

INTERNATIONAL STANDARD

ISO
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Textiles — Tests for colour fastness — **Part B05:** Detection and assessment of photochromism

Textiles — Essais de solidité des teintures —

Partie B05: Détection et évaluation de la phototropie



Reference number
ISO 105-B05:1993(E)

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 voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 105-B05 was prepared by Technical Committee ISO/TC 38, *Textiles*, Sub-Committee SC 1, *Tests for coloured textiles and colorants*.

This fourth edition cancels and replaces the third edition (ISO 105-B05:1988), of which it constitutes a minor revision.

ISO 105 was previously published in thirteen "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 B05:

Detection and assessment of photochromism

1 Scope

This part of ISO 105 specifies a method intended for detecting and assessing change in colour, after brief exposure to light, of coloured textiles which change in colour on exposure to light but which virtually return to their original shade when stored in the dark.

NOTE 1 This phenomenon used to be termed "phototropism", but the term "phototropism" is much more widely used in biological science where its meaning is entirely different. As the derivation of "phototropism" is in accord with its biological meaning, the term "photochromism" is preferable for reversible colour changes induced by light.

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

ISO 105-B01:1989, *Textiles — Tests for colour fastness — Part B01: Colour fastness to light: Daylight*.

ISO 105-B02:1988, *Textiles — Tests for colour fastness — Part B02: Colour fastness to artificial light: Xenon arc fading lamp test*.

3 Principle

A specimen of the textile is exposed to light of high intensity for a time much shorter than that necessary to cause a permanent change. The change in colour of the specimen is assessed immediately after exposure, using the grey scale. The specimen is then stored in the dark and assessed again.

4 Reference materials and apparatus

4.1 Reference materials

The references used for this test are References 1 and L2 as specified in subclauses 4.1.1 and 4.1.2 of ISO 105-B01:1989.

4.2 Apparatus

4.2.1 Light source, a xenon arc lamp of correlated colour temperature 5 500 K to 6 500 K.

4.2.2 Filter.

A filter is placed between the light source and the specimens and references so that the ultra-violet spectrum is steadily reduced. The transmission of the

glass shall be at least 90 % between 380 nm and 750 nm, falling to 0 % between 310 nm and 320 nm.

The equipment described in ISO 105-B02 is considered most satisfactory.

4.2.3 Opaque cardboard, or other thin opaque material, for example thin sheet aluminium, or cardboard covered with aluminium foil, or, in the case of pile fabrics, a cover that avoids surface compression.

4.2.4 Grey scale for assessing change in colour, complying with ISO 105-A02.

5 Test specimen

5.1 An area of the textile not less than 10 mm × 45 mm is required. The specimen may be a strip of cloth, yarns wound close together on a card or laid parallel and fastened on a card, or a mat of fibres combed and compressed to give a uniform surface and fastened on a card.

5.2 To facilitate handling, the specimen and a similar strip of the reference may be mounted on cards.

6 Procedure

6.1 Cover approximately one-half of the strip of Reference 1 or Reference L2 (see 4.1) with opaque cardboard (4.2.3).

6.2 Expose the partially covered Reference 1 or Reference L2 continuously to the xenon arc fading lamp at moderate effective humidity (see ISO 105-B02) until the contrast between the unexposed and the exposed portions of the reference is equal to grey scale grade 4. Determine the time necessary to produce this change. It will only be necessary to repeat this operation if exposure conditions change significantly.

6.3 Cover approximately one-half of the specimen (see 5.1) with opaque cardboard (4.2.3).

6.4 Expose the specimen in the same position and under the same conditions as in 6.2 for one-quarter of the time necessary to produce a grey scale grade 4 fade on Reference 1 or one-twenty-fifth of the time necessary to produce a grey scale grade 4 fade on Reference L2 (see 6.2).

6.5 Remove the specimen from the source of light. Immediately remove the cover from the specimen and assess the contrast between the unexposed and the exposed portions with the grey scale.

6.6 If the contrast is not greater than grey scale grade 4, the specimen is not photochromic and further examination is not necessary.

6.7 If the contrast between the original and the exposed portion of the specimen is greater than grey scale grade 4, leave the specimen in the dark for 1 h at $20\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ and a relative humidity of $(65 \pm 2)\%$. If, after this period, the contrast between the unexposed and exposed portions of the specimen can still be perceived, expose the specimen to steam at atmospheric pressure to accelerate further colour restoration.

Carry out the steaming by placing the specimen on a mesh of non-corrodible material which is attached to the mouth of a 1 litre flask containing 500 ml of gently boiling water. Mount the specimen with the unexposed side facing the mesh. Steam for a period of 60 s.

6.8 Inspect the specimen to determine if the contrast between the unexposed and the exposed portions is still visible, and, if so, re-assess the contrast between the unexposed and exposed portions of the specimen against the grey scale.

7 Expression of results

7.1 If the specimen shows a contrast not greater than grey scale grade 4 between the exposed and unexposed portions immediately after exposure (see 6.6), the specimen is not photochromic; report the light fastness of the specimen in the normal manner described in ISO 105-B01 or ISO 105-B02.

7.2 If the specimen immediately after exposure shows a contrast between the unexposed and the exposed portions of the specimen which is greater than grey scale grade 4 but which after conditioning according to 6.7 shows a difference not greater than grey scale grade 4-5, it is photochromic.

The light fastness rating of the specimen (as determined by ISO 105-B01 or ISO 105-B02) shall be followed by the letter P and the grey scale rating, in brackets, for example 6(P3-4), 6-7(P2-3).

7.3 If the contrast between the unexposed and the exposed portions of the specimen after conditioning is greater than grey scale grade 4-5, the sample is not photochromic, but is of low initial light fastness. Assess the light fastness and give the rating for the first perceptible change in brackets.

7.4 Temporary changes in colour which may be due to lower moisture content and/or higher temperature and whose existence can be ascertained by a hot pressing test shall not be reported as photochromic.

8 Test report

The test report shall include the following particulars:

- a) the number and date of publication of this part of ISO 105 (i.e. ISO 105-B05:1993);
- b) all details necessary for the identification of the sample tested;
- c) the result of the test, expressed in accordance with the instructions in clause 7.

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