INTERNATIONAL STANDARD

ISO 105-E03

Third edition
1994-09-01

Textiles — Tests for colour fastness —

Part E03:
Colour fastness to chlorinated water (swimming-pool water)

Textiles — Essais de solidité des teintures —
Partie E03: Solidité des teintures à l'eau chlorée (eau de piscine)

Reference number
ISO 105-E03:1994(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-E03 was prepared by Technical Committee ISO/TC 38, *Textiles*, Subcommittee SC 1, *Tests for coloured textiles and colorants*.

This third edition cancels and replaces the second edition (ISO 105-E03:1987), of which it constitutes a technical 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.

International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

Textiles — Tests for colour fastness —

Part E03:
Colour fastness to chlorinated water (swimming-pool water)

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 active chlorine in concentrations such as are used to disinfect swimming-pool water (break-point chlorination).

Three alternative test conditions are specified. The active chlorine concentrations of 50 mg/l and 100 mg/l are intended for swimwear. The active chlorine concentration of 20 mg/l is intended for accessories such as beach robes and towels.

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.*

3 Principle

A specimen of the textile is treated with a weak chlorine solution of a given concentration and dried. The change in colour of the specimen is assessed by comparison with the grey scale. Three alternative test conditions are specified.

4 Apparatus and reagents

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

NOTE 1 Other mechanical devices may be used for the test provided that equivalent results are obtained.

4.2 Sodium hypochlorite (NaOCl), aqueous solution having the following composition:

— active chlorine: 40 g/l to 160 g/l;

— sodium chloride (NaCl): 120 g/l to 170 g/l;

— sodium hydroxide (NaOH): 20 g/l maximum;

— sodium carbonate (Na_2CO_3): 20 g/l maximum;

— iron (Fe): 0,01 g/l maximum.

All sodium hypochlorite solutions should be prepared just prior to use.

4.3 Sodium hypochlorite (NaOCl), aqueous solution containing 100 mg of active chlorine per litre, at pH = 7,50 ± 0,05.

All sodium hypochlorite solutions should be prepared just prior to use. Prepare solutions as follows, using grade 3 water:

Solution 1: Dilute 20,0 ml sodium hypochlorite solution (4.2) to 1 litre.

Solution 2: 14,35 g KH_2PO_4 (4.6) per litre.

Solution 3: 20,05 g $Na_2HPO_4.2H_2O$ (4.7) per litre, or 40,35 g $Na_2HPO_4.12H_2O$ (4.7) per litre.

To 25,0 ml of solution 1 add excess potassium iodide (KI) and hydrochloric acid (HCl), and titrate the liberated iodine with a sodium thiosulfate solution, $c(Na_2S_2O_3)$ = 0,1 mol/l, using starch as indicator.

Let the volume of sodium thiosulfate solution required be V ml.

For each litre of working solution at pH 7,50 ± 0,05, use:

$\frac{705,0}{V}$ ml solution 1

100,0 ml solution 2

500,0 ml solution 3

Dilute to 1 litre.

Before use, check the pH of the solution using the calibrated pH-meter (4.8).

If necessary, adjust the pH using either sodium hydroxide, $c(NaOH)$ = 0,1 mol/l, or acetic acid, $c(CH_3COOH)$ =0,1 mol/l.

4.4 Sodium hypochlorite, (NaOCl) aqueous solution containing 50 mg of active chlorine per litre, at pH = 7,50 ± 0,05.

Follow the same procedure as in 4.3, except that for each litre of working solution at pH 7,50 ± 0,05 use $\frac{705,0}{2V}$ ml of solution 1.

4.5 Sodium hypochlorite (NaOCl) aqueous solution containing 20 mg of active chlorine per litre, at pH = 7,50 ± 0,05.

Follow the same procedure as in 4.3, except that for each litre of working solution at pH 7,50 ± 0,05 use $\frac{705,0}{5V}$ ml of solution 1.

4.6 Potassium dihydrogenphosphate (KH_2PO_4).

4.7 Disodium hydrogenphosphate dihydrate ($Na_2HPO_4.2H_2O$), or **disodium hydrogenphosphate dodecahydrate** ($Na_2HPO_4.12H_2O$).

4.8 pH-meter, having an accuracy of 0,02 units.

4.9 Grade 3 water, (see ISO 105-A01:1994, subclause 8.1).

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

5 Test specimen

5.1 If the textile to be tested is fabric, use a specimen 40 mm × 100mm.

5.2 If the textile to be tested is yarn, knit it into fabric and use a specimen 40 mm × 100 mm, or make a wick of parallel lengths, 100 mm long and about 5 mm in diameter, tied near both ends.

5.3 If the textile to be tested is loose fibre, comb and compress enough of it to form a sheet 40 mm × 100 mm. Determine the mass of the fibre and sew it on to a piece of polyester or polypropylene cloth to support the fibre. The liquor ratio (see 6.1) shall be based on the mass of fibre only.

6 Procedure

6.1 Each specimen shall be tested in a separate container in the mechanical device (4.1). Immerse the specimen in the sodium hypochlorite solution (4.3, 4.4 or 4.5), liquor ratio 100:1, ensuring that the specimen is thorougly wetted. Close the container and agitate at 27 °C ± 2 °C for 1 h in darkness.

6.2 Remove the specimen from the container, squeeze or hydroextract it, and dry it by hanging it in air at room temperature in subdued light.

6.3 Assess the change in colour of the specimen by comparison with the grey scale.

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-E03:1994;

b) all details necessary for the identification of the sample tested;

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

d) the concentration of active chlorine used (see 4.3, 4.4 and 4.5).

This page intentionally left blank