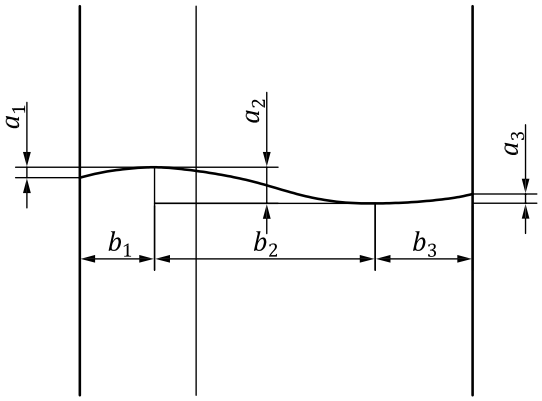
— b_1 is the distance (base) between the orthogonal projections on the perpendicular to the warp of the beginning of the weft yarn and the first top of the line;

— a_2 is the maximal distance (height) of the first top of the line, measured between the top and the perpendicular to the warp going by the following top;

— b_2 is the distance (base) between the orthogonal projections on the perpendicular to the warp of both tops of the line;

— a_3 is the maximal distance (height) of the second top of the line, measured between the top and the perpendicular to the straight line going by the weft yarn end;

— b_3 is the distance (base) between the orthogonal projections on the perpendicular to the warp of the second top of the line and the weft yarn end.



Key

a_1 height 1
a_2 height 2
a_3 height 3
b_1 base 1
b_2 base 2
b_3 base 3

Figure 8 — Local skew (model with three triangles)

9 Calculation and expression of the results

9.1 Calculation for the overall skew

Calculate the overall skew as follows:

$$\text{Skew}\% = \frac{a}{b} \times 100 \tag{1}$$

where a and b are defined in 8.4.3.

Calculate again the results of two other weft yarns.

Record the overall skew as the highest percentage of slope met on three weft yarns.

9.2 Calculation with two triangles for local skew

Calculate the local skew as follows:

$$\text{Skew}_1\% = \frac{a_1}{b_1} \times 100 \tag{2}$$

$$\text{Skew}_2\% = \frac{a_2}{b_2} \times 100 \tag{3}$$

where a_1, a_2, b_1, and b_2 are defined in 8.4.4.

Record only the local skew corresponding to the highest local skew.

As given in Figure 7, the final result of the local skew is $\text{Skew}_1\%$ as it is superior to $\text{Skew}_2\%$.

Calculate again the results of two other weft yarns.

Record the local skew as the highest percentage of slope met on three weft yarns.

9.3 Calculation with three triangles for local skew

Calculate the local skew as follows:

$$\text{Skew}_1\% = \frac{a_1}{b_1} \times 100 \quad (4)$$

$$\text{Skew}_2\% = \frac{a_2}{b_2} \times 100 \quad (5)$$

$$\text{Skew}_3\% = \frac{a_3}{b_3} \times 100 \quad (6)$$

where a_1, a_2, a_3, b_1, b_2, and b_3 are defined in 8.4.5.

Record only the local skew corresponding to the highest local skew.

As given in Figure 8, the final result of the local skew is $\text{Skew}_2\%$ as it is superior to both $\text{Skew}_1\%$ and $\text{Skew}_3\%$.

Calculate again the results of two other weft yarns.

Record the local skew as the highest percentage of slope met on three weft yarns.

10 Test report

The test report shall include the following information:

a) a reference to this International Standard (i.e. ISO 13015:2013);

b) the identification of the tested woven fabric;

c) the procedure used to determine the line, either by

   — "marking the selected weft yarn" (see 8.2), or

   — "fraying the test specimen to expose the selected weft yarn"(see 8.3);

d) the positions on the test specimen where lines were determined regarding the beginning or selected end of the test specimen;

e) the result of the overall skew, if required;

f) the result of the local skew, if required;

g) when relevant, the weft bow (if required) (see A.1);

h) when relevant, the warp bow (if required) (see A.2);

i) any deviation from the specified procedure likely to have influenced the result.

Annex A
(normative)

Weft bow and warp bow determination

A.1 Determination of weft bow

A.1.1 Procedure

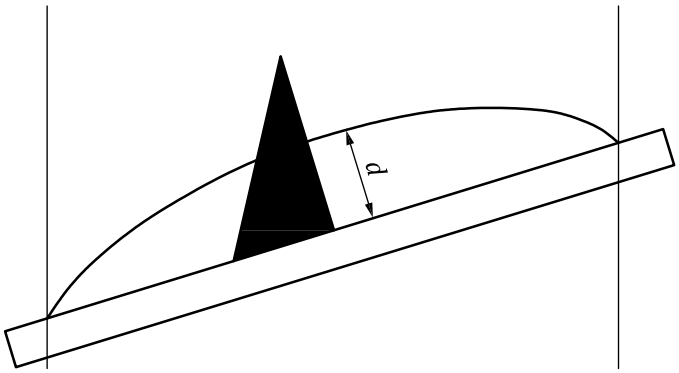
A.1.1.1 Prepare the specimen as described in 8.2 or 8.3.

A.1.1.2 Align the straight edge of the rule across the fabric width with the points at which the selected weft yarn meets the fabric edges.

A.1.1.3 Slide the set square gently along the rule and record the greatest perpendicular distance *d* between the weft yarn and the rule to the nearest millimetre as shown in Figure A.1 or in Figure A.2.

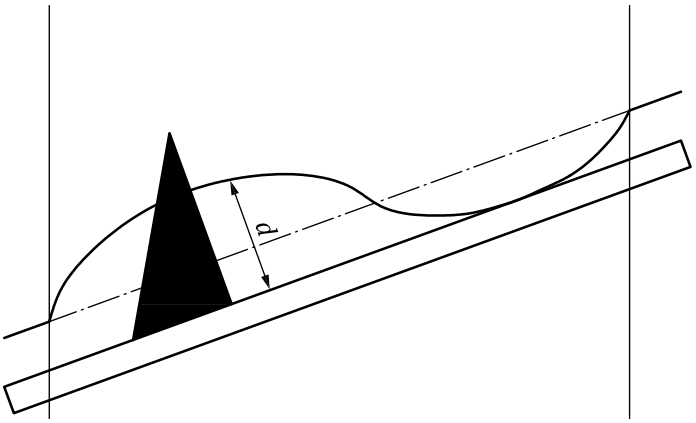
A.1.2 Expression of the result

Weft bow is expressed in mm as the distance *d*.



Key
d distance

Figure A.1 — Measurement of the weft bow (general)



Key
d distance

Figure A.2 — Measurement of the weft bow (case of double bow)

A.2 Determination of warp bow

A.2.1 Procedure

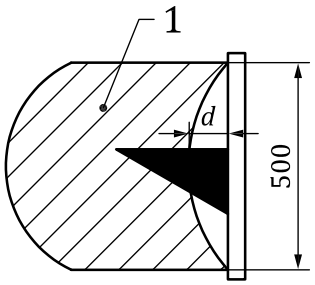
A.2.1.1 Place the rule to form a chord 500 mm long to the curved surface as shown in Figure A.3.

A.2.1.2 Gently slide the set square along the rule and record the greatest perpendicular distance *d* between the edge of the fabric and the rule to the nearest millimetre.

A.2.2 Expression of the result

Warp bow is expressed in mm as the distance *d*.

Dimension in millimetres



Key
d distance
1 fabric

Figure A.3 — Measurement of the warp bow

Bibliography

Standards related to measurements of the woven fabric distortion

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[2] NF G 07-163:1990, *Textiles — Test for woven fabrics — Measurement of the skew*

[3] ASTM D 3882, *Standard Test Methods for Bow and Skew in Woven and Knitted Fabrics*

[4] BS 2819:1990, *Bow, skew and lengthway distortion in woven and knitted fabrics*

[5] SANS 5091:2007, *Bow and skewness in woven textile fabrics*

Standards related to cleaning methods

[6] ISO 3175-1:2010, *Textiles — Professional care, drycleaning and wetcleaning of fabrics and garments — Part 1: Assessment of performance after cleaning and finishing*

[7] ISO 3175-2:2010, *Textiles — Professional care, drycleaning and wetcleaning of fabrics and garments — Part 2: Procedure for testing performance when cleaning and finishing using tetrachloroethene*

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[10] ISO 6330:2012, *Textiles — Domestic washing and drying procedures for textile testing*

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