International Standard 675

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Textiles — Woven fabrics — Determination of dimensional change on commercial laundering near the boiling point

(Revision of ISO/R 675-1968)

Textiles — Tissus — Détermination de la variation des dimensions au lavage industriel au voisinage de l'ébullition

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Ref. No. ISO 675-1979 (E)

Descriptors : textiles, woven fabrics, physical tests, dimensional stability tests, washing tests, boiling point, hardness (of water).

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Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 675 was developed by Technical Committee ISO/TC 38, *Textiles*.

It was submitted directly to the ISO Council, in accordance with clause 6.13.1 of the Directives for the technical work of ISO. It cancels and replaces ISO Recommendation R 675-1968, which had been approved by the member bodies of the following countries :

Australia
Austria
Belgium
Canada
Chile
Czechoslovakia
Denmark
Egypt, Arab Rep. of
Germany, F. R.
Hungary
India
Iran
Israel
Japan
Korea, Rep. of
Norway
Poland
Romania
South Africa, Rep. of
Spain
Sweden
Switzerland
Turkey
United Kingdom
USA
USSR

The member bodies of the following countries had expressed disapproval of the document on technical grounds :

France
Italy
Netherlands

Printed in Switzerland

INTERNATIONAL STANDARD ISO 675 : 1979
TECHNICAL CORRIGENDUM 1

Published 1990-12-01

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

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TECHNICAL CORRIGENDUM 1

Textiles — Tissus — Détermination de la variation des dimensions au lavage industriel au voisinage de l'ébullition
RECTIFICATIF TECHNIQUE 1

Technical corrigendum 1 to International Standard ISO 675 : 1979 was prepared by Technical Committee ISO/TC 38, *Textiles*, Sub-Committee SC 2, *Cleaning, finishing and water resistance tests.*

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Clause 6

Insert the following note at the end of clause 6:

"NOTE — To prevent entanglement due to excessive ravelling, 1 cm slits along the cut edges of the test specimen should be made at approximately 10 cm intervals."

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Textiles — Woven fabrics — Determination of dimensional change on commercial laundering near the boiling point

(Revision of ISO/R 675-1968)

1 Scope and field of application

This International Standard specifies a method for the determination of the dimensional change (shrinkage or stretch) of all types of woven fabrics after commercial laundering near the boiling point.

The test has been devised principally for cotton fabrics. If it is applied to other fabrics such as linen or regenerated cellulosic fibres, sub-clause 9 i) should be consulted. The method is intended only for the assessment of dimensional changes undergone by a woven fabric subjected to a single laundering. When it is desired to determine the amount of progressive dimensional change, the test specimen may be washed repeatedly and the results reported so as clearly to indicate the amount of dimensional change in the laundered specimen as compared with the original dimensions of the unwashed specimen and the number of testing cycles to which the specimen has been subjected.

2 References

ISO 139, *Textiles — Standard atmospheres for conditioning and testing.*

ISO 3759, *Textiles — Preparation, marking and measuring of fabric specimens and garments in tests for determination of dimensional change.*

3 Principle

Washing of a specimen in a cylindrical reversing laundry machine under specified conditions. Extraction of excess water and pressing without preliminary drying. Measurement, before and after laundering, of distances marked on the specimen in the warp and weft directions.

4 Reagents

4.1 Detergent, soap

A stock solution may be prepared by dissolving 0,5 kg of soap in 4 litres of hot water. When cooled, this solution forms a thick homogeneous jelly which may be used as required.

Soap meeting the following specification is satisfactory :

— Moisture and volatile matter contents at 105 °C, max.	10,0 % (m/m)
— Sum of free alkali, total matter insoluble in alcohol, and sodium chloride contents, max.	4,0 % (m/m)
— Free alkali content, calculated as NaOH, max.	0,2 % (m/m)
— Content of matter insoluble in water, max.	1,0 % (m/m)
— Titre of the mixed fatty acids prepared from the soap, min.	39 °C
— Anhydrous soap content, min.	85,0 %

4.2 Water

Soft water (not more than 50 mg/kg hardness) shall be used (see the annex).

4.3 Anhydrous sodium carbonate

5 Apparatus

5.1 Wash wheel

A horizontal cylindrical machine with rotating cage and reversing mechanism shall be used. The cage should have a diameter between 40 and 60 cm and a peripheral speed of 50 to 55 m/min. Other diameters may be used as a temporary measure, provided that the rotational frequency is adjusted to give an equivalent peripheral speed.

For preference, three or four fins or "lifters" about 8 cm wide, equally spaced around the interior of the cage and extending its full length, should be used. Either a single fin or two fins may be used, however, provided that equivalent results can be obtained.

The cage shall turn at such speed that the load is lifted by the fins and falls back into it. (A peripheral speed of 54 m/min has been found satisfactory.) The cage shall make 5 to 10 revolutions before reversing its direction.

The machine shall be equipped with heating facilities, such as live steam, gas or electricity, and with an outlet large enough to permit discharge of all water from the machine in less than 2 min.

A thermometer in a suitable well, or equivalent equipment, shall be provided to indicate the temperature of the water to within 1 °C during the washing and rinsing, and there shall be an outside water gauge to indicate the level of the water in the wheel.

The mass of the load to be run in the machine shall be between 8 and 50 kg of air-dry fabric per cubic metre of cage space, including the volume of the fins. The load shall be made up of test specimens and as much other similar fabric as is required. The quantity of water used shall be sufficient to cover the load, the level being situated at a height from 1/7 to 1/3 of the inside diameter of the cage.

5.2 Extractor

A laundry-type centrifugal extractor with perforated basket, or equivalent apparatus, shall be used and shall be capable of adjusting the moisture retention to a range between 50 and 100 % (m/m) based on the air-dry mass of the fabric.

NOTES

1 Any other apparatus that will give equivalent results without fabric distortion may be used, for example, a rubber roll wringer which could pass the specimen through the rolls along a diagonal line without altering its dimensions.

2 Heavier fabrics of tight construction require a high moisture retention to ensure removal of wrinkles during pressing.

5.3 Pressing equipment

A flat bed press capable of pressing a specimen 60 cm × 60 cm and of providing a minimum pressure of 3,0 kPa is required. The temperature of the press shall be 150 ± 15 °C.

5.4 Marking equipment

The equipment specified in clause 4 of ISO 3759 is required.

6 Preparation of specimen

Take a specimen, preferably the full width of the cloth and at least 60 cm long. Each specimen shall be cut, not torn, from the material to be tested so that its sides are parallel to the warp and weft. Take specimens from at least 1 m away from the end of a roll and preferably 3 m away from the end. Mark, condition and measure the specimens as specified in sub-clauses 6.2 to 6.6 of ISO 3759, but using at least 500 mm between adjacent marks in each direction.

7 Procedure

7.1 Washing and rinsing

7.1.1 Place the specimen or specimens individually in the machine with sufficient similar fabric to make up the proper dry load (see 5.1). Start the machine, noting the time, and allow the machine to run continuously for 60 min. During this time, carry out the following operations as indicated, each without delay.

7.1.2 Run water (see 4.2) into the machine at a temperature such that the machine will heat the liquor to boiling point within 10 min maximum, and fill to the proper level for washing (see 5.1) within 4 min.

7.1.3 Add approximately 2 g per litre of the anhydrous sodium carbonate (4.3). Raise the temperature rapidly to 95 °C. Add sufficient soap (4.1) to give a good running suds. If more than 5 g per litre of soap is used, the amount and reasons for use shall be reported [see clause 9 h)]. The temperature shall be maintained at not less than 80 °C.

7.1.4 When the machine has run for 40 min timed from the start of the test, drain off the soap solution quickly and fill the machine with water to the proper level for rinsing. Raise the temperature to 60 °C within 2 min.

7.1.5 When the machine has run for 45 min from the start of the test, drain off the water, fill again and heat to 60 °C as before.

7.1.6 At the end of 55 min from the start of the test, drain off the water quickly. Allow the machine to run without further additions to complete the full 60 min of operation. Stop the machine.

7.2 Extraction

Remove the specimen from the machine. Extract the excess water (see 5.2).

7.3 Pressing

Press each specimen, using the press (5.3), taking care to ensure that it is smoothed, without stretching, to remove wrinkles before pressing. Continue this operation until sufficient moisture has been extracted from the fabric to ensure conditioning from the dry side.

7.4 Evaluation

Allow the pressed specimen to cool, condition it in the standard atmosphere for testing chosen from those specified in ISO 139, and repeat the procedure specified in sub-clauses 6.4 to 6.6 of ISO 3759. Make all measurements to the nearest 1 mm.

8 Calculation and expression of results

Calculate the average dimensional changes in the warp and weft directions separately. Express as percentages of the original value to the nearest 0,5 %, using a minus sign (−) to indicate shrinkage and a plus sign (+) to indicate stretch. Calculate the mean value and the range of the dimensional change for each set of replicates.

9 Test report

The test report shall include the following particulars :

a) a statement that the procedure was conducted in accordance with this International Standard;

b) the positions of the specimens in the fabric in relation to the ends of the piece;

c) the number of testing cycles to which the specimen has been subjected;

d) the dimensional change of each specimen, in the warp and weft directions, as a percentage of the original value;

e) the mean dimensional change of the replicates, in the warp and weft directions, as a percentage of the original value;

f) the range of the individual dimensional change values;

g) whether the specimen includes selvedges;

h) the soap used. State the reasons for using more than 5 g per litre of soap when this amount is exceeded;

i) the following statement, if the test method is applied to fabrics which may be inherently extensible :

"The application of even moderate tension in commercial washing and pressing may be expected to cause considerable extension of the washed fabrics."

Annex

Hardness of water

Hardness refers to the presence of such soap-precipitating compounds as calcium, magnesium and iron salts in the water. It is expressed in various units, most of them based on equivalents of calcium carbonate. Definitions of some of the units used are given below, followed by a table showing the conversion factors for these units.

Table — Conversion factors for units of water hardness

Name of unit	Definition	Symbol	Conversion factors						
			Ca^{2+}		CaO	$CaCO_3$			
			mmol/l	meq/l	°d	mg/kg[1]	°e	°a	°f
millimole per litre	1 mmol of calcium (II) ions (Ca^{2+}) in 1 litre of water	mmol/l	1	2,000	5,600	100	7,020	5,850 0	10,00
milliequivalent per litre	20,04 mg of calcium (II) ions (Ca^{2+}) in 1 litre of water	meq/l	0,500	1	2,800	50	3,510	2,925 0	5,00
German degree of hardness	10 mg of calcium oxide (CaO) in 1 litre of water	°d	0,178	0,357	1	17,8	1,250	1,044 0	1,78
milligram per kilogram	1 mg of calcium carbonate ($CaCO_3$) in 1 litre of water	mg/kg[1]	0,010	0,020	0,056	1	0,070	0,058 5	0,10
English degree of hardness	1 grain of calcium carbonate ($CaCO_3$) in 1 gal (UK) of water	°e	0,142	0,285	0,793	14,3	1	0,829 0	1,43
American degree of hardness	1 grain of calcium carbonate ($CaCO_3$) in 1 gal (US) of water	°a	0,171	0,342	0,958	17,1	1,200	1	1,71
French degree of hardness	1 mol (= 100 g) of calcium carbonate ($CaCO_3$) in 10 m^3 of water	°f	0,100	0,200	0,560	10,0	0,702	0,583 0	1

1) The unit "part per million" (ppm) is often used for mg/kg.