INTERNATIONAL STANDARD

ISO 16322-2

Second edition
2021-04

Textiles — Determination of spirality after laundering —

Part 2: Woven and knitted fabrics

Textiles — Détermination du vrillage après lavage —

Partie 2: Étoffes tissées ou tricotées

Reference number
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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 38, *Textiles*, Subcommittee SC 2, *Cleansing, finishing and water resistance tests.*

This second edition cancels and replaces the first edition (ISO 16322-2:2005), which has been technically revised. It also incorporates the Technical Corrigendum ISO 16322-2:2005/Cor 1:2007.

The main changes compared to the previous edition are as follows:

— in 9.2.1.1, the absolute value of Formula (1) has been specified;

— Figures 5 and 7 have been corrected.

A list of all parts in the ISO 16322 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Textiles — Determination of spirality after laundering —

Part 2: Woven and knitted fabrics

1 Scope

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

The results obtained from different procedures will not always be comparable.

This document 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 documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

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

5.7 **Marking template**, of dimensions 380 mm × 380 mm, 680 mm × 380 mm or 580 mm × 510 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. Place a 380 mm × 380 mm template on single-layer fabric, aligned with selvedge or tubular fold line. Cut three specimens. Take each specimen with different length and width yarns or different wales and courses. Cut no test specimen from within 150 mm of laboratory sample edges.

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.

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

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 [see Figure 6 a)]. Cut no test specimens from within 150 mm of either edge of the laboratory sample.

Cut a double thickness.

NOTE It is possible that the underlayer will 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 [see Figure 6 b)].

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

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

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 (X) for each specimen to the nearest 0,1 % as shown in Formula (1):

$$X = \left| 100 \left[2 \frac{(AC - BD)}{(AC + BD)} \right] \right| \quad (1)$$

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 Formula (1) 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 Formula (1) 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 3).

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).

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

Calculate the percentage spirality (X) to 0,1 % for each specimen as shown in Formula (2):

$$X = 100 \frac{(AA' + DD')}{(AB + CD)} \quad (2)$$

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 (X) to 0,1 % for each specimen as shown in Formula (3):

$$X = 100 \left(\frac{AA'}{AB} \right) \quad (3)$$

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 (X) to the nearest 0,1 % for each specimen as shown in Formula (4):

$$X = 100\frac{(AA'+DD')}{(AB+CD)} \tag{4}$$

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) a reference to this document, i.e. ISO 16322-2:2021;

b) details of sample tested;

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

d) marking procedure used (A, B or C);

e) laundering procedure and type washer used;

f) number of laundering cycles;

g) date of the test;

h) details of any deviation from the specified procedure.

Dimensions in millimetres

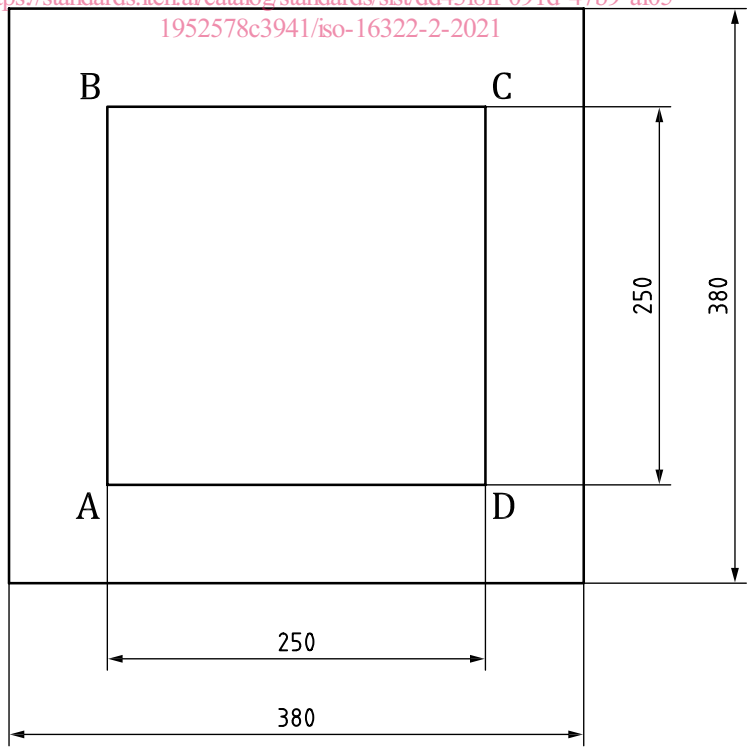
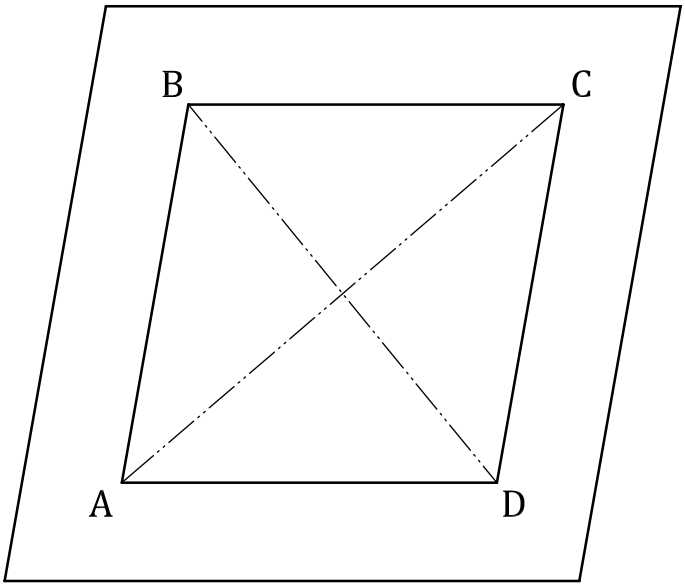
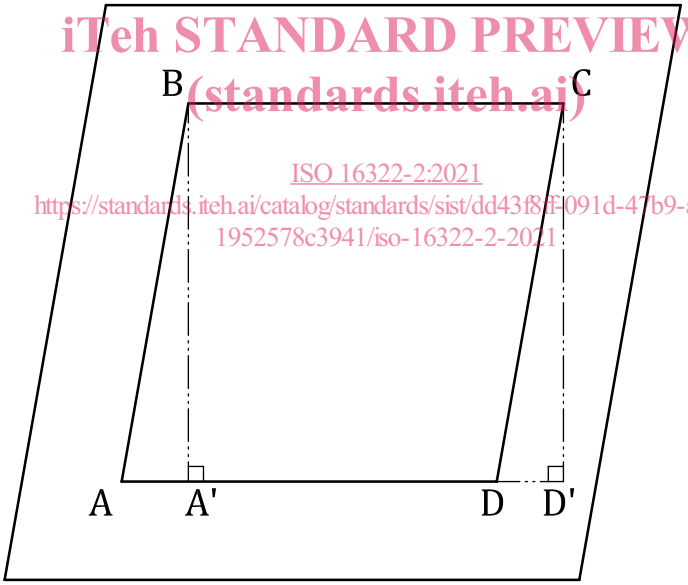


Figure 1 — Diagonal marking (procedure A) before laundering



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

Figure 2 — Diagonal marking (procedure A) after laundering



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

Figure 3 — Diagonal marking (procedure A, alternative assessment option) after laundering