

Textiles — Tests for colour fastness —

Part E04: Colour fastness to perspiration

The European Standard EN ISO 105-E04:1996 has the status of a
British Standard

ICS 59.080.10

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee TCI/25, Chemical properties, upon which the following bodies were represented:

Association of Consulting Scientists

Association of Suppliers to the British Clothing Industry

British Apparel and Textile Confederation

British Clothing Industry Association

British Measurement and Testing Association

British Retail Consortium

Chemical Industries Association

Consumer Policy Committee of BSI

Fabric Care Research Association Ltd.

Home Laundering Consultative Council

International Wool Secretariat

Mail Order Traders' Association

Ministry of Defence

National Wool Textile Export Corporation

SATRA Footwear Technology Centre

Soap and Detergent Industry Association

Society of Dyers and Colourists

Textile Finishers' Association

Participation in the detailed technical work was undertaken by the Society of Dyers and Colourists

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Amendments issued since publication

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The following BSI references relate to the work on this British Standard:
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National foreword

This British Standard has been prepared by Technical Committee TCI/25. It is the English language version of EN ISO 105-E04:1996 *Textiles — Tests for colour fastness — Part E04: Colour fastness to perspiration*, which is identical with ISO 105-E04:1994, including Technical Corrigendum February 2002, published by the International Organization for Standardization.

This British Standard supersedes the corresponding method in BS 1006:1990, which is deleted by amendment.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the *BSI Electronic Catalogue* or of British Standards Online.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN ISO title page, the EN ISO foreword page, pages 1 to 4, an inside back cover and a back cover.

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Descriptors: See ISO document

English version

Textiles — Tests for colour fastness — Part E04: Colour fastness to perspiration

(ISO 105-E04:1994)

Textiles — Essais de solidité des teintures —
Partie E04: Solidité des teintures à la sueur
(ISO 105-E04:1994)

Textilien — Farbechtheitsprüfungen —
Teil E04: Farbechtheit gegen Schweiß
(ISO 105-E04:1994)

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Foreword

The text of the international standard from Technical Committee ISO/TC 38, Textiles, of the International Organization for Standardization (ISO) has been taken over as a European Standard by Technical Committee CEN/TC 248, Textiles and textile products, the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 1996, and conflicting national standards shall be withdrawn at the latest by December 1996.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

NOTE Normative references to international standards are listed in Annex ZA (normative).

1 Scope

This part of ISO 105 specifies a method for determining the resistance of the colour of textiles of all kinds and in all forms to the action of human perspiration.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 105. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 105 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 105-A01:1994, *Textiles — Tests for colour fastness — Part A01: General principles of testing.*

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

ISO 105-A03:1993, *Textiles — Tests for colour fastness — Part A03: Grey scale for assessing staining.*

ISO 105-F:1985, *Textiles — Tests for colour fastness — Part F: Standard adjacent fabrics.*

ISO 105-F10:1989, *Textiles — Tests for colour fastness — Part F10: Specification for adjacent fabric: Multifibre.*

3 Principle

Specimens of the textile in contact with adjacent fabrics are treated in two different solutions containing histidine, drained and placed between two plates under a specified pressure in a test device. The specimens and the adjacent fabrics are dried separately. The change in colour of each specimen and the staining of the adjacent fabrics are assessed by comparison with the grey scales.

4 Apparatus and reagents

4.1 Test devices

Each consisting of a frame of stainless steel into which a weight-piece of mass approximately 5 kg and base of 60 mm × 115 mm is closely fitted, so that a pressure of 12,5 kPa can be applied on test specimens measuring 40 mm × 100 mm placed between glass or acrylic-resin plates measuring approximately 60 mm × 115 mm × 1,5 mm. The test device shall be constructed so that, if the weight-piece is removed during the test, the pressure of 12,5 kPa remains unchanged.

If the dimensions of the composite specimen differ from the size of 40 mm × 100 mm, the weight-piece used shall be such that a pressure of 12,5 kPa is applied to the specimen.

NOTE 1 Other devices may be used provided that equivalent results are obtained.

4.2 Oven

Without an air-circulating fan, maintained at 37 °C ± 2 °C.

4.3 Alkaline solution

Freshly prepared, containing, per litre:

0,5 g L-histidine monohydrochloride monohydrate (C₆H₉O₂N₃.HCl.H₂O);

5 g of sodium chloride (NaCl);

either

5 g of disodium hydrogen orthophosphate dodecahydrate (Na₂HPO₄.12H₂O)

or

2,5 g of disodium hydrogen orthophosphate dihydrate (Na₂HPO₄.2H₂O).

The solution is brought to pH 8 with 0,1 mol/l sodium hydroxide solution.

4.4 Acid solution

Freshly prepared, containing, per litre,

0,5 g of L-histidine monohydrochloride monohydrate ($C_6H_9O_2N_3.HCl.H_2O$);

5 g of sodium chloride (NaCl);

2,2 g of sodium dihydrogen orthophosphate dihydrate ($NaH_2PO_4.2H_2O$).

The solution is brought to pH 5,5 with 0,1 mol/l sodium hydroxide solution.

4.5 Adjacent fabrics

(see ISO 105-A01:1994, subclause 8.2).

Either

4.5.1 A multifibre adjacent fabric complying with ISO 105-F10.

or

4.5.2 Two single-fibre adjacent fabrics, complying with the relevant sections of F01 to F08 of ISO 105-F:1985.

One of the adjacent fabrics shall be made of the same kind of fibre as that of the textile to be tested, or that predominating in the case of blends, the second piece made of the fibre as indicated in Table 1 or, in the case of blends, of the kind of fibre second in order of predominance or as otherwise specified.

Table 1 — Single-fibre adjacent fabrics

If first piece is:	Second piece to be:
cotton	wool
wool	cotton
silk	cotton
viscose	wool
acetate	viscose
polyamide	wool or viscose
polyester	wool or cotton
acrylic	wool or cotton

4.5.3 If required, a non-dyeable fabric (for example, polypropylene).

4.6 Grey scale for assessing change in colour

Complying with ISO 105-A02, and **grey scale for assessing staining**, complying with ISO 105-A03.

5 Test specimen

5.1 If the textile to be tested is fabric, either

- a) attach a specimen measuring 40 mm × 100 mm to a piece of the multifibre adjacent fabric (4.5.1), also measuring 40 mm × 100 mm, by sewing along one of the shorter sides, with the multifibre fabric next to the face of the specimen; or
- b) attach a specimen measuring 40 mm × 100 mm between the two single-fibre adjacent fabrics (4.5.2), also measuring 40 mm × 100 mm, by sewing along one of the shorter sides.

5.2 Where yarn or loose fibre is to be tested, take a mass of the yarn or loose fibre approximately equal to one half of the combined mass of the adjacent fabrics, and either

- a) place it between a 40 mm × 100 mm piece of the multifibre fabric (4.5.3) and a 40 mm × 100 mm piece of the non-dyeable fabric and sew them along all four sides (see ISO 105-A01:1994, subclause 9.3); or
- b) place it between a 40 mm × 100 mm piece of each of the two specified single-fibre fabrics and sew along all four sides.

6 Procedure

6.1 Lay out the composite specimen smooth in a flat-bottomed dish and cover with the solution. Thoroughly wet one composite specimen in the alkaline solution at pH 8 (4.3) at a liquor ratio of 50:1, and allow it to remain in the solution at room temperature for 30 min. Press and move it from time to time to ensure good and uniform penetration of the liquor. Pour off the solution and wipe the excess liquor off the specimen between two glass rods.

Place the composite specimen between two glass or acrylic resin plates, under a pressure of 12,5 kPa, and place in the test device which has been preheated to the test temperature.

By the same procedure, one composite specimen is wetted in the acid solution at pH 5.5 (see 4.4) and then tested in a separate preheated test device.

NOTE 2 Up to ten test specimens, each separated from the next by one plate, may be tested in one test device simultaneously.

6.2 Place the test devices (4.1) containing the composite specimens in the oven (4.2) for 4 h at 37 °C ± 2 °C.

6.3 Open out each composite specimen (by breaking the stitching except on one of the shorter sides, if necessary) and dry it by hanging it in air at a temperature not exceeding 60 °C, with the two or three parts in contact only at the line of stitching.

6.4 Assess the change in colour of each specimen and the staining of the adjacent fabric(s) by comparison with the grey scales (4.6).

NOTE 3 In many cases of cellulosic fibres dyed with direct dyes containing copper, or after treatment with copper salts, the prescribed tests and natural perspiration bring about a removal of copper from the dyeings. This may cause a significant alteration in fastness to light and washing, and it is therefore recommended that this possibility be taken into consideration.

7 Test report

The test report shall include the following information:

- a) the number and year of publication of this part of ISO 105, i.e. ISO 105-E04:1994;
- b) all details necessary for the identification of the sample tested;
- c) the numerical grey scale ratings for change in colour of the specimen in each solution;
- d) if single-fibre adjacent fabrics were used, the numerical grey scale rating for staining of each kind of adjacent fabric used;
- e) if a multifibre adjacent fabric was used, the numerical grey scale rating for staining of each type of fibre in the multifibre adjacent fabric, and the type of multifibre adjacent fabric used.

Annex ZA (normative)**Normative references to international publications with their relevant European publications**

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

IEC publication	Date	Title	EN/HD	Date
ISO 105-A01 1994	1994	<i>Textiles — Tests for colour fastness Part A01: General principles of testing</i>	EN ISO 105-A01	1995
ISO 105-A02 1993	1993	<i>Textiles — Tests for colour fastness Part A02: Grey scale for assessing change in colour</i>	EN 20105-A02	1994
ISO 105-A03 1993	1993	<i>Textiles — Tests for colour fastness Part A03: Grey scale for assessing staining</i>	EN 20105-A03	1994

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