

INTERNATIONAL STANDARD



105 / VII

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

Tests for colour fastness of textiles — Seventh series

Essais de solidité des teintures des textiles — Septième série

First edition — 1975-02-15

UDC 677.016.474 : 620.1

Ref. No. ISO 105/VII-1975 (E)

Descriptors : textiles, dyeing, printing, colourfastness, tests, chemical tests.

FOREWORD

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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.

International Standard ISO 105/VII was drawn up by Technical Committee ISO/TC 38, *Textiles*, and circulated to the Member Bodies in April 1973.

It has been approved by the Member Bodies of the following countries :

Australia	India	South Africa, Rep. of
Belgium	Iran	Spain
Brazil	Ireland	Sweden
Bulgaria	Israel	Switzerland
Canada	Italy	Thailand
Czechoslovakia *	Japan	Turkey
Egypt, Arab Rep. of	Netherlands	United Kingdom
Finland	New Zealand	U.S.A.
France *	Norway	U.S.S.R.
Germany *	Portugal	
Hungary	Romania	

* approved only part 2 of the document.

The Member Bodies of the following countries expressed disapproval of part 1 of the document on technical grounds :

Czechoslovakia
France
Germany

Tests for colour fastness of textiles — Seventh series

PART 1

COLOUR FASTNESS TO BURNT GAS FUMES

1 SCOPE AND FIELD OF APPLICATION

1.1 This method is intended for assessing the resistance of the colour of textiles of all kinds and in all forms except loose fibres, when exposed to atmospheric oxides of nitrogen as derived from the combustion of butane (C.P.) gas.

1.2 This method may be used for rating colour fastness of dyes by applying the dye to textiles by a specified procedure and at a specified depth of colour and testing the dyed textiles.

2 PRINCIPLE

A specimen of the textile and the test control fabric are exposed simultaneously to oxides of nitrogen from burnt gas fumes until the control shows a change in colour corresponding to that of the standard of fading. The change in colour of the specimen is assessed with the standard grey scale for assessing change in colour. If no colour change is observed in the specimen after one exposure period or cycle, exposure may be continued for either a specified number of periods or for the number of periods required to produce a specified amount of colour change in the specimen.

3 APPARATUS AND MATERIALS

3.1 Exposure chamber (see 8.1).

3.2 Test control (see 8.2).

3.3 Standard of fading (see 8.2).

3.4 Grey scale for assessing change in colour.¹⁾

3.5 Butane (C.P.) gas (see 8.3).

3.6 Urea solution (see 8.4).

3.7 If required, perchloroethylene, Stoddard Solvent, or trichloroethylene (see 4.4 and 8.5).

3.8 If required, standard detergent (see 4.5 and 8.6).

4 SPECIMEN

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

4.2 If the textile to be tested is yarn, knit it into fabric and use a specimen 100 mm × 40 mm.

4.3 For fastness to oxides of nitrogen in storage or use, use a specimen of the original fabric.

4.4 For fastness to oxides of nitrogen after dry cleaning (see 8.5) immerse one specimen in cold Stoddard Solvent for 10 min, squeeze, and allow to dry in the air. Immerse one specimen in cold perchloroethylene for 10 min, squeeze and allow to dry in the air. If desired trichloroethylene may be substituted for perchloroethylene. Retain a specimen after dry cleaning and before testing to compare with the tested specimen.

4.5 For fastness to oxides of nitrogen after washing (see 8.5), unless a specific wash-test is specified, wash the test specimen in a detergent solution (see 8.6) (containing 5 g of AATCC standard detergent WOB per litre of water of approximately zero hardness) for 10 min at 40 °C, rinse in warm water and allow to dry in the air. Retain a specimen after washing and before testing to compare with the tested specimen.

1) See ISO/R 105/I, Parts 1 and 2.

5 PROCEDURE

5.1 Freely suspend the test specimen and a piece of the test control in the test chamber so that they are not in contact with each other and do not come into direct contact with any hot metallic surface. Light the gas burner (see 8.3) and adjust the flame and ventilating equipment so that the temperature in the chamber does not exceed 60 °C (see 8.7 and 8.8). Keep the specimens in the chamber until the test control shows a change in colour corresponding with that of the standard of fading, when compared in daylight or equivalent artificial illumination (see ISO/R 105/I, Part 1, sub-clause 12.1).

5.2 Remove the test specimens from the test chamber and immediately make a preliminary assessment of change in colour by the use of the grey scale for change in colour.

5.3 Those specimens showing a colour change, a piece of each of their original specimens, and the test control shall, without delay, be plunged into the buffered urea solution (see 8.4) for 5 min. They shall be squeezed out, thoroughly rinsed in water, and dried in air at a temperature not above 60 °C. When dry, assess the change of colour of the specimen against the portion of the original textile which has been treated with buffered urea solution, with the grey scale. If retained, store in the dark.

5.4 After the first cycle, return to the test chamber any specimens which do not show a colour change and which are not treated with the buffered urea solution, along with a fresh piece of the test control, and continue the test until the second test control shows a change in colour corresponding to that of the standard of fading.

5.5 Cycles may be repeated for either a specified number of cycles or until the specimens show a specified amount of colour change.

6 EVALUATION AND CLASSIFICATION

6.1 Repeat the procedure as often as necessary or desired to disclose the number of exposure periods (cycles) required to produce an appreciable alteration of shade. After each exposure period, remove the specimens from the chamber and immediately compare them with the respective originals.

6.2 The effect on the colour of the test specimens after any desired number of cycles can be expressed and defined by reference to the grey scale for colour change.

7 TEST REPORT

Report the class number for each specimen and the number of cycles to which it was exposed. Report the average temperature employed and, if humidity was increased, report the method employed.

8 NOTES

8.1 Exposure chamber

8.1.1 The exposure chamber may be of variable construction but must provide an enclosure in which test specimens can be exposed in an atmosphere of air which has passed over the burner and contains the by-products of combustion from a lighted gas burner. The apparatus shall be equipped with a suitable means of supporting the test specimens so that there is a free circulation of the atmosphere around the specimens and so that only a minimum amount of the specimen at the point of its suspension is in direct contact with any hot metallic surface. Either a motor-driven fan to move the air around in the test chamber or a motor-driven rotating specimen rack shall be employed in order to ensure as nearly as possible that all specimens are exposed to the same conditions of gas concentration, temperature and humidity.

Adjustable vents or dampers in the top of the unit together with the height of the flame of the gas burner shall be used to regulate the temperature of the exposure chamber, but temperature and humidity will vary with that of the room in which the exposure chamber is being operated.

8.1.2 Several forms of suitable apparatus are illustrated in the *American Dyestuff Reporter*, July 22, 1940, pages 368-9. Blueprints of a suitable apparatus may be purchased from AATCC, P.O. Box 12215, Research Triangle Park, N.C. 27709, U.S.A.

8.1.3 The US Testing Co., 1415 Park Ave., Hoboken, N.J., U.S.A., in co-operation with AATCC, has developed a gas-fading apparatus which is suitable for large-scale testing and is available for purchase. The unit collects the fumes from a safety-type Electrolux burner which is located in a lower chamber as shown in the figure. In order to ensure uniform fading of the test specimens, the arms on which they are hung are revolved at the rate of 2 rev/min by a motor drive, thus ensuring that all specimens are exposed under identical controlled conditions. Since the test apparatus has been primarily designed for more accurate control work, it is recommended that the temperature be adjusted so as to complete one test in 7 to 16 h.

8.2 Test control and standard of fading

8.2.1 The test control fabric is secondary cellulose acetate uniformly dyed in an open width dyeing machine with 0,4 % (on mass of fabric) Celliton Blue FFRN (Colour Index Disperse Blue 3) in a dye-bath containing 1 g/l of a neutral non-ionic dispersing agent at a liquor ratio of 10 : 1.

The dyeing begins at 40 °C and the temperature is raised to 80 °C within 30 min. The dyeing is continued for a further 60 min. The fabric is rinsed in cold water and dried.

The colour co-ordinates of this dyeing are $x = 0,1988$, $y = 0,1904$, $Y = 23,20$.

The tolerance may be 2 AN (40) units maximum.