INTERNATIONAL STANDARD

ISO 105-C08

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Textiles — Tests for colour fastness —

Part C08: Colour fastness to domestic and commercial laundering using a non-phosphate reference detergent incorporating a low-temperature bleach activator

Textiles — Essais de solidité des coloris —

Partie C08: Solidité des coloris aux lavages domestiques et industriels, utilisant un détergent de référence sans phosphate comprenant un activateur de blanchiment à basse température

Reference number
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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 105-C08 was prepared by Technical Committee ISO/TC 38, *Textiles*, Subcommittee SC 1, *Tests for coloured textiles and colorants*.

This second edition cancels and replaces the first edition (ISO 105-C08:2001), which has been technically revised. The dates of the references in Clause 2 have been removed, tolerances have been added in Clause 6 and instrumental measurement has been added to applicable clauses. It also incorporates ISO 105-C08:2001/Amd.1:2006 and a modified version of ISO 105-C08:2001/Cor.1:2002.

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.

Introduction

The test methods specified in ISO 105-C06 and that specified in this part of ISO 105 are intended to reflect the effect of laundering by domestic or commercial laundering procedures, as distinct from the washing test methods given in ISO 105-C10.

The general principles of testing described in ISO 105-A01 must be understood before using this part of ISO 105.

Textiles — Tests for colour fastness —

Part C08:
Colour fastness to domestic and commercial laundering using a non-phosphate reference detergent incorporating a low-temperature bleach activator

1 Scope

This part of ISO 105 specifies methods for determining the resistance of the colour of textiles of all kinds and in all forms to domestic or commercial laundering procedures used for normal household articles using a non-phosphate reference detergent incorporating a low-temperature bleach activator.

The colour loss and staining resulting from desorption and/or abrasive action in one single test closely approximates to one domestic or commercial laundering.

This method does not reflect the effect of optical brighteners present in some commercial washing products.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 105-A01:2010, *Textiles — Tests for colour fastness — Part A01: General principles of testing*

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

ISO 105-A03, *Textiles — Tests for colour fastness — Part A03: Grey scale for assessing staining*

ISO 105-A04, *Textiles — Tests for colour fastness — Part A04: Method for the instrumental assessment of the degree of staining of adjacent fabrics*

ISO 105-A05, *Textiles — Test for colour fastness — Part A05: Instrumental assessment of change in colour for determination of grey scale rating*

ISO 105-F01, *Textiles — Tests for colour fastness — Part F01: Specification for wool adjacent fabric*

ISO 105-F02, *Textiles — Tests for colour fastness — Part F02: Specification for cotton and viscose adjacent fabrics*

ISO 105-F03, *Textiles — Tests for colour fastness — Part F03: Specification for polyamide adjacent fabric*

ISO 105-F04, *Textiles — Tests for colour fastness — Part F04: Specification for polyester adjacent fabric*

ISO 105-F05, *Textiles — Tests for colour fastness — Part F05: Specification for acrylic adjacent fabric*

ISO 105-F06, *Textiles — Tests for colour fastness — Part F06: Specification for silk adjacent fabric*

ISO 105-F07, *Textiles — Tests for colour fastness — Part F07: Specification for secondary acetate adjacent fabric*

ISO 105-F10, *Textiles — Tests for colour fastness — Part F10: Specification for adjacent fabric: Multifibre*

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

3 Principle

A specimen of the textile in contact with specified adjacent fabric or fabrics is laundered, rinsed and dried. Specimens are laundered under appropriate conditions of temperature, alkalinity, bleaching and abrasive action such that the result is obtained in a conveniently short time. The abrasive action is accomplished by the use of an appropriate number of steel balls. The change in colour of the specimen and the staining of the adjacent fabric or fabrics are assessed with reference to the original fabric, either with the grey scales or instrumentally.

4 Reagents and materials

4.1 Reference detergent.

4.1.1 ECE[1] non-phosphate reference detergent base powder (1998 formulation).

4.1.2 Bleach activator, tetra-acetylethylene diamine (TAED).

4.1.3 Sodium perborate tetrahydrate.

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

4.3 Adjacent fabrics (see ISO 105-A01).

NOTE Supplies of spun acetate might be limited due to decreased manufacturing.

Either

4.3.1 A multifibre adjacent fabric, complying with ISO 105-F10, according to the temperature used:

— a multifibre adjacent fabric (DW) containing wool and acetate (for tests at 40 °C and 50 °C and in certain cases, to be indicated in the test report, at 60 °C);

— a multifibre adjacent fabric (TV) not containing wool and acetate (in certain tests at 60 °C, and in all tests at 95 °C).

In the use of multifibre with wool, it should be taken into consideration that the combination of a temperature of 60 °C and sodium perborate might be harmful to the wool.

Or

4.3.2 Two single-fibre adjacent fabrics, complying with the relevant standards ISO 105-F01 to ISO 105-F07. 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 shall be made of the fibre indicated in Table 1 or, in the case of blends, of the kind of fibre second in order of predominance, or as otherwise specified.

1) European Colourfastness Establishment (ECE), Gartenstrasse 5, D-14169 Berlin, Germany.

Table 1 — Pairs of adjacent fabrics

First piece	Second piece	
	For tests at 40 °C and 50 °C	For tests at 60 °C and 95 °C
cotton	wool	viscose
wool	cotton	—
silk	cotton	—
viscose	wool	cotton
acetate	viscose	viscose
polyamide	wool or cotton	cotton
polyester	wool or cotton	cotton
acrylic	wool or cotton	cotton

4.3.3 **Non-dyeable fabric**, e.g. polypropylene, if required.

4.4 **Grade 3 water**, complying with ISO 3696.

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

4.6 **Grey scale for assessing staining**, complying with ISO 105-A03.

4.7 **Spectrophotometer** or **colorimeter for assessing change in color and staining**, complying with ISO 105-A04 and ISO 105-A05.

4.8 **Acetic acid solution**, containing 0,2 g of glacial acetic acid per litre if required for souring treatment.

5 Apparatus

5.1 **Suitable mechanical laundering device**, consisting of a water bath containing a rotatable shaft which supports, radially, stainless steel containers with a diameter of (75 ± 5) mm and a height of (125 ± 10) mm, of capacity (550 ± 50) ml, 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.

NOTE Other mechanical devices can be used for this test, provided that the results are identical with those obtained with the apparatus described in 5.1.

5.2 **Balance**, accurate to 0,01 g (see ISO 105-A01).

5.3 **Mechanical stirrer**, minimum speed 16,667 s^{-1} (minimum 1 000 r/min) to ensure thorough dispersion and prevent settling.

5.4 **Flat-iron**, (if required for pressing treatment), of mass not exceeding 2,5 kg and capable of giving the temperature appropriate to the fabric under test [see A.9 b)].

6 Test specimen

6.1 If the textile to be tested is fabric, either

a) attach a specimen (100 ± 2) mm × (40 ± 2) mm to a piece of the multifibre adjacent fabric (4.3.1), also (100 ± 2) mm × (40 ± 2) mm, by sewing along one of the shorter edges, with the multifibre adjacent fabric next to the face side of the specimen, or

b) attach a specimen (100 ± 2) mm × (40 ± 2) mm between the two single-fibre adjacent fabrics (4.3.2), also (100 ± 2) mm × (40 ± 2) mm, by sewing along one of the shorter edges.

6.2 Yarn may be knitted into fabric and tested in this form. Where yarns or loose fibres are 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 (100 ± 2) mm × (40 ± 2) mm piece of the multifibre adjacent fabric (4.3.1) and a piece of the non-dyeable fabric (4.3.3), and sew them along four sides (see ISO 105-A01:2010, 10.3, Preparation of composite specimens), or

b) place it between (100 ± 2) mm × (40 ± 2) mm pieces of the two specified single-fibre adjacent fabrics (4.3.2) and sew them along all four sides.

6.3 Determine the mass, in grams, of the composite specimen using the balance (5.2) to aid accurate liquor ratio volumes.

7 Test procedure

Provision is made in Annex A for a washing procedure using a bleach activator and reference detergent.

8 Test report

The test report shall include the following information:

a) a reference to this International Standard, i.e. ISO 105-C08:2010;

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

c) the temperature of the method of test used (as listed in Table A.2);

d) the numerical grey scale rating or instrumental assessment for change in colour of the specimen;

e) if single-fibre adjacent fabrics were used, the numerical grey scale rating or instrumental assessment for staining of each kind of adjacent fabric used;

f) if a multifibre adjacent fabric was used, the type of multifibre adjacent fabric used and the numerical grey scale rating or instrumental assessment for staining of each fibre in the multifibre adjacent fabric;

g) whether steel balls have been used in the 40 °C or 50 °C tests;

h) whether the treatment in the acetic acid reagent described in A.7 was conducted;

i) whether the specimen was air dried or dried by pressing as described in A.9; in the latter case, the temperature of the pressing treatment shall be reported;

j) the reference detergent and bleach activator;

k) any deviation from the test method.

Annex A
(normative)

ECE non-phosphate reference detergent/TAED procedure

A.1 The reference detergent is supplied in three separate parts and the composition is given in Table A.1:

a) ECE non-phosphate reference detergent base powder (1998 formulation);

b) bleach activator, tetra-acetylethylenediamine (TAED);

c) sodium perborate tetrahydrate ($NaBO_3 \cdot 4H_2O$).

For details of suppliers, apply to: The Society of Dyers & Colourists, Perkin House, 82 Grattan Road, Bradford BD1 2LU, England, or Deutsche Echtheitskommission e.V., Zur Niedermühle 4, D-85435 Erding, Germany.

Table A.1 — ECE 1998 non-phosphate reference detergent (without optical brightener)

Base detergent	%
Linear sodium alkyl benzene sulphonate (mean length of alkane chain $C_{11,5}$)	9,7
Ethoxylated fatty alcohol C_{12-18} (7EO)	5,2
Sodium soap, chain length C_{12-17} 46 %:C_{18-20} 54 %	3,6
Foam inhibitor (DC-42485)	4,5
Sodium aluminium silicate (zeolite 4A)	32,5
Sodium carbonate	11,8
Sodium salt of a copolymer from acrylic and maleic acid	5,2
Sodium silicate (SiO_2:Na_2O = 3,3:1)	3,4
Carboxymethylcellulose (CMC)	1,3
Diethylene triamine penta (methylene phosphonic acid)	0,8
Sodium sulfate	9,8
Water	12,2
Tetra-acetylethylenediamine (TAED) (100 % active)[a]	As separate addition
Sodium perborate tetrahydrate	As separate addition

[a] The activity of the supplied TAED will be specified and is likely to be less than 100 %.

The required amount, in grams, of TAED per litre of wash liquor is calculated:

$$\frac{0{,}15 \times 100}{\%\ \text{activity}}$$

If it is desired to evaluate the effect of enzymes, the optional addition of the following enzymes can be made with a corresponding reduction in the base detergent powder.

— Protease: Savinase 12T, reduction of 0,5 %.

— Lipase: Lipolase 100T, reduction of 0,1 %.

— Amylase: Termamyl 60T, reduction of 0,3 %.

— Cellulase: Celluzyme 0,7T, reduction of 0,3 %.

All these enzymes are available from Novo Nordisk Bio-industrials[2)].

A.2 Prepare the wash liquor by dissolving 4 g of the ECE non-phosphate reference detergent base powder [A.1 a)] plus 0,15 g of TAED [A.1 b)] (at 100 % activity) (see Table A.1 for details of the calculation where the activity of the TAED is less than 100 %) and 1 g of sodium perborate tetrahydrate [A.1 c)] per litre of grade 3 water (4.4).

A minimum of 1 L of detergent solution should be prepared immediately prior to each laundering run.

A.3 Vigorously disperse the ECE base detergent powder, sodium perborate tetrahydrate and TAED, in the amounts specified in A.2, using a mixer with a minimum speed of 16,667 s^{-1} (1 000 r/min) in grade 3 water (4.4) at (25 ± 5) °C for (10 ± 1) min.

A.4 Add to each container the volume of wash liquor required to give a liquor:fabric composite volume of 20:1 ratio. See Table A.2.

Place the composite specimen in the container, together with the specified number of steel balls (4.2). Note the initial temperature (25 ± 5) °C, close the container and place in the laundering device and commence rotation.

Table A.2 — Test conditions

Temperature (±2 °C) °C	**Liquor:fabric** ml/g	**Time at temperature** min	**Steel balls**
40	20	30	25[a]
50	20	30	25[a]
60	20	30	25
95	20	30	25

[a] For delicate fabrics and articles of wool or silk or blends containing these fibres, steel balls are not used in the test. Record the use of steel balls in the test report. [See 8 g)].

A.5 Raise the temperature at a rate of (1,5 ± 0,5) °C per min to the temperature specified in Table A.2, and continue to run the test for a further (30 ± 1) min at the same temperature.

A.6 For all tests, remove the composite specimen at the end of the wash and place it in a 4 L beaker half filled with grade 3 water (4.4) at ambient temperature. Gently agitate, rinse for 1 min and then place the beaker under a cold running tap for 10 min.

2) This information is given for the convenience of users of this part of ISO 105 and does not constitute an endorsement by ISO of the products named. Equivalent products may be used if they can be shown to lead to the same results.