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Third edition
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Textiles — Tests for colour fastness —

Part E12 :

Colour fastness to milling: Alkaline milling

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Textiles — Essais de solidité des teintures —

Partie E12 : Solidité des teintures au foulon: Foulon alcalin

ISO 105-E12:1989

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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.

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. They are approved in accordance with ISO procedures requiring at least 75% approval by the member bodies voting.

International Standard ISO 105-E12 was prepared by Technical Committee ISO/TC 38, *Textiles*.

This third edition cancels and replaces the second edition (ISO 105-E12:1987), of which it constitutes a technical revision.

ISO 105 was previously published in 13 "parts", each designated by a letter (e.g. "Part A"), with publication dates between 1978 and 1985. Each part contained a series of "sections", each designated by the respective part letter and by a two-digit serial number (e.g. "Section A01"). These sections are now being republished as separate documents, themselves designated "parts" but retaining their earlier alphanumeric designations. A complete list of these parts is given in ISO 105-A01.

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Textiles — Tests for colour fastness —

Part E12 :

Colour fastness to milling: Alkaline milling

1 Scope

This part of ISO 105 specifies a method for determining the resistance of the colour of wool and part-wool textiles to the action of soap and sodium carbonate solutions used in alkaline milling.

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-A01:1989, *Textiles — Tests for colour fastness — Part A01: General principles of testing.*

ISO 105-A02:1987, *Textiles — Tests for colour fastness — Part A02: Grey scale for assessing change in colour.*

ISO 105-A03:1987, *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

A specimen of the textile in contact with one or two specified adjacent fabrics is milled in a jar containing steel balls and a solution of soap and sodium carbonate. The severity of the action is controlled by means of a test-control dyeing milled separately in the same way. After rinsing and drying, the change in colour of the specimen and the staining of the adjacent fabrics are assessed with the grey scales.

4 Apparatus and reagents

4.1 Suitable mechanical device (see 8.1), consisting of a water bath containing a rotatable shaft which supports, radially, glass or stainless steel containers (75 mm \pm 5 mm diameter \times 125 mm \pm 10 mm high) of approximately 550 ml \pm 50 ml capacity, the bottom of the containers being 45 mm \pm 10 mm high from the centre of the shaft. The shaft/container assembly is rotated at a frequency of 40 min⁻¹ \pm 2 min⁻¹. The temperature of the water bath is thermostatically controlled to maintain the test solution at the prescribed temperature of 40 °C \pm 2 °C.

4.2 Non-corrodible (stainless) steel balls, approximately 6 mm in diameter.

4.3 Adjacent fabrics (see ISO 105-A01:1989, sub-clause 8.3).

Either:

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

Or:

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4.3.2 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, and 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
linen	wool
viscose	wool
acetate	wool
polyamide	wool
polyester	wool
acrylic	wool

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

4.4 **Milling solution**, containing 50 g of soap and 10 g of anhydrous sodium carbonate per litre. The soap shall contain not more than 5 % moisture and comply with the following requirements based upon dry mass:

- free alkali, calculated as Na_2CO_3 : 0,3 % maximum;
- free alkali, calculated as NaOH: 0,4 % maximum;
- total fatty matter: 850 g/kg minimum;
- titre of mixed fatty acids prepared from soap: 30 °C maximum;
- iodine value: 50 maximum.

The soap shall be free from fluorescent whitening agents.

4.5 **Test control**, a dyeing of Cl Acid Blue 7 (Colour Index, 3rd Edition) on wool fabric (see 8.2).

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.

4.7 **Grade 3 water** (see ISO 105-A01:1989, sub-clause 8.2).

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, 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, also measuring 40 mm × 100 mm, by sewing along one of the shorter sides.

5.2 Where yarns 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 and a 40 mm × 100 mm piece of the non-dyeable fabric and sew them along all four sides (see ISO 105-A01:1989, sub-clause 9.6) 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.

5.3 Prepare the composite specimen of the test control (4.5) in the way outlined for fabric in 5.1.

6 Procedure

6.1 Carry out the operations described in 6.2 to 6.4 inclusive with the composite specimen and the composite test-control specimen in parallel, in separate baths.

6.2 Put the composite specimen and the composite test-control specimen in separate containers in the test device (4.1), each with three times its own mass of the milling solution (4.4) and 50 of the stainless-steel balls (4.2). Run the device for 2 h at $40 \text{ °C} \pm 2 \text{ °C}$.

6.3 Add sufficient grade 3 water (4.7) at $40 \text{ °C} \pm 2 \text{ °C}$ to give a liquor ratio of 100 : 1, and run the device for an additional 10 min.

6.4 Remove the composite specimens, rinse twice in cold water (4.7) then rinse for 10 min in cold, running tap water. Open out the composite specimen (by breaking the stitching on all sides except 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.

6.5 Assess the change in colour of the test control and the staining of its adjacent fabric(s) with the grey scales (4.6). If the change in colour is not equal to rating 3 on the appropriate grey scale, the test has not been carried out correctly, and the operations described in 6.1 to 6.4 shall be repeated with a fresh composite specimen and a fresh composite test-control specimen.

6.6 Assess the change in colour of the specimen and the staining of its adjacent fabric(s) with the grey scales (4.6).

7 Test report

The test report shall include the following particulars:

- a) the number and date of this part of ISO 105, i.e. ISO 105-E12:1989;
- b) all details necessary for the identification of the sample tested;

c) the numerical rating for change in colour of the specimen;

d) if single-fibre adjacent fabrics were used, the numerical rating for staining of each kind of adjacent fabric used;

e) if a multifibre adjacent fabric was used, the staining of each type of fibre in the multifibre adjacent fabric, and the type of multifibre adjacent fabric used.

8 Notes

8.1 Other mechanical devices may be used for the test provided that the results are identical to those obtained with the apparatus described in 4.1.

8.2 Enter a well wetted-out pattern of wool serge at 40 °C into a dye-bath containing 3 % CI Acid Blue 7 (Colour Index, 3rd Edition), 10 % sodium sulfate decahydrate ($\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$) and 3 % sulfuric acid (ρ 1,84 g/ml), all percentages being calculated with respect to the mass of the wool, at a liquor ratio of 40 : 1.

Raise the dye bath to the boil in 30 min and boil for 45 min. Remove the pattern, rinse and dry.

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