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Plastics-coated fabrics for upholstery —

Part 1:
Specification for PVC-coated knitted fabrics

Supports textiles revêtus de plastique pour ameublement et garniture —

Partie 1: Spécifications des étoffes tricotées revêtues de PVC

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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 3.

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 part of ISO 7617 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 7617-1 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 4, *Products (other than hoses)*.

This third edition cancels and replaces the second edition (ISO 7617-1:1994), which has been technically revised.

ISO 7617 consists of the following parts, under the general title *Plastics-coated fabrics for upholstery*:

— *Part 1: Specification for PVC-coated knitted fabrics*

— *Part 2: Specification for PVC-coated woven fabrics*

— *Part 3: Specification for polyurethane-coated woven fabrics*

Annexes A to E form a normative part of this part of ISO 7617.

Plastics-coated fabrics for upholstery —

Part 1:
Specification for PVC-coated knitted fabrics

1 Scope

This part of ISO 7617 specifies technical requirements for coated fabrics for upholstered furniture for interior use, obtained by applying to one side of a weft-knitted base cloth a substantially continuous coating of a suitably plasticized polymer of vinyl chloride, or a copolymer the major constituent of which is vinyl chloride. Such coatings are known as poly(vinyl chloride) (PVC) coatings. The present specification covers fabrics coated with solid PVC and also covers two grades with coatings consisting of a layer of expanded PVC.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 7617. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 7617 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 105-A02:1993, *Textiles —Tests for colour fastness — Part A02: Grey scale for assessing change in colour*

ISO 105-B01:1994, *Textiles — Tests for colour fastness — Part B01: Colour fastness to light: Daylight*

ISO 105-B02:1994, *Textiles — Tests for colour fastness — Part B02: Colour fastness to artificial light: Xenon arc fading lamp test*

ISO 105-X12:2001, *Textiles — Tests for colour fastness — Part X12: Colour fastness to rubbing*

ISO 1419:1995, *Rubber- or plastics-coated fabrics — Accelerated-ageing tests*

ISO 1421:1998, *Rubber- or plastics-coated fabrics — Determination of tensile strength and elongation at break*

ISO 2231:1989, *Rubber- or plastics-coated fabrics — Standard atmospheres for conditioning and testing*

ISO 2286:1998 (all parts), *Rubber- or plastics-coated fabrics — Determination of roll characteristics*

ISO 2411:2000, *Rubber- or plastics-coated fabrics — Determination of coating adhesion*

ISO 3303:1990, *Rubber- or plastics-coated fabrics — Determination of bursting strength*

ISO 5978:1990, *Rubber- or plastics-coated fabrics — Determination of blocking resistance*

ISO 5981:1997, *Rubber- or plastics-coated fabrics — Determination of resistance to combined shear flexing and rubbing*

ISO 6451:1982, *Plastics coated fabrics — Polyvinyl chloride coatings — Rapid method for checking fusion*

ISO 7854:1995, *Rubber- or plastics-coated fabrics — Determination of resistance to damage by flexing*

3 Sampling

If individual rolls can be identified with manufacturing batches, at least one sample shall be taken from each batch in the consignment. Each sample shall be regarded as being representative of its source, and suitable measures shall be taken to preserve the identity between the samples and batch numbers.

If individual rolls cannot be identified in this way, the number of samples to be regarded as being representative of the bulk shall be fixed by agreement between the purchaser and the supplier. Such samples shall be drawn at random.

4 Testing and compliance

Samples shall first be subjected to the preliminary examination described in 5.1, which enables grossly defective coated fabrics to be rejected immediately. If the samples satisfy this examination, testing shall be continued as follows:

Tests shall be carried out on a set of test specimens selected from each sample in accordance with annex A. If testing shows that the test specimens comply with the requirements of Tables 1 to 4, the bulk of the coated fabric represented by the sample shall be deemed to comply with the requirements of this part of ISO 7617.

If any of the specimens tested do not comply with any of the appropriate requirements given in Tables 1 to 4, the tests which the specimens have failed shall be repeated twice. For this purpose, two further samples shall be taken from the same source as the original sample, and test specimens shall be taken from each sample so that duplicate tests may be conducted. If all the re-test results comply with the appropriate requirements of Tables 1 to 4, then the bulk represented by the samples from which the specimens for re-testing were taken, together with the original samples, shall be deemed to comply with the requirements of this part of ISO 7617. If any of the results of the re-tests do not comply with the appropriate requirements of Tables 1 to 4, then the bulk represented by those samples shall be deemed not to comply with the requirements of this part of ISO 7617.

5 Technical requirements

5.1 Preliminary inspection

5.1.1 General

A preliminary inspection shall be carried out as specified in 5.1.2 and 5.1.3, before conducting a detailed examination and expensive tests, in order to ensure that the samples do not exhibit easily detectable unacceptable faults. If such faults are detected, the inspection shall be stopped and the sample shall be considered as not complying with the requirements of this part of ISO 7617. This shall be stated in the test report.

5.1.2 Visual inspection

The coating shall be uniformly applied and shall be free of visible flaws or cracks. Indicated local flaws are admitted, but no test specimen shall be cut less than 5 cm from the flaw.

When examined under a magnification of $\times 6$, the coating shall be substantially free of pinholes. Carry out the inspection by examining 10 areas, each measuring 2 cm $\times$ 2 cm, evenly distributed over the usable width and length of the sample. The mean pinhole density shall not be more than 10 per square decimetre (i.e. 2,5 times the total count shall be < 10). This requirement does not apply to products stated to be microperforated.

NOTE 1 Products which are stated to be microperforated will nomally be provided with special cleaning instructions.

Unless the coating is intentionally transparent, the knitted base fabric shall not be visible through the coating. Its profile shall also not be visible, either when the coated fabric is slack or when a slight tension is applied by hand. Its presence shall also not be apparent by virtue of any printing or surface lacquer which may be present. If the base fabric is visible in any of these ways, testing may be continued, but the visibility of the base fabric shall be reported in the test report.

NOTE 2 It is possible that the surface is marked with the pattern of the back surface if the roll has been wound too tight. Such marks are reversible and acceptable. They can be easily identified by heating a piece of coated fabric for a few minutes in an oven at a temperature around 100 °C: the marking due to tight winding disappears.

It shall be possible to bend the coated fabric through an angle of 180°, with its coated face outwards, without any noticeable whitening. If whitening appears, testing may be continued, but the appearance of the whitening shall be reported in the test report.

5.1.3 Fusion

Verify the state of fusion of the coating to the base fabric in accordance with ISO 6451. Stop testing if the components are not fused together satisfactorily.

5.2 Colour, embossing and finish

The quality of the colour, embossing and finish of the coated fabric, whether the material is plain or multicoloured, shall be subject to agreement between the customer and supplier. This agreement shall be based on a reference sample, and on illustrations or other ways of indicating acceptable deviations from the reference sample.

Comparison of colours shall be carried out in accordance with ISO 105-B01.

NOTE 1 Instrumental measurement of the colour difference between a specimen and the agreed reference sample may be performed, if agreed between the interested parties. However, it should be pointed out that such methods are not without problems. The result is influenced by the gloss and the state of the surface of the coated fabric. In addition, the presence of embossing and small differences in gloss induce variations, which can be large, in the results, while the colour itself remains the same. The use of a spectrophotometer equipped with an integrating sphere is mandatory but allows these variations to be only partly eliminated. It is recommended therefore that, before carrying out any instrumental colour measurements on unknown samples, the interested parties conduct comparative trials in order to determine precisely the optimum conditions of measurement and to define tolerances, using samples which have already been adjudged acceptable or not by examination in accordance with ISO 105-B01.

NOTE 2 Gloss can be evaluated by means of a glossmeter or reflectometer, which measures specular reflection The sensitivity of such an apparatus will vary with the angle of incidence, to an extent depending on the degree of gloss or dullness: 20°, 60° and 85° are the angles of incidence normally selected for glossy, semiglossy and matt coated fabrics. However, sensitivity is poor for highly matt materials. Moreover, reflection can vary noticeably from place to place on the surface depending on the embossing pattern. Bearing these reservations in mind and the fact that response can vary from one apparatus to another, parties which decide to evaluate gloss in this manner should preferably verify, in advance, the reproducibility of the apparatus used for the coated fabrics to be tested.

5.3 Dimensions

5.3.1 Usable width

The usable width of the coated fabric, measured in accordance with ISO 2286-1, shall be as agreed between purchaser and supplier. For this purpose, the term “usable width” shall refer to the width that has received a coating complying with the requirements of 5.1. (See also the note to 5.3.2.)

5.3.2 Length of coated fabric in a roll

The length of material in a roll, measured in accordance with ISO 2286-1, shall be as agreed between purchaser and supplier, including selected lengths and accepted tolerances.

NOTE When, exceptionally, the coated fabric is supplied as pre-cut pieces, the concepts of length and width become meaningless. In this case, the shape and dimensions of the pieces, as well as the tolerances on the dimensions, should preferably be defined by agreement between purchaser and supplier. It is recommended that the agreement include a scale drawing.

5.3.3 Thickness

The thickness of the coated fabric, measured in accordance with ISO 2286-3 under a pressure of 2 kPa, shall comply with the requirements of Table 1.

5.4 Physical requirements

5.4.1 Mass of coating per unit area

The mass of coating per unit area, measured in accordance with ISO 2286-2, shall comply with the requirements of Table 1.

5.4.2 Mechanical properties

The coated fabric shall comply with the requirements of Table 2.

5.4.3 Surface properties

The coated fabric shall comply with the requirements of Table 3.

5.4.4 Properties after ageing

After accelerated ageing for 168 h at 85 °C under the conditions described in ISO 1419:1995, method 1, the coated fabric shall comply with the requirements of Table 4.

5.4.5 Fire behaviour

The fire behaviour of the coated fabric shall comply with any existing local or national regulations.

NOTE It is not possible to specify *a priori* performance requirements for fire behaviour: finished items, which are made up of coated fabrics and include various fillings and structures, have to fulfil risk requirements. These risks depend directly on the place and environment of use. However, it is strongly recommended that manufacturers of coated fabrics give the users information regarding fire behaviour so that they may manufacture furnishings responding as well as possible to safety regulation requirements.

Table 1 — Thickness of coated fabric and mass of coating per unit area

Property	Unit	Solid coating	Slightly expanded coating	Expanded coating	Test method
Total mass of coating per unit area	g/m^2	⩾ 480	⩾ 480	⩾ 600	ISO 2286-2
Thickness of coated fabric (nominal)	mm	0,75 to 1,0	0,85 to 1,15	1,10 to 1,40	ISO 2286-3
Tolerance on thickness	mm	± 0,07	± 0,10	± 0,15	

Table 2 — Mechanical-property requirements

Property	Unit	Solid coating	Slightly expanded coating	Expanded coating	Test method
Tensile strength	N				
Longitudinal		⩾ 250	⩾ 250	⩾ 250	ISO 1421:1995, method 1
Transverse		⩾ 150	⩾ 150	⩾ 150	
Elongation at break	%				
Longitudinal		⩾ 50	⩾ 50	⩾ 50	ISO 1421:1995, method 1
Transverse		⩾ 100	⩾ 100	⩾ 100	
Bursting strength	kPa	⩾ 700	⩾ 400	⩾ 700	ISO 3303:1990, method B
Elongation (static)	%				
Longitudinal		⩾ 5	⩾ 12	⩾ 8	Annex B
Transverse		⩾ 35	⩾ 80	⩾ 70	
Elastic recovery	%				
Longitudinal		⩾ 80	⩾ 80	⩾ 80	Annex B
Transverse		⩾ 80	⩾ 80	⩾ 80	
Resistance to flexing	cycles	⩾ 400 000	⩾ 400 000	⩾ 400 000	ISO 7854:1995, method B
or					
shear flexing and rubbing	strokes	⩾ 50 000	⩾ 50 000	⩾ 50 000	ISO 5981:1997, method 2
Abrasion resistance [a]	cycles	⩾ 700	⩾ 700	⩾ 700	Annex D
Coating adhesion	N				
Longitudinal		⩾ 30	⩾ 30	⩾ 30	ISO 2411
Transverse		⩾ 20	⩾ 20	⩾ 20	

[a] Number of cycles without exposure of an intermediate layer under the outer skin.

Table 3 — Surface properties

Property	Test method	Solid coating	Slightly expanded coating	Expanded coating
Print wear	Annex C	⩾ 3	⩾ 3	⩾ 3
Colour fastness to light	ISO 105-B02	⩾ 6	⩾ 6	⩾ 6
Colour fastness to dry rubbing	Annex E	⩾ (4 to 5)	⩾ (4 to 5)	⩾ (4 to 5)
Colour fastness to wet rubbing	Annex E	⩾ (4 to 5)	⩾ (4 to 5)	⩾ (4 to 5)
Colour fastness to rubbing with soapy water[a]	Annex E	⩾ (4 to 5)	⩾ (4 to 5)	⩾ (4 to 5)
Blocking resistance	ISO 5978	Separation without surface damage		

[a] Same conditions as for wet rubbing, but replacing water by a 4 % aqueous solution of soap.

Table 4 — Properties after ageing

Property	Unit	Solid coating	Slightly expanded coating	Expanded coating	Test method
Resistance to flexing	cycles	⩾ 400 000	⩾ 400 000	⩾ 300 000	ISO 7854:1995, method B
Resistance to shear flexing and rubbing	strokes	⩾ 50 000	⩾ 50 000	⩾ 50 000	ISO 5981:1997, method 2

6 Marking

Each roll of coated fabric shall be supplied with a label with the following information:

a) the name and/or trade mark of the manufacturer, and all details necessary for identification of the coated fabric;

b) the grade of coated fabric: coating solid, slightly expanded or expanded;

c) the roll number, and the batch number if this is necessary to trace the coated fabric;

d) the colour;

e) the length of coated fabric in the roll;

f) the usable width;

g) a reference to this part of ISO 7617 (i.e. ISO 7617-1).

7 Test report

The test report shall include at least the following:

a) a reference to this part of ISO 7617 (i.e. ISO 7617-1);

b) all details necessary for complete identification of the coated fabric tested;

c) the grade of coated fabric (solid, slightly expanded or expanded coating);

d) all details necessary for identification of the testing authority;

e) an indication of compliance or non-compliance with this part of ISO 7617, and in the latter case a clear indication of the property or properties which led to non-compliance;

f) details of the results obtained for the tests specified in 5.4.1, 5.4.2, 5.4.3 and 5.4.4;

g) any observations resulting from the examinations specified in 5.1 and 5.2;

h) the usable width of the coated fabric and the length of coated fabric in the rolls, as determined in 5.3.1 and 5.3.2;

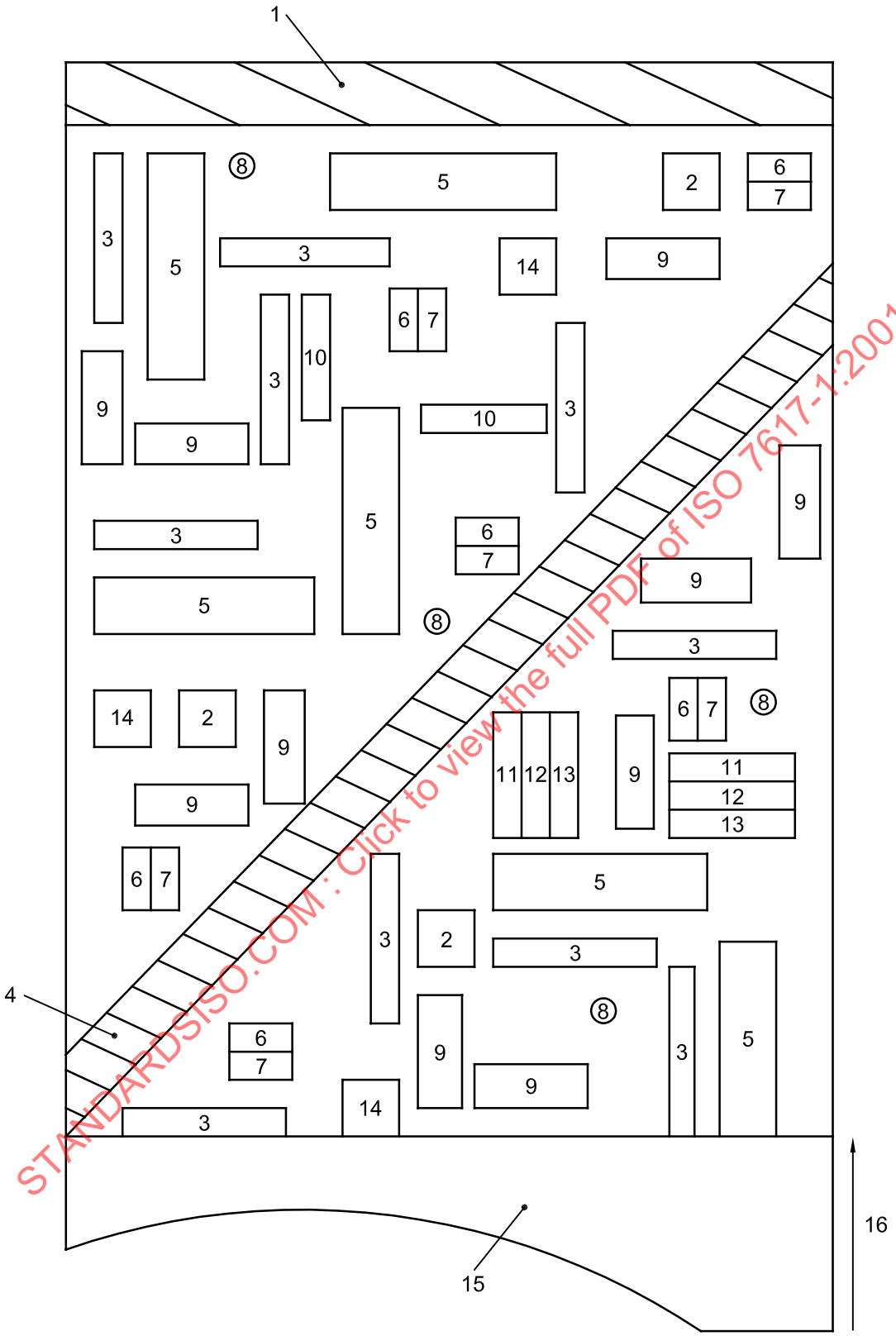
i) the thickness of the coated fabric as determined in 5.3.3;

j) details of any deviations from the specified procedures, as well as any additional observations which may have a bearing on the results.

Annex A
(normative)

Method of selecting test specimens

Test specimens shall be selected from the sample in accordance with the scheme illustrated in Figure A.1, which shows the positions from which the specimens for each type of test shall be taken. Specimens for the preliminary inspection and the assessment of appearance shall be taken from an area outside that reserved for the other specimens, except that the visual inspection using a × 6 lens for the detection of pinholes (see 5.1.2) shall be made in the diagonal area indicated. Specimens required for colour-fastness testing shall, if possible, include all colours present. If this is impossible, specimens shall be taken in such a way that each colour is included in at least two specimens. The position of such specimens are not critical, and they may be taken at any suitable position across the usable width.



Key

1 Thickness determination
2 Mass of coating per unit area
3 Tensile strength and elongation at break
4 Bursting strength and inspection for pinholes
5 Elongation under constant load and elastic recovery
6 Flexing (or shear flexing and rubbing) before ageing
7 Flexing (or shear flexing and rubbing) after ageing
8 Abrasion
9 Coating adhesion
10 Print wear
11 Colour fastness to dry rubbing
12 Colour fastness to wet rubbing
13 Colour fastness to rubbing with soapy water
14 Blocking resistance
15 Preliminary inspection and appearance
16 Longitudinal (machine) direction

Figure A.1 — Scheme for selection of test specimens

Annex B
(normative)

Determination of elongation and elastic recovery

B.1 General

When subjected to a constant tensile load for a given length of time, a coated fabric stretches. When the load is removed, the coated fabric tends to come back to its initial length. In practice, the visco-elastic characteristics of plasticized PVC result in a permanent residual elongation, the magnitude of which depends upon many factors such as the size of the applied load, the duration of loading, the width over which the load is applied, the elasticity of the coated fabric, the temperature and humidity during the test, and the time allowed for recovery after removal of the load. A seat covering should have good elasticity, and therefore a small permanent elongation in use.

The permanent elongation, expressed in absolute units, does not give a useful measure of the elasticity of a coated fabric. Expressing the permanent elongation as a percentage of the initial elongation gives a better measure. However, it is preferred to express it as that portion of the initial elongation which is recovered during the relaxation period. This parameter is known as the elastic recovery.

A test length of 200 mm is enough in most cases to give sufficient accuracy. For low-extensibility coated fabrics, it may be necessary to increase the test length. If so, the test length shall be reported in the test report. The calculation shall be modified accordingly.

B.2 Apparatus

B.2.1 Two grips, capable of clamping 10-cm-wide test specimens. One grip (the upper grip) shall be capable of being attached to a rigid frame in such a way that, when a specimen is centered in the grip and clamped with the jaws of the grip running across the specimen, the specimen hangs in the vertical plane. The other (lower) grip shall be designed so that weightpieces can be added to bring its mass up to a total of 10 kg. The height of the frame shall be such that the loaded specimen can extend freely without touching the floor or lab bench.

B.2.2 Ruler, readable to the nearest 0,5 mm, or an equivalent device.

B.3 Test specimens

Cut out three test specimens measuring 400 mm × 100 mm with their length in the longitudinal direction and another three specimens with their length in the transverse direction, in accordance with the scheme in annex A. Mark the specimens accordingly.

B.4 Procedure

Condition the test specimens in one of the atmospheres defined in ISO 2231. Tests shall be carried out in the same atmosphere.

Draw two fine lines across each test specimen, at right angles to its longest dimension, 100 mm from each end and 200 mm apart. Draw a third line, perpendicular to the two others, to cut them in their mid-point. Make all measurements along this line.

Insert a specimen centered in the upper grip, with the line at the upper end not less than 50 mm from the jaws. Insert the other end in the lower grip in the same way. Attach the upper grip to the frame.

Apply smoothly to the lower grip a weightpiece that will bring the total mass of the lower grip to 10 kg and note the time. After 10 min, measure and note the distance L_1 between the two lines to the nearest 0,5 mm.

Remove the load and withdraw the specimen from the grips. Place it on a flat, horizontal surface. After 10 min, measure and note the distance L_2 between the two lines to the nearest 0,5 mm.

Repeat the procedure with the remaining specimens.

B.5 Expression of results

B.5.1 The elongation, expressed as a percentage of the initial distance between the lines, is given by the formula

$$\left(\frac{L_1 - 200}{200}\right) \times 100$$

where L_1 is the distance, in mm, between the lines after extension under constant load.

B.5.2 The elastic recovery, expressed as a percentage, is given by the formula

$$\left(\frac{L_2 - L_1}{L_1 - 200}\right) \times 100$$

where L_2 is the distance, in mm, between the lines after recovery.

B.5.3 Calculate the elongation and the elastic recovery for each test specimen and report the mean for the set of three specimens in each direction to the nearest 0,5 %. Report the test conditions if they differ from those in the procedure above (for example in relation to specimen length).

Annex C
(normative)

Determination of resistance to print wear

C.1 Principle

A specimen is subjected to 500 cycles of simple harmonic abrasion using a known abradant under a known pressure. It is then assessed for colour difference with an unabraded portion using the grey scale for assessing change in colour.

C.2 Apparatus

The apparatus shall be as described in ISO 105-X12, but with the following modifications:

a) The force applied to the rubbing finger shall be such that the equivalent of a total mass of 1 500 g is brought to bear on the specimen.

b) The frequency of operation of the apparatus shall be 0,25 Hz (i.e. 0,5 strokes per second: each cycle comprises one outward stroke and one return stroke).

c) Use as the abradant a cotton fabric which has been desized, scoured and bleached, is free from fluorescent brightening agents, and has a pH of aqueous extract not greater than 8, a mass per unit area of 93 g/m^2 and a construction of 40 ends/cm, 39 picks/cm, 11,4 tex warp and 9,2 tex weft in plain weave.

d) Grey scale for assessing change in colour (see ISO 105-A02).

C.3 Test specimens

Cut out two specimens of coated fabric, each measuring 230 mm × 50 mm, one with its length parallel to the longitudinal direction of the sample and the other with its length parallel to the transverse direction. Also cut out two circular pieces of the bleached cotton fabric, each 30 mm in diameter, avoiding lumps and neps.

NOTE Initially, four pieces of cotton fabric abradant can be cut out and a double thickness of cotton cloth mounted on the rubbing finger, so that only the outermost layer coming into contact with the test specimen needs to be renewed at each test.

C.4 Procedure

Condition the test specimens and cotton fabric in accordance with ISO 2231.

Using the clamps, mount a test specimen securely on the bed of the machine with the coated side uppermost and under sufficient tension to hold the specimen flat. To do this with coated fabrics having a knitted base cloth, it has been found necessary to stretch the specimen approximately 9 %.

Wipe the coated surface of the specimen with a clean, dry cloth to remove dust before testing.

Secure the conditioned cotton fabric to the base of the rubbing finger, making sure that the sateen face is presented to the specimen under test, i.e. with the ribbed side of the cotton fabric in contact with the finger. Lower the finger on to the specimen and run the machine for 500 cycles. Repeat the procedure using the second specimen and second piece of cotton fabric.

Assess the degree of surface print wear on the specimens, using the grey scale as comparator in accordance with ISO 105-A02. If one specimen exhibits greater print wear than the other, the worse result of the two shall be taken as the test result.

C.5 Expression of results

Report the change in colour between the abraded and unabraded portions of the test specimen by reference to the grey scale for assessing change in colour.