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**Textiles — Determination of spirality  
after laundering —**

Part 1:  
**Percentage of wale spirality change  
in knitted garments**

*Textiles — Détermination du vrillage après lavage —*

*Partie 1: Pourcentage de la variation du vrillage des colonnes de mailles pour les vêtements tricotés*

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 16322-1 was prepared by Technical Committee ISO/TC 38, *Textiles*, Subcommittee SC 2, *Cleansing, finishing and water resistance tests*.

ISO 16322 consists of the following parts, under the general title *Textiles — Determination of spirality after laundering*:

- *Part 1: Percentage of wale spirality change in knitted garments*
- *Part 2: Woven and knitted fabrics*
- *Part 3: Woven and knitted garments*

# Textiles — Determination of spirality after laundering —

## Part 1: Percentage of wale spirality change in knitted garments

### 1 Scope

This part of ISO 16322 specifies a method of measuring the percentage of wale spirality change in weft-knitted jersey garments produced on knitting machines, following laundering.

The results obtained from different procedures may not be comparable.

The change in spirality is calculated from measurements on knitted garments before and after laundering.

### 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 4921, *Knitting — Basic concepts — Vocabulary*

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

ISO 8388, *Knitted fabrics — Types — Vocabulary*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4921, ISO 8388 and the following apply.

#### 3.1

##### **wale spirality**

distortion of a knitted fabric in which the wales follow a spiral path around the axis of a tube

### 4 Principle

The welt or hem of the body of a garment prior to laundering is tensioned until the top edge of the welt or hem is straight. The angle subtended by the wales with a line perpendicular to the top edge of the welt or hem is measured. This measurement is repeated after laundering and the change in spirality computed from the difference in results.

## 5 Apparatus

- 5.1 **Calibrated metal straightedge or rule** at least 20 cm in length, with 1 mm graduated marks.
- 5.2 **Transparent plastic protractor**, graduated from 0 °C to 180 °C, marked in 1 °C increments.
- 5.3 **Two tensioning masses**, each  $(1 \pm 0,01)$  kg in mass and with a surface area of approximately 20 cm<sup>2</sup>.
- 5.4 **Hydroextractor**, e.g. domestic spin dryer.
- 5.5 **Automatic washing machine** (as specified in ISO 6330).

## 6 Conditioning

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

## 7 Test specimen

The test specimen consists of the body part of a finished garment.

## 8 Procedure

- 8.1 Place the garment on a flat surface with the technical face of the fabric upwards.
- 8.2 If necessary, place a tensioning mass on one side of the welt or hem. Pull the other side of the welt or hem until the line along the top of the welt or hem is straight and the wales in the welt or hem are at right angles to that line. Place the other mass on the other end of the welt or hem to keep it straight.
- 8.3 Using only the middle third of the garment width, place the ruler or straightedge parallel to the direction of the wales in the body of the garment. Choose one wale, and align the straight edge of the ruler with that wale at the intersection between the body of the garment and the welt or hem. Keeping that point fixed, rotate the straightedge until it crosses the same wale at a position  $(200 \pm 1)$  mm from the top of the welt or hem.
- 8.4 Without moving the straightedge, place the protractor on the straightedge with the base line parallel to the top of the welt or hem. Measure the angle between the line of the straightedge and the bottom of the protractor which is parallel to the top of the welt (see Figure 1).
- 8.5 Repeat this procedure in three separate places on the front of the garment and three on the back of the garment, to give a total of six measurements.
- 8.6 Launder the garment to be measured by thoroughly wetting out using one of the following methods.
  - 8.6.1 *Dry-clean-only garment*: static soak for 30 min in cold water and then hydroextract for 1 min.
  - 8.6.2 *Hand-washable garment*: one simulated hand wash cycle according to ISO 6330.
  - 8.6.3 *Machine-washable garment*: one cycle of the 7A wash cycle, or other appropriate cycles in ISO 6330, as agreed between parties.
- 8.7 Flat-dry the garment at ambient room temperature or in an oven not exceeding 60 °C.
- 8.8 After drying, lay the garment on a flat smooth surface, remove any major creases, and condition the garment in accordance with Clause 6.
- 8.9 Remeasure the spirality as described in 8.1 to 8.4.

## 9 Calculation of results

Calculate the arithmetic mean of the original six results and the six results after laundering of each garment, to the nearest degree.

Calculate the percent change in wale angle spirality from the original measurement as follows:

$$S = \frac{\alpha - \beta}{\alpha} \times 100$$

where

$S$  is the percent spirality change after laundering, expressed as a percentage of the original;

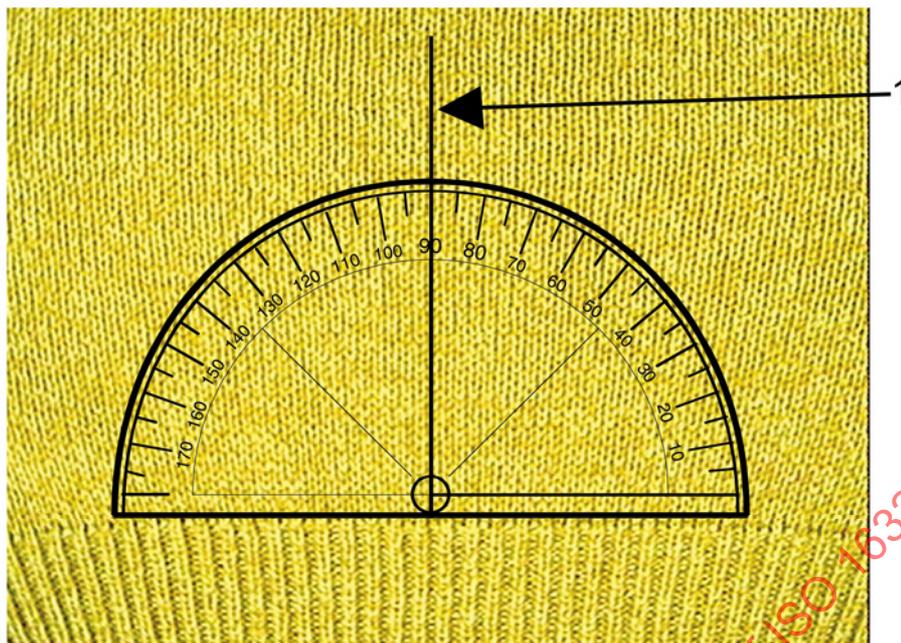
$\alpha$  is the original wale spirality angle, expressed in degrees (Figure 1);

$\beta$  is the wale spirality angle after laundering, expressed in degrees (Figure 2).

## 10 Test report

The test report shall contain the following:

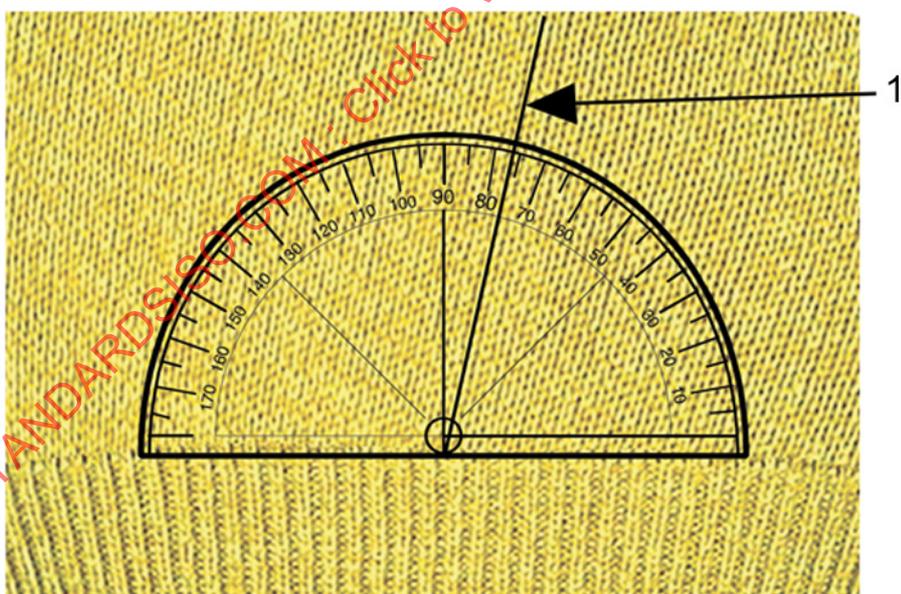
- a) reference to this part of ISO 16322, i.e. ISO 16322-1:2005;
- b) details of the sample garment tested;
- c) average angle of wale spirality of the original garment;
- d) average angle of wale spirality of the garment after laundering;
- e) percentage of wale spirality change between the original and laundered garment;
- f) method of laundering.



**Key**

- 1 measurement before laundering,  $\alpha = 90$  degrees in the formula in Clause 9

**Figure 1 — Panel before laundering**



**Key**

- 1 measurement after laundering,  $\beta = 76$  degrees in the formula in Clause 9

**Figure 2 — Panel after laundering**