
**Footwear — Test methods for upper
components and insoles — Colour
fastness to rubbing and bleeding**

*Chaussures — Méthodes d'essai des composants de la tige et des
premières de propreté — Solidité des coloris au frottement et à
l'exsudation*

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Contents

	Page
Foreword.....	iv
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions.....	1
4 Apparatus and materials.....	2
4.1 Method A.....	2
4.2 Method B.....	3
4.3 Method C.....	4
4.4 Method D.....	5
5 Sampling and conditioning.....	6
5.1 Method A.....	6
5.2 Method B.....	7
5.3 Method C.....	7
5.4 Method D.....	7
6 Test method.....	8
6.1 Principle.....	8
6.1.1 Methods A and B.....	8
6.1.2 Method C.....	8
6.1.3 Method D.....	8
6.2 Procedure.....	9
6.2.1 Method A.....	9
6.2.2 Method B.....	10
6.2.3 Method C.....	12
6.2.4 Method D.....	12
7 Test report.....	13
7.1 Methods A and B.....	13
7.2 Method C.....	14
7.3 Method D.....	14
Annex A (informative) Summary of test conditions normally used for method B.....	15
Bibliography.....	16

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 216, *Footwear*.

This second edition cancels and replaces the first edition (ISO 17700:2004), which has been technically revised. The main changes compared with the previous edition are as follows:

- a new method (method C) to perform the colour fastness to rubbing has been introduced;
- in method D, the possibility to perform the colour fastness to bleeding in shoe laces and yarns has been introduced.

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.

Footwear — Test methods for upper components and insoles — Colour fastness to rubbing and bleeding

1 Scope

This document specifies three test methods (method A, method B and method C) for assessing the degree of transfer of a material's surface colour during dry or wet rubbing and a method (method D) for determining the likelihood of colour bleeding.

The methods are applicable to all footwear uppers, linings and insoles, irrespective of the material. Method D is also applicable to sewing threads and shoelaces.

The methods are:

- method A: to-and-fro square rubbing finger fastness testing machine;
- method B: rotative rub fastness testing machine;
- method C: to-and-fro circular rubbing finger fastness testing machine;
- method D: colour fastness to bleeding.

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 105-A01, *Textiles — Tests for colour fastness — Part A01: General principles of testing*

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

ISO 105-A03, *Textiles — Tests for colour fastness — Part A03: Grey scale for assessing staining*

ISO 105-F09, *Textiles — Tests for colour fastness — Part F09: Specification for cotton rubbing cloth*

ISO 105-F10, *Textiles — Tests for colour fastness — Part F10: Specification for adjacent fabric: Multifibre*

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

ISO 4045, *Leather — Chemical tests — Determination of pH and difference figure*

ISO 18454, *Footwear — Standard atmospheres for conditioning and testing of footwear and components for footwear*

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

colour fastness

ability of a footwear material or component to maintain its colour after the action of various agents

3.2

thick leather

leather with a thickness greater than 2 mm

4 Apparatus and materials

4.1 Method A

The following apparatus and materials shall be used.

4.1.1 Test machine, with the elements given in [4.1.1.1](#) to [4.1.1.8](#).

4.1.1.1 A flat horizontal metal platform of minimum dimensions 80 mm × 25 mm.

4.1.1.2 Means of moving the platform in a direction parallel to its 80 mm edges through a distance of 35 mm to 40 mm and back again at a rate of 40 cycles/min ± 2 cycles/min.

4.1.1.3 A pair of clamps positioned at the ends of the platform at 90° to the 80 mm edges and designed to clamp the test specimen against the platform. The clamp faces shall be at a minimum distance of 80 mm apart.

4.1.1.4 Means of moving the clamps apart so that the test specimen is extended linearly by an amount adjustable up to 20 %.

4.1.1.5 A rubbing finger with a flat horizontal lower surface capable of holding a square felt pad ([4.1.2](#)). The depth of the cavity that holds the square felt pad should be 3,9 mm ± 0,1 mm. For machines with a platform wider than 25 mm, the relative position of the rubbing finger shall be adjustable across the width of the platform.

4.1.1.6 Means of holding a square felt pad ([4.1.2](#)) on the lower surface of the finger.

4.1.1.7 Means of applying a downward force of 4,9 N ± 0,1 N or 9,8 N ± 0,2 N to the rubbing finger.

4.1.1.8 Means of counting the number of cycles traversed by the platform.

4.1.2 Square pads of white or black pure wool felt, with the requirements given in [4.1.2.1](#) to [4.1.2.4](#).

4.1.2.1 Sides of length: 15 mm ± 1 mm.

4.1.2.2 Mass per unit area: 1 900 g/m² ± 150 g/m².

4.1.2.3 Thickness: 6,0 mm ± 0,5 mm, when measured using a dial gauge exerting a downward pressure of 49 kPa ± 5 kPa on a measuring foot diameter of 10 mm ± 1 mm.

4.1.2.4 pH of water extract: between 4,5 and 8,0, in accordance with ISO 4045.

Black felts shall be dyed with Acid Black 24 (C.I. 26370).

4.1.3 Grey scales, for assessing changes in colour and staining with half step ratings, conforming to ISO 105-A02 and ISO 105-A03.

4.1.4 Assessment cabinet, with artificial lighting as specified in ISO 105-A01. Alternatively, the assessment can be carried out in daylight from the north, when the test is carried out in the northern hemisphere, or daylight from the south, when testing in the southern hemisphere.

4.1.5 Distilled or deionised water, conforming to grade 3 of ISO 3696.

4.1.6 Synthetic alkaline perspiration solution, containing, per litre of solution:

- 0,5 g of l-histidine monohydrochloride monohydrate ($C_6H_9O_2N_3 \cdot HCl \cdot H_2O$);
- 5 g of sodium chloride (NaCl);

and either:

- 5 g of disodium hydrogen orthophosphate dodecahydrate ($Na_2HPO_4 \cdot 12H_2O$);

or:

- 2,5 g of disodium hydrogen orthophosphate dihydrate ($Na_2HPO_4 \cdot 2H_2O$).

The solution is brought to pH 8 ($\pm 0,2$) with 0,1 M sodium hydroxide solution.

4.1.7 White spirit, general purpose reagent grade.

NOTE Information about the producers of test machines and accessories can be requested from the Committee Manager of TC 216.

4.2 Method B

The following apparatus and materials shall be used.

4.2.1 Test machine, with the elements given in [4.2.1.1](#) to [4.2.1.5](#).

4.2.1.1 Rigid horizontal platform (preferably metal) capable of clamping the test specimen.

4.2.1.2 Vertical rotating spindle capable of holding the circular felt pad.

4.2.1.3 Means of rotating the felt pad at a speed of $15,6 \text{ rad/s} \pm 0,5 \text{ rad/s}^1$.

4.2.1.4 Means of loading the rotating felt pad with a force of either $24,5 \text{ N} \pm 0,5 \text{ N}$ or $7,1 \text{ N} \pm 0,2 \text{ N}$.

4.2.1.5 Means of counting the number of revolutions of the felt pad.

4.2.2 Circular pads of scoured pure wool felt, with central holes, with the following requirements:

- a) outside diameter: $25 \text{ mm} \pm 1 \text{ mm}$, bore diameter: $3 \text{ mm} \pm 0,5 \text{ mm}$;
- b) thickness: measured by one of the methods given in [Table 1](#);
- c) density: $190 \text{ kg/m}^3 \pm 20 \text{ kg/m}^3$.

1) $1 \text{ rad} \approx 0,16 \text{ rev}$.

Table 1 — Methods to measure the thickness

Thickness	Downward pressure/presser foot size	Specimen
5,0 mm ± 0,5 mm	49 kPa ± 5 kPa/10 mm ± 1 mm	Cut pads or uncut sheet material
6,5 mm ± 0,5 mm	2,0 kPa ± 0,2 kPa/19 mm ± 1mm	Cut pads

4.2.3 Grey scales, for assessing changes in colour and degree of staining, conforming to ISO 105-A02 and ISO 105-A03, respectively.

4.2.4 Metal plate, approximately 75 mm × 65 mm and thickness 5 mm, with a hole diameter 25 mm through its centre for use in the wetting from the back with organic solvents test described in [6.2.2.6](#).

4.2.5 Polished aluminium disc, diameter approximately 50 mm and thickness approximately 12 mm, to help cool the test specimen in dry rub tests.

4.2.6 Balance, capable of weighing masses up to 5 g to an accuracy of 10 mg.

4.2.7 Assessment cabinet, with artificial lighting as specified in ISO 105-A01. Alternatively, the assessment can be carried out in daylight from the north, when the test is carried out in the northern hemisphere, or daylight from the south, when testing in the southern hemisphere.

4.2.8 Distilled or deionised water, conforming to grade 3 of ISO 3696, for the wet rub test described in [6.2.2.3](#).

4.2.9 Synthetic perspiration solution, for the perspiration rub test described in [6.2.2.4](#), consisting of an alkaline solution containing, per litre of solution:

- 0,5 g of l-histidine monohydrochloride monohydrate ($C_6H_9O_2N_3 \cdot HCl \cdot H_2O$);
- 5 g of sodium chloride (NaCl);

and either:

- 5 g of disodium hydrogen orthophosphate dodecahydrate ($Na_2HPO_4 \cdot 12H_2O$);

or:

- 2,5 g of disodium hydrogen orthophosphate dihydrate ($Na_2HPO_4 \cdot 2H_2O$).

The solution is brought to pH 8 ($\pm 0,2$) with 0,1 M sodium hydroxide solution.

4.2.10 White spirit (e.g. CAS n.64742-48-9), for the spirit rub test described in [6.2.2.5](#).

4.2.11 Organic solvents (as used for solvent activated stiffeners), for wetting from the back with the organic solvents test described in [6.2.2.6](#).

NOTE Information about the producers of test machines and accessories can be requested from the Committee Manager of TC 216.

4.3 Method C

The following apparatus and materials shall be used.

4.3.1 Rubbing finger, consisting of a cylinder of $16 \text{ mm} \pm 0,1 \text{ mm}$ diameter, which is driven to carry out a linear reciprocating motion along a $100 \text{ mm} \pm 5 \text{ mm}$ track on the specimen, exerting a downward force of $9 \text{ N} \pm 0,2 \text{ N}$.

Soft-back waterproof abrasive paper, or grating of stainless steel wire 1 mm in diameter and with a mesh width of about 20 mm.

Attention should be paid to the characteristics of the grating or abrasive paper used to hold the specimen as they may leave an imprint through the textile, which would cause a false rating to be made.

The use of the abrasive paper may be preferred for testing textile fabrics.

4.3.2 White cotton rubbing cloth, desized, bleached, without finish, conforming to ISO 105-F09. The cloth is cut into squares measuring approximately $50 \text{ mm} \times 50 \text{ mm}$, for the rubbing finger (4.3.1).

4.3.3 Grey scales, for assessing the degree of staining, conforming to ISO 105-A03.

4.3.4 Assessment cabinet, with artificial lighting as specified in ISO 105-A01. Alternatively, the assessment can be carried out in daylight from the north, when the test is carried out in the northern hemisphere, or daylight from the south, when testing in the southern hemisphere.

NOTE Information about the producers of test machines and accessories can be requested from the Committee Manager of TC 216.

4.4 Method D

The following apparatus and materials shall be used.

4.4.1 Glass vessel, large enough to accommodate a glass plate (4.4.2) for each test specimen assembly.

4.4.2 Glass plate, length at least 110 mm and width at least 55 mm, with a mass of $100 \text{ g} \pm 2 \text{ g}$ for each test specimen assembly.

4.4.3 Rectangular pieces of multifibre fabric type DW, as specified in ISO 105-F10, dimensions $(100 \pm 2) \text{ mm} \times (40 \pm 2) \text{ mm}$.

4.4.4 Oven, maintained at a temperature of $37 \text{ }^\circ\text{C} \pm 2 \text{ }^\circ\text{C}$.

4.4.5 Grey scales, for assessing changes in colour and staining with half steps, conforming to ISO 105-A02 and ISO 105-A03.

4.4.6 Assessment cabinet, with artificial lighting as specified in ISO 105-A01. Alternatively, the assessment can be carried out in daylight from the north, when the test is carried out in the northern hemisphere, or daylight from the south, when testing in the southern hemisphere.

4.4.7 Balance, capable of measuring mass up to 100 g to the nearest 0,1 g, for testing yarns or loose fibres.

4.4.8 Distilled or deionised water, conforming to grade 3 of ISO 3696.

4.4.9 Alkaline perspiration solution, containing, per litre of solution:

- 0,5 g of l-histidine monohydrochloride monohydrate ($\text{C}_6\text{H}_9\text{O}_2\text{N}_3 \cdot \text{HCl} \cdot \text{H}_2\text{O}$);
- 5 g of sodium chloride (NaCl);

and either:

— 5 g of disodium hydrogen orthophosphate dodecahydrate ($\text{Na}_2\text{HPO}_4 \cdot 12\text{H}_2\text{O}$);

or:

— 2,5 g of disodium hydrogen orthophosphate dihydrate ($\text{Na}_2\text{HPO}_4 \cdot 2\text{H}_2\text{O}$).

The solution is brought to pH 8 ($\pm 0,2$) with 0,1 M sodium hydroxide solution.

The solution should be stored at $4\text{ }^\circ\text{C} \pm 1\text{ }^\circ\text{C}$. If the solution is more than one week old, its pH should be checked and adjusted as necessary before use. Discard the solution if precipitated solids develop.

4.4.10 Acid perspiration solution, containing, per litre of solution:

— 0,50 g l-histidine monohydrochloride monohydrate;

— 5,00 g sodium chloride;

— 2,20 g sodium dihydrogen orthophosphate dihydrate.

After preparation, the solution is brought to pH 5,5 with 0,1 M hydrochloric acid solution.

The solution should be stored at $4\text{ }^\circ\text{C} \pm 1\text{ }^\circ\text{C}$. If the solution is more than one week old, its pH should be checked and adjusted as necessary before use. Discard the solution if precipitated solids develop.

NOTE Information about the producers of test machines and accessories can be requested from the Committee Manager of TC 216.

5 Sampling and conditioning

5.1 Method A

5.1.1 Rectangular test specimens of sufficient size to be clamped firmly on the test platform ([4.1.1.1](#)) are required. The test specimens can be cut from the material in any direction. Typically, test specimens shall be of minimum dimensions 100 mm \times 25 mm. In case of stretch materials, the test specimen should be cut from the direction that is less elastic.

For test machines that have test platforms of width 25 mm, separate test specimens are required for each number of rubs or test condition to be used.

For test machines that have wider test platforms and the ability to position the test finger ([4.1.1.5](#)) at different positions across the width of the platform, wider test specimens can be used so that separate rubbing tracks can be used side by side.

5.1.2 Place the test specimens in a conditioned atmosphere as specified in ISO 18454 for 24 h prior to testing.

NOTE Test specimens can be cut either from materials likely to be used in footwear or from made-up uppers or finished footwear.

5.2 Method B

5.2.1 Test specimens shall be of a sufficient size to allow them to be fixed firmly to the test platform (4.2.1.1). Typically, test specimens shall be either squares of 60 mm × 60 mm, or circles of 60 mm diameter. Alternatively, a 60 mm wide strip can be used for several tests.

For materials, cut the test specimens from a range of positions across the full usable width and length of the sheet material. For materials with a woven structure, this should prevent any two specimens containing the same warp or weft threads.

For shoe uppers, avoid seams, perforations and other areas where a flat test specimen cannot be cut.

5.2.2 Place the test specimens in a conditioned atmosphere as specified in ISO 18454 for 24 h prior to testing.

5.3 Method C

5.3.1 Two representative test specimens, each measuring not less than 140 mm × 50 mm, are required. One for dry rubbing and the other for wet rubbing. In cases of stretch materials, the test specimen should be cut from the direction that is less elastic.

5.3.2 Place the test specimens in a conditioned atmosphere as specified in ISO 18454 for 24 h prior to testing.

5.4 Method D

5.4.1 Test specimens can be taken either from materials likely to be used for uppers, linings and insoles or from made-up uppers, linings and insoles, or from finished products.

5.4.2 For sheet material or specimens from shoe uppers, linings and insoles, follow the instructions given in 5.4.2.1 to 5.4.2.3.

5.4.2.1 Cut one rectangular test specimen to 110 mm ± 10 mm × 55 mm ± 5 mm for each method of the test to be carried out. If insufficient material is available, cut several smaller test specimens that can be fitted together to produce a rectangle of this size.

5.4.2.2 If the material to be tested is patterned, cut sufficient additional specimens to ensure that all the colours of the pattern are in contact with all six sections of the multifibre fabric (4.4.3).

5.4.2.3 Assemble the test specimen by placing pieces of multifibre fabric (4.4.3) in contact with the surfaces of the specimens to be tested so that this surface of the specimen is in contact with all six components of the multifibre fabric. If both surfaces of the test specimen are being tested, sandwich the test specimen between two pieces of multifibre fabric.

5.4.3 For yarn, shoe laces or loose fibre, follow the instructions given in 5.4.3.1 to 5.4.3.3.

5.4.3.1 For each method of test to be carried out (D.1, D.2 and D.3), lay out sufficient yarn, shoe lace or fibre to completely cover the surface of one piece of the multifibre fabric (4.4.3).

5.4.3.2 If more convenient, the yarn, shoe lace or fibre can be cut into lengths of 100 mm ± 5 mm.

5.4.3.3 Place the yarn, shoe lace or fibre between two pieces of the multifibre fabric (4.4.3) so that approximately equal amounts of the yarn, shoe lace or fibre are in contact with each of the six components of the multifibre fabric. It is likely that the yarn, shoe lace or fibre will overlap one another to some extent

and this should be kept to a minimum. Avoid creating areas of several thicknesses of yarn, shoe lace or fibre as this will lead to uneven pressure on the test specimen assembly during the test.

5.4.4 Retain a portion of the material to use as a reference for visually comparing any colour change of the test specimen.

6 Test method

6.1 Principle

6.1.1 Methods A and B

In method A, a test specimen of the material is rubbed by a dry or wet wool felt pad under a constant contact force in the to-and-fro direction.

In method B, a test specimen of the material is rubbed by a dry or wet wool felt pad under a constant contact force, rotational against the surface of the materials.

The test is stopped after a predetermined number of cycles or revolutions and the damage to, or transfer of, colour is assessed subjectively using a geometric grey scale. Four versions of the test are described for each method:

- dry rub;
- wet rub;
- perspiration rub;
- white spirit rub.

For method B, a further test is described:

- dry rub after wetting from the back with organic solvent.

6.1.2 Method C

Specimens are rubbed with a dry or wet rubbing cloth attached to a cylindrical finger that is moved to and fro, under controlled conditions. Colour transferred to the white cloth is assessed subjectively using a geometric grey scale for staining.

6.1.3 Method D

A test specimen, in contact with a standard multifibre fabric, is soaked with one of the following:

- D.1: distilled or deionised water;
- D.2: alkaline solution of artificial perspiration;
- D.3: acid solution of artificial perspiration.

The test specimen assembly is then sandwiched between two glass surfaces and stored in a warm environment for a set time. The specimen and the multifibre fabric are dried separately and the change in their colour is assessed using grey scales.

6.2 Procedure

6.2.1 Method A

6.2.1.1 General

All tests shall be repeated at least once to confirm the results and shall be conducted in a conditioned atmosphere, as specified in ISO 18454.

6.2.1.2 Dry rub test

- a) Secure the test specimen onto the platform (4.1.1.1).
- b) Move the clamps (4.1.1.3) apart to extend the test specimen by:
 - 1) woven fabrics and thick leather, 5 %;
 - 2) standard footwear leather, 10 %;
 - 3) soft leather, nonwoven and knitted fabric, 15 % to 20 %.
- c) Secure a new dry felt pad (4.1.2) onto the lower surface of the rubbing finger so that two of its edges are parallel to the direction of movement of the platform.
- d) Bring the felt pad and the test specimen into contact and apply a force of:
 - 1) suede: $4,9 \text{ N} \pm 0,1 \text{ N}$;
 - 2) all other types of material: $9,8 \text{ N} \pm 0,2 \text{ N}$.

NOTE Suede includes all types of finishing in leather and textile with fibre, i.e. nubuck, split leather, velvet or microfibre.
- e) Operate the test machine (4.1.1) until the platform has completed the required number of cycles. If the number of cycles has not been specified, stop the machine after 100 cycles. If necessary, when using high numbers of cycles, take precautions to avoid thermal damage to the surface coating by stopping the machine at intervals and allowing the sample to cool.
- f) Lift the felt pad clear of the test specimen surface and remove from the machine.
- g) Remove the test specimen from the machine and clamp a fresh test specimen on the platform, or adjust the position of the rubbing finger so that the area to be rubbed by the pad is at least 5 mm from the edges of the test specimen and from the area previously rubbed. Repeat the procedure in c) to f) for this further test.
- h) Repeat the procedure in g) for any additional number of cycles and the required duplicate tests.
- i) Proceed to 6.2.1.6.

6.2.1.3 Wet rub test

- a) Immerse the felt pads (4.1.2) in cool distilled or deionised water, conforming to grade 3 of ISO 3696. Heat the water to boiling and allow it to boil gently for $(60 \pm 5) \text{ s}$ until the felt pieces sink. Then, decant off the hot water and replace it with cold demineralized water. Allow to stand until the wetted felt pieces have reached room temperature. Remove the pads from the water immediately before use but reject any that are excessively swollen or soft. Squeeze or wipe to reduce the water uptake to $1 \text{ g} \pm 0,1 \text{ g}$. The wet pieces of felt shall not be allowed to soak in the water for more than 24 h. Unused wet pads shall be discarded after 24 h and fresh wet pads prepared as necessary.
- b) Follow the procedure in 6.2.1.2 a) to h) using the wet instead of dry pads.

- c) Dry the felt pads and test specimen(s) for a minimum of 16 h according to the atmosphere specified in ISO 18454 and proceed to [6.2.1.6](#).

6.2.1.4 Perspiration solution rub test

- a) Wet the felt pads as described in [6.2.1.3](#) a).
- b) Gently squeeze the excess water from the felt pad and immediately immerse it in the synthetic perspiration solution for 5 min.
- c) Remove the felt pads from the perspiration solution. Reject any that are excessively swollen.
- d) Follow the procedure in [6.2.1.3](#) b) to c) and proceed to [6.2.1.6](#).

6.2.1.5 White spirit rub test

- a) Immerse a felt pad in white spirit ([4.1.7](#)) for 30 s ± 5 s. Reject any felt pads that are excessively swollen.
- b) Follow the procedure in [6.2.1.3](#) b) to c) and proceed to [6.2.1.6](#).

6.2.1.6 Assessment of results (all tests)

- a) To assess the colour transfer, use a not-used pad to compare it with the test pads.
- b) To make the assessment of colour degradation easier, each test specimen should be compared against a test specimen without degree of damage (marring).
- c) Use the assessment cabinet with artificial lighting as specified in ISO 105-A01. Alternatively, the assessment can be carried out in daylight from the north, when the test is carried out in the northern hemisphere, or daylight from the south, when testing in the southern hemisphere. Compare the contrast between tested and non-tested areas with the ratings on the relevant geometric grey scale (i.e. “degree of staining” for colour transfer and “change in colour” for marring). If the assessment falls between two ratings on the grey scale, quote the lowest number of the two grey scale ratings, i.e. the worst case.
- d) In cases where the duplicate tests give different numerical grey scale ratings, the lower value of the two shall be taken as the result for that test.

6.2.2 Method B

6.2.2.1 General

All tests described in [6.2.2.2](#) to [6.2.2.6](#) shall be repeated at least once to confirm the results and shall be conducted in a conditioned atmosphere as specified in ISO 18454.

NOTE A summary of test conditions normally used for method B is given in [Annex A](#).

6.2.2.2 Dry rub test

- a) Secure the test specimen onto the horizontal platform of the test machine and configure the machine to operate with a fixed force of 24,5 N.
- b) Secure a dry felt pad onto the spindle of the test machine.
- c) Bring the felt pad and the test specimen into contact and run the machine for the required number of revolutions. If necessary, take precautions to avoid thermal damage (see [A.3](#)).
- d) Lift the felt pad clear of the test specimen surface and remove from the machine.

- e) Remove the test specimen from the machine and clamp a fresh test specimen on the platform. Repeat the procedure in [6.2.2.2](#) b) to d) for this further test.
- f) Repeat the procedure in [6.2.2.2](#) e) for any additional number of revolutions and the required duplicate tests.
- g) Proceed to [6.2.2.7](#).

6.2.2.3 Wet rub test

- a) Secure the test specimen onto the horizontal platform of the test machine and configure the machine to operate with a fixed force of 7,1 N.
- b) Immerse the felt pads in boiling distilled or deionised water, continue to boil for 60 s and allow to cool to room temperature. To facilitate more rapid cooling, the water can be decanted off and replaced with fresh distilled or deionised water.
- c) Remove the pads from the water immediately before use but reject any that are excessively swollen or soft. Pads shall not be kept in water for more than 24 h. Unused wet pads shall be discarded after 24 h and fresh wet pads prepared as necessary.
- d) Adjust the amount of liquid in the pad to $1,0 \text{ g} \pm 0,1 \text{ g}$ by gently squeezing the excess from it.
- e) Follow the procedure in [6.2.2.2](#) b) to f) using the wet instead of dry pads.
- f) Dry the felt pads and test specimens at standard laboratory temperature and proceed to [6.2.2.7](#).
- g) Lift the pad clear of the test specimen surface, dry the felt pad and test specimen (see [A.2](#)) and proceed to [6.2.2.7](#).

6.2.2.4 Perspiration rub test

- a) Set up the test machine as described in [6.2.2.3](#) a) and wet the pad as described in [6.2.2.3](#) b).
- b) Gently squeeze the excess water from the felt pad and immediately immerse it in the synthetic perspiration solution ([4.2.9](#)) for 5 min. Remove the felt pads from the perspiration solution.
- c) Reject any that are excessively swollen. Adjust the amount of liquid in the pad to $1,0 \text{ g} \pm 0,1 \text{ g}$ by gently squeezing the excess from it.
- d) Proceed as in [6.2.2.3](#) d) to g).

6.2.2.5 White spirit rub test

- a) Set up the test machine as described in [6.2.2.3](#) a).
- b) Immerse a felt pad in white spirit ([4.2.10](#)) for 30 s. Reject any felt pads that are excessively swollen and proceed as in [6.2.2.3](#) d) to g).

6.2.2.6 Dry rub test after wetting from the back with organic solvent

- a) Place the plate ([4.2.4](#)) on the test machine platform, fit a dry felt pad into the hole in the plate and wet it evenly with $2,5 \text{ cm}^3 \pm 0,1 \text{ cm}^3$ of the organic solvent ([4.2.11](#)).
- b) Immediately secure the test specimen over the pad. Configure the machine to operate with a fixed force of 7,1 N. Secure a dry felt pad onto the spindle. Bring the felt pad into contact with the specimen and leave for $60 \text{ s} \pm 2 \text{ s}$. Run the machine for the required number of revolutions.
- c) Proceed as in [6.2.2.2](#) d) to g) with fresh solvent wetted pads beneath each test specimen following the procedure in [6.2.2.6](#) a) and b).

6.2.2.7 Assessment of results (all tests)

Proceed as indicated in [6.2.1.6](#).

6.2.3 Method C

6.2.3.1 General

Fasten each test specimen securely to the baseboard of the test device so that the surface to be tested is upmost and the long direction of the specimen follows the track of the device.

6.2.3.2 Dry rub test

- a) Fix the dry rubbing cloth in place over the end of the cylindrical finger of the test device.
- b) At a rate of one turn per second, complete 10 turns of the crank to slide the rubbing finger to and fro (10 times to and 10 times fro) in a straight line along a track 100 mm long on a dry specimen.
- c) After rubbing, remove the cloth.

6.2.3.3 Wet rub test

- a) Establish a technique for preparing a wet rubbing cloth by weighing a conditioned piece of cloth, thoroughly wetting it out in distilled water, squeezing or wringing it, then reweighing it until the water pick-up is $100\% \pm 5\%$.
- b) Fix the wet rubbing cloth in place over the end of the cylindrical finger of the test device.
- c) At a rate of one turn per second, complete 10 turns of the crank to slide the rubbing finger to and fro (normally 10 times to and 10 times fro or other specified number of times according to use needs) in a straight line along a track 100 mm long on a dry specimen.
- d) After rubbing, remove the cloth and dry at standard laboratory temperature.

6.2.3.4 Assessment of results (all tests)

Proceed as indicated in [6.2.1.6](#) b), c) and d).

To assess the colour transfer, use a not-used rubbing cloth to compare it with the test rubbing cloths.

6.2.4 Method D

6.2.4.1 Centrally place each test specimen assembly in its own glass vessel ([4.4.1](#)).

6.2.4.2 Cover each test specimen assembly with one of the following:

- D.1: water ([4.4.8](#));
- D.2: alkaline perspiration solution ([4.4.9](#));
- D.3: acid perspiration solution ([4.4.10](#)).

6.2.4.3 Gently prod and scrape each test specimen assembly with the edge of a glass plate ([4.4.2](#)) so that they are fully wetted and any air bubbles are expelled.

6.2.4.4 Maintain the glass vessels, with the test specimen assemblies in place, for $30\text{ min} \pm 2\text{ min}$ at the temperature specified in ISO 18454.

6.2.4.5 Place a glass plate (4.4.2) centrally over each test specimen assembly and fully cover the glass plates with the appropriate reagent, see 5.4.3.

6.2.4.6 Maintain the glass vessels, with the test specimen assemblies and glass plates still in position, for 15 min ± 1 min at the temperature specified in ISO 18454.

6.2.4.7 Pour off the water or artificial perspiration solution from each glass vessel while holding the glass plate and test specimen assembly in place. Do not squeeze the test specimen assembly or remove the glass plate.

6.2.4.8 Place the glass vessels, with the test specimen assemblies and glass plates still in position, in the oven (4.4.4) for 4,0 h ± 0,1 h at 37 °C ± 2 °C.

6.2.4.9 Separate the test specimens and multifibre fabric and leave them to dry separately on a non-absorbent surface at a temperature not exceeding 60 °C.

6.2.4.10 Place the pieces of tested multifibre fabric on a white background under the lighting conditions (4.4.6). In accordance with ISO 105-A01, assess the staining of each of the six individual components of each piece of multifibre fabric by comparing the contrast between tested and non-tested fabrics with the ratings on the grey scale for assessing staining (4.4.5).

6.2.4.11 If required, assess the change in colour of each specimen surface tested by comparing the contrast between the specimen and the reference piece of material (see 5.4.4) with the ratings on the grey scale for colour change (4.4.5). Take care to compare equivalent surfaces of the two pieces of material.

6.2.4.12 If either of the assessments in 6.2.4.10 or 6.2.4.11 fall between two ratings on the grey scale, quote the lower numbered rating.

7 Test report

7.1 Methods A and B

The test report for methods A and B shall include the following information:

- a) a reference to this document, i.e. ISO 17700;
- b) for each pad, the minimum numerical grey scale rating determined in 6.2.1.6 (method A) or 6.2.2.7 (method B);
- c) a description of the specimen that was tested, including commercial references (style codes, etc.);
- d) a reference to the method of test;
- e) the surface of the specimen that was tested;
- f) the version of the test that was used (dry, wet, perspiration, white spirit, organic solvent);
- g) if applicable, which perspiration solution was used (4.1.6 or 4.2.9);
- h) the number of cycles or revolutions used;
- i) the date of testing;
- j) any deviations from the test method.