INTERNATIONAL STANDARD

ISO 105-E03

Second edition
1987-12-15

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION
ORGANISATION INTERNATIONALE DE NORMALISATION
МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Textiles — Tests for colour fastness —

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

Textiles — Essais de solidité des teintures —

Partie E03: Solidité des teintures à l'eau chlorée (eau de piscine)

Reference number
ISO 105-E03 : 1987 (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.

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-E03 was prepared by Technical Committee ISO/TC 38, *Textiles*.

This second edition cancels and replaces the first edition (included in ISO 105-E : 1978), clauses 1, 4, 6, 7 and 8 of which have been technically revised.

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.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Printed in Switzerland

Textiles — Tests for colour fastness —

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

1 Scope and field of application

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-bath 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 References

ISO 105, *Textiles — Tests for colour fastness —*

Part A01: General principles of testing.

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 with the grey scale. Three alternative test conditions are specified.

4 Apparatus and reagents

4.1 Suitable mechanical device (see 8.4), consisting of a water bath containing a rotatable shaft which supports, radially, glass or stainless steel containers (75 ± 5 mm in diameter × 125 ± 10 mm high) of approximately 550 ± 50 ml capacity, the bottom of the containers being 45 ± 10 mm from the centre of the shaft. The shaft/container assembly is rotated at a frequency of 40 ± 2 min^{-1}. The temperature of the water bath is thermostatically controlled to maintain the test solution at the prescribed temperature ± 2 °C.

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

- active chlorine: 40 to 160 g/l
- sodium chloride (NaCl): 120 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

4.3 Sodium hypochlorite (NaOCl), solution containing 100 mg of active chlorine per litre, at pH = 7,50 ± 0,05 (see 8.1).

4.4 Sodium hypochlorite (NaOCl), solution containing 50 mg of active chlorine per litre, at pH = 7,50 ± 0,05 (see 8.2).

4.5 Sodium hypochlorite (NaOCl), solution containing 20 mg of active chlorine per litre, at pH = 7,50 ± 0,05 (see 8.3).

4.6 Potassium dihydrogen phosphate (KH_2PO_4).

4.7 Disodium hydrogen phosphate dihydrate ($Na_2HPO_4 \cdot 2H_2O$), or **disodium hydrogen phosphate dodecahydrate** ($Na_2HPO_4 \cdot 12H_2O$).

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

4.9 Distilled water or **deionized water.**

4.10 Grey scale for assessing change in colour (see clause 2).

5 Test specimen

5.1 If the textile to be tested is fabric, use a specimen 10 cm × 4 cm.

5.2 If the textile to be tested is yarn, knit it into fabric and use a specimen 10 cm × 4 cm, or make a wick of parallel lengths, 10 cm long and about 0,5 cm 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 10 cm × 4 cm. 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 thoroughly wetted. Close the container and agitate at 27 ± 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 with the grey scale.

7 Test report

Report the numerical rating for change in colour and the concentration of active chlorine used (see 4.3, 4.4 and 4.5).

8 Notes

8.1 Preparation of a sodium hypochlorite solution containing 100 mg of active chlorine per litre

All sodium hypochlorite solutions should be prepared just prior to use. Prepare solutions as follows, using distilled or deionized water:

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

Solution 2: 14,35 g KH_2PO_4 per litre.

Solution 3: 20,05 g $Na_2HPO_4 \cdot 2H_2O$ per litre, or 40,35 g $Na_2HPO_4 \cdot 12H_2O$ 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 thiosulphate solution, $c(Na_2S_2O_3) = 0{,}1$ mol/l, using starch as indicator.

Let the volume of sodium thiosulphate 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.

8.2 Preparation of a sodium hypochlorite solution containing 50 mg of active chlorine per litre

Follow the same procedure as in 8.1, except that for each litre of working solution at pH 7,50 ± 0,05 use $\frac{705{,}0}{2V}$ ml of solution 1.

8.3 Preparation of a sodium hypochlorite solution containing 20 mg of active chlorine per litre

Follow the same procedure as in 8.1, except that for each litre of working solution at pH 7,50 ± 0,05 use $\frac{705{,}0}{5V}$ ml of solution 1.

8.4 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.

UDC 677.016.47

Descriptors : textiles, dyes, tests, chemical tests, water tests, chlorination, determination, colour fastness.

Price based on 2 pages