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Textiles — Domestic washing and drying procedures for textile testing

Textiles — Méthodes de lavage et de séchage domestiques en vue des essais des textiles

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 38, *Textiles*, Subcommittee SC 2, *Cleansing, finishing and water resistance tests*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 248, *Textiles and textile products*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fourth edition cancels and replaces the third edition (ISO 6330:2012), which has been technically revised.

The main changes compared to the previous edition are as follows:

— a new terminology [wash load (3.11)] has been added for clarification;

— information on available detergents have been updated;

— information on ballasts have been clarified;

— acceptable devices have been updated;

— in Annex L, the reference detergent has been corrected as SDC reference detergent Type 4 (it was incorrectly designated as IEC reference detergent A in ISO 6330:2000);

— annexes within the document have been harmonized.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document is utilized by a broad range of textile quality and performance evaluations including but not exclusive to: smoothness appearance, dimensional change, stain release, water resistance, water repellence, colour fastness to domestic laundering, and care labelling that are prescribed in other international and regional test method standards.

This document is also used to evaluate not only the attributes of fabrics themselves but also the performance of apparel, home products and other textile end-products. The selection of washing and drying machines and their associated ballast types, detergents, and other drying options are determined according to the international region in which the textile will be used by consumers.

NOTE Suitable machines, detergents and ballast are available commercially. If you need this information, please contact the ISO TC 38/SC 2 Secretariat.

Textiles — Domestic washing and drying procedures for textile testing

1 Scope

1.1 This document specifies domestic washing and drying procedures for textile testing. The procedures are applicable to textile fabrics, garments or other textile articles which are subjected to appropriate combinations of domestic washing and drying procedures. This document also specifies the reference detergents and ballasts for the procedures.

1.2 Provision is made for

a) 16 different washing procedures based on the use of the reference washing machine Type A: horizontal axis, front-loading type,

b) 12 procedures based on the use of the reference washing machine Type B: vertical axis, top-loading agitator type, and

c) 7 procedures based on the use of the reference washing machine Type C: vertical axis, top-loading pulsator type.

1.3 Each washing procedure represents a single domestic wash.

1.4 This document also specifies six drying procedures: line dry, line drip dry, flat dry, flat drip dry, flat press, and tumble dry.

1.5 A complete test consists of a washing and drying procedure.

NOTE Use of different parameters (washing machine type, detergent type and type of tumble dryer) can affect test results for any test using this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 139, *Textiles — Standard atmospheres for conditioning and testing*

ISO 6059, *Water quality — Determination of the sum of calcium and magnesium — EDTA titrimetric method*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
ambient condition
temperature and relative humidity in the test environment not differing from the typical indoor condition or the typical outdoor condition in the region where the test is performed

3.2
ballast
textile fabric to be added to the specimen(s) under test in order to fill the mass required by the washing procedure

3.3
tumbler moisture sensor
control unit in a tumble dryer capable of measuring the humidity of the load and ending the drying operation at a predetermined residual moisture level

3.4
overdrying
prolonged drying operation where the load is dried until all remaining moisture in the load has been removed

3.5
reference detergent
detergent with specified formulations to be used for testing purposes

3.6
reference washing machine
washing machine with defined engineering specifications to be used for testing purposes

3.7
washing procedure
cycle of the washing action including water supplying, washing, and repeated rinsing, *spinning* (3.8) and water supplying and ended by spinning as predetermined on the washing machine

3.8
spinning
water-extracting process in the washing machine by which water is removed from the textiles by centrifugal action as a part of the *washing procedure* (3.7)

3.9
still air
air not influenced by any natural wind or mechanical device giving it a forced flow

3.10
total air-dry load mass
mass the specimen under test and the ballast in a conditioned state following ISO 139

3.11
wash load
material to be processed, comprised of the ballast and specimen mixed together

4 Principle

A specimen is washed in an automatic washing machine and dried according to specified procedures.

5 Apparatus and materials

5.1 Automatic washing machines

5.1.1 Reference washing machine Type A — Horizontal axis, front-loading type

The specification for reference washing machine Type A shall be in accordance with Annex A.

5.1.2 Reference washing machine Type B — Vertical axis, top-loading agitator type

The specification for reference washing machine Type B shall be in accordance with Annex C.

5.1.3 Reference washing machine Type C — Vertical Axis, top-loading pulsator type

The specification for reference washing machine Type C shall be in accordance with Annex D.

5.2 Tumble dryers

5.2.1 Type A1 tumble dryer — Vented

The specification for Type A1 tumble dryer shall be in accordance with Annex F.

5.2.2 Type A2 tumble dryer — Condenser

The specification for Type A2 tumble dryer shall be in accordance with Annex F.

5.2.3 Type A3 tumble dryer — Large vented

The specification for Type A3 tumble dryer shall be in accordance with Annex F.

5.3 Electrically (dry) heated flat-bed press

If this method of drying is used, the type of press shall be specified among the interested parties.

5.4 Line drying

For procedure for line drying, see 10.2.1; for line drip drying, see 10.2.2.

5.5 Drying racks

Use screen drying racks of approximately 16 mesh stainless steel or plastic for flat drying (see 10.2.3) or flat drip drying (see 10.2.4).

5.6 Ballasts

5.6.1 Type I, 100 % cotton ballast

The nominal composition of 100 % Cotton ballast shall be in accordance with Annex G.

5.6.2 Type II, 50 % cotton/50 % polyester ballast

The nominal composition of 50 % cotton/50 % polyester ballast shall be in accordance with Annex G.

5.6.3 Type III, 100 % polyester ballast

The nominal composition of 100 % polyester ballast shall be in accordance with Annex G.

5.6.4 Other ballast

Ballast associated with another product performance specification may be used if agreed upon between interested parties. If used, include alternate ballasts in the test report.

6 Reagents

6.1 Reference detergents

NOTE Annex H uses the term "brightener", Annexes I and L use the term "optical whitener", and Annex K uses the term "optical brightener", both of which represent "optical brightener".

6.1.1 Reference detergent 1

Reference detergent 1 is a non-phosphate powder detergent without enzymes and is available both with and without optical brightener. [Other designations are 1993 AATCC standard reference detergent without optical brightener (WOB) and 1993 AATCC standard reference detergent with optical brightener.]

Reference detergent 1 may only be used in machine Type B.

The nominal composition of reference detergent 1 shall be in accordance with Annex H.

6.1.2 Reference detergent 2

Reference detergent 2 is a non-phosphate powder detergent with optical brightener and with enzymes. (Another designation is IEC reference detergent A*.)

Reference detergent 2 may be used in both machine Type A and Type B.

The nominal composition of reference detergent 2 shall be in accordance with Annex I.

Distribution and mixing shall be in accordance with Annex N.

6.1.3 Reference detergent 3

Reference detergent 3 is a non-phosphate powder detergent without optical brightener and without enzymes. (Another designation is ECE reference detergent 98.)

Reference detergent 3 may be used in both machine Type A and Type B.

The nominal composition of reference detergent 3 shall be in accordance with Annex J.

Distribution and mixing shall be in accordance with Annex N.

6.1.4 Reference detergent 4

Reference detergent 4 is a non-phosphate powder detergent with optical brightener and with enzymes. [Another designation is JIS K 3371 (Category 1).] Reference detergent 4 can only be used in washing machine Type C.

The nominal composition of reference detergent 4 shall be in accordance with Annex K.

6.1.5 Reference detergent 5

Reference detergent 5 was a non-phosphate liquid detergent available from AATCC. It is no longer commercially available. In order to maintain continuity through the rest of the document and eliminate confusion in the markets, subsequent references will maintain their original names (i.e. Reference Detergent 6 will continue to be known as Reference Detergent 6).

6.1.6 Reference detergent 6

Reference detergent 6 is a non-phosphate powder detergent with optical brightener and without enzymes.

Reference detergent 6 may be used in machine Type A.

The nominal composition of reference detergent 6 shall be in accordance with Annex L.

Distribution and mixing shall be in accordance with Annex N.

6.1.7 Reference detergent 7

Reference detergent 7 is a liquid detergent for wool/silk material for mild/delicate washing process. This detergent can be suitable for materials that are typically labelled as delicate or hand wash.

The nominal composition of reference detergent 7 shall be in accordance with Annex M.

6.2 Water

6.2.1 Water hardness

Water hardness shall be a maximum of 3,0 mmol/l expressed as calcium carbonate, in accordance with ISO 6059.

Alternative water hardness can be applicable with a consent among the interested parties. In this case, water hardness shall be reported.

6.2.2 Water pressure

The laboratory water supply pressure at the inlet to the reference washing machine shall be higher than 150 kPa.

6.2.3 Cold-water inlet temperature

The water temperature at the inlet to the reference washing machines shall be no more than 25 °C.

When the measurement is carried out with a water temperature that differs from the limit, the supply temperature shall be reported.

7 Conditioning and testing atmosphere

The conditioning atmosphere used for textile specimens shall be in accordance with ISO 139.

8 Wash load

8.1 Total wash load

The total air-dry load mass (i.e. specimen plus appropriate ballast, see 5.6 and 8.3) shall be (2,0 ± 0,2) kg for all types of reference washing machines.

In the case of testing a whole garment, report the total load mass if it is more than 2,2 kg.

8.2 Number of specimens

The number of specimens to be subjected to the washing and drying procedures specified in this document shall be determined by the purpose for which the material is being tested.

8.3 Selection of ballast

For specimens with 51 % or more of cellulosic fibres, the cotton ballast, Type I shall be used (see 5.6.1), unless otherwise agreed upon by interested parties. For specimens with 51 % or more of synthetic fibres, the polyester ballast, Type III shall be used (see 5.6.3), unless otherwise agreed upon by interested parties. For specimens that are made of other fibres or blends, either the polyester/cotton ballast, Type II or the polyester ballast, Type III may be used (see 5.6.2 and 5.6.3), unless otherwise agreed upon by interested parties. In all cases the ballast type shall be reported.

A ballast associated with another product performance specification that references procedures in this document shall be used so long as it is agreed upon between interested parties and is reported.

8.4 Ratio of load to ballast

If dimensional stability is being determined, not more than half of the wash load shall consist of specimens being tested.

In the case of testing a whole garment, report the ratio of load to ballast if it is more than 1/1.

9 Washing procedure

9.1 Select the washing procedure to be used from those stated in Annex B for a type A reference washing machine, from Annex C for a type B reference washing machine, or from Annex D for a type C reference washing machine.

9.2 Weigh the (individual) specimens, made-up articles, or garments before washing. If required add ballast to meet the required load mass (see 8.1). The specimen and the ballast shall be evenly mixed before it is loaded into the reference machine.

9.3 Place the material to be washed in the washing machine (see 5.1.1 to 5.1.3).

a) In reference washing machines Type A, add (20 ± 1) g of the reference detergent 2, 3 or 6 directly into the dispenser. For delicate items or wool, use (47 ± 1) g of reference detergent 7 in the dispenser.

b) In reference washing machines Type B fill the machine with water at the selected temperature, then add (66 ± 1) g of reference detergent 1 or if reference detergent 2 or 3 is used, add the appropriate amount to provide good running suds having a height of not more than (3,0 ± 0,5) cm at the end of the washing cycle.

c) In reference machines Type C, fill the machine with water at the selected temperature, then add 1,33 g/l of reference detergent 4 directly into the dispenser.

d) See Table 1 for a summary of the reference detergent dosage.

Table 1 — Dosage of the reference detergents

Reference detergents	Reference washing machines		
	Type A	Type B	Type C
1	—	(66 ± 1) g	—
2	(20 ± 1) g	Appropriate	—
3	(20 ± 1) g	Appropriate	—
4	—	—	1,33 g/l
5	—		—
6	(20 ± 1) g	—	—
7	(47 ± 1) g		

9.4 After the washing procedure has been completed, remove the specimen(s) carefully, ensuring that they are neither stretched nor distorted, and dry according to one of the drying procedures described in Clause 10.

10 Drying procedure

10.1 General

At the end of the selected washing procedure, immediately remove the material and follow the selected drying procedures A to F.

10.2 Open-air dry

10.2.1 General

For drip drying, the washing procedure shall be finished without the final spinning, and material samples shall be removed.

10.2.2 Procedure A — Line dry

Remove the specimen from the washing machine and hang each hydro-extracted specimen unfolded to avoid distortion. Suspend the specimen being tested from a line, in still air under ambient conditions.

The warp or wale direction of the material specimen shall be vertical. Made-up articles shall be suspended in the direction of use.

For subsequent testing, the drying may be carried out in a conditioned atmosphere according to ISO 139.

10.2.3 Procedure B — Line drip dry

Follow the procedure in 10.2.2 using the programs 3HD or 4HD in order to perform drip dry (e.g. without extracting the water).

For subsequent testing, the drying may be carried out in a conditioned atmosphere according to ISO 139.

10.2.4 Procedure C — Flat dry

Remove the specimen from the machine and spread out each hydro-extracted specimen on a horizontal screen drying rack (see 5.5) or perforated surface; remove the wrinkles by hand without stretching or distorting. Allow the specimen to dry in still air in ambient conditions.