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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

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 6330 was prepared by Technical Committee ISO/TC 38, *Textiles*, Subcommittee SC 2, *Cleansing, finishing and water resistance tests*.

This third edition cancels and replaces the second edition (ISO 6330:2000), which has been technically revised. It also incorporates ISO 6330:2000/Amd.1:2008.

Introduction

This International Standard 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 International Standard 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 to be made 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 International Standard 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 International Standard also specifies the reference detergents and ballasts for the procedures.

1.2 Provision is made for

a) 13 different washing procedures based on the use of the reference washing machine Type A: horizontal axis, front-loading type,

b) 11 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 International Standard also specifies six drying procedures:

A — Line dry

B — Drip line dry

C — Flat dry

D — Drip flat dry

E — Flat press

F — 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 drier) may affect test results for any test using this International Standard. Therefore, parties using this standard are strongly encouraged to agree on the parameters to be used.

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

ISO 139, *Textiles — Standard atmospheres for conditioning and testing*

3 Terms and definitions

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

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

3.2
ballast
textile load (cotton, cotton/polyester or polyester) to be added to the specimen under test in order to achieve the specified weight in the reference washing machines

3.3
controlled humidity device
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 and water supplying and ended by spinning as predetermined on the washing machine

3.8
spinning process
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

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

3.10
total air-dry mass
total weight of the specimen under test and the ballast in a conditioned state according to ISO 139

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 is given in Annex A.

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

The specification for reference washing machine Type B is given in Annex C.

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

The specification for reference washing machine Type C is given in Annex E.

5.2 Tumble dryers

5.2.1 Type A1 tumble dryer – Vented

The specification for Type A1 tumble dryer is given in Annex G.

5.2.2 Type A2 tumble dryer – Condenser

The specification for Type A2 tumble dryer is given in Annex G.

5.2.3 Type A3 tumble dryer – Large vented

The specification for Type A3 tumble dryer is given in Annex G.

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 10.1.1; for drip line drying, see 10.1.2.

5.5 Drying racks

Use screen drying racks of approximately 16 mesh stainless steel or plastic for flat drying (see 10.1.3) or drip flat drying (see 10.1.4).

5.6 Ballasts

5.6.1 Type I, 100 % Cotton ballast

The nominal composition of 100 % Cotton ballast is given in Annex H.

5.6.2 Type II, 50 % Cotton/50 % Polyester ballast

The nominal composition of 50 % Cotton/50 % Polyester ballast is given in Annex H.

5.6.3 Type III, 100 % Polyester ballast

The nominal composition of 100 % Polyester ballast is given in Annex H.

6 Reagents

6.1 Reference detergents

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 can only be used in machine Type B.

The nominal composition of reference detergent 1 is given in Annex I.

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 can be used in both machine Type A and Type B.

The nominal composition of reference detergent 2 is given in Annex J.

For distribution and mixing, see Annex O.

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 can be used in both machine Type A and Type B.

The nominal composition of reference detergent 3 is given in Annex K.

For distribution and mixing, see Annex O.

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 is given in Annex L.

6.1.5 Reference detergent 5

Reference detergent 5 is a non-phosphate liquid detergent and is available both with and without optical brightener (WOB). (Other designations are 2003 AATCC standard reference liquid detergent with optical brightener and 2003 AATCC standard reference liquid detergent without optical brightener.)

Reference detergent 5 can only be used in washing machine Type B.

The nominal composition of reference detergent 5 is given in Annex M.

6.1.6 Reference detergent 6

Reference detergent 6 is a non-phosphate powder detergent with optical brightener and without enzymes. (Another designation is SDC Reference Detergent Type 4. This was incorrectly designated as IEC reference detergent A in ISO 6330:2000.)

Reference detergent 6 can be used in machine Type A. The nominal composition of reference detergent 6 is given in Annex N.

For distribution and mixing, see Annex O.

6.2 Water

6.2.1 Water hardness

Water hardness shall be lower than 0,7 mmol/l expressed as calcium carbonate, when determined in accordance with ISO 6059.

NOTE A water hardness of lower than 2,7 mmol/l can be applicable with a consent among the interested parties in accordance with IEC 60456.

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 (20 ± 5) °C

In tropical countries, the water temperature (20 ± 5) °C should be regarded as a minimum temperature. When the measurement is carried out with a water temperature that differs from these limits, the supply temperature should be stated in the test report.

7 Conditioning and testing atmosphere

The atmospheres used for conditioning 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., test specimen plus appropriate ballast, see 5.6 and 10.2) shall be (2,0 ± 0,1) kg for all types of reference washing machines.

NOTE In the case of testing a whole garment, report the total load if it is more than 2,1 kg.

8.2 Number of specimens

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

8.3 Selection of ballast

For cellulosic products, the Cotton ballast, Type I shall be used (see 5.6.1). For synthetic products and products that are made of blends, either the Polyester/Cotton ballast, Type II or the Polyester ballast, Type III shall be used (see 5.6.2 and 5.6.3).

8.4 Ratio of load to ballast

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

NOTE 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 given in Annex B for a type A reference washing machine, from Annex D for a type B reference washing machine, or from Annex F for a type C reference washing machine.

9.2 Weigh the (individual) specimens or made-up articles or garments before washing if measurement of weight loss is required or if they are to be tumble dried.

9.3 Place the material to be washed in the washing machine (see 5.1.1 to 5.1.3) and add sufficient ballast (see 5.6) to make a total air-dry material load of the mass shown in 8.1 using the washing procedure selected. The specimen and the ballast shall be evenly mixed before it is loaded into the reference machine.

a) In Reference washing machines Type A, add (20 ± 1) g of the reference detergent 2, 3 or 6 directly into 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 add (100 ± 1) g of reference detergent 5, 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 ± 0,5) 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	—	(100 ± 1) g	—
6	(20 ± 1) g	—	—

9.4 After the washing procedure has been completed, remove the test 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 Open-air dry

At the end of the selected washing procedure, immediately remove the material and follow the selected drying procedures A to F. In the case of drip drying, the washing procedure shall be finished without spinning; this means taking out the material before final spinning.

10.1.1 Procedure A — Line dry

Remove the specimen from the washing machine and hang each hydro-extracted specimen unfolded with the fabric length in the vertical direction to avoid distortion. Suspend the test specimen 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.

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

10.1.2 Procedure B — Drip line dry

Follow the procedure in 10.1.1 without extracting the water.

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

10.1.3 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.

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

10.1.4 Procedure D — Drip flat dry

Follow the procedure in 10.1.3 without extracting the water.

10.1.5 Procedure E — Flat press

Remove the specimen from the washing machine and place the specimen on the flat bed of the press (see 5.3). Smooth out heavy wrinkles by hand and lower the head of the press, which shall be set at a temperature suitable for the specimen to be pressed, for one or more short periods as required to dry the specimen. Record the temperature and pressure used.

10.2 Tumble dry

10.2.1 Procedure F — Tumble dry

At the end of the selected washing procedure, immediately remove the load and place the specimens and the ballast in the tumble dryer (see 5.2). Tumble dry the load as specified in either 10.2.2, 10.2.3 or 10.2.4.

10.2.2 Timer setting for tumble dryer

To determine the optimum heat setting, tumble dry the load at the normal (high) heat setting for the calculated test cycle time as determined by the method described in Annex P. At the end of the calculated test cycle time, the final moisture shall be equivalent to the moisture content of the conditioned textile relative humidity.

If measuring the fabric temperature during tumble drying is required, plastic ribbons (thermolabels) that indicate the temperature shall be affixed to the fabric. These thermolabels shall be capable of measuring in the temperature range (40 to 90) °C.

For the machines specified in 5.2, ensure that the temperature of the exhaust from the drum is set at a minimum temperature of 40 °C and not exceeding 80 °C for normal fabrics and 60 °C for delicate fabrics. Operate the dryer until the load is dry, and continue tumbling for 5 min with the heat turned off. Remove the fabrics immediately.

10.2.3 Overdrying

Overdrying is characterized by drying to a final moisture level below the conditioned state.

In relation to the textile composition, the following values of the final moisture shall be applied:

— −2 % for textile made of synthetic materials compared with the conditioned-textile relative humidity;

— −5 % for textile made of cellulosic materials compared with the conditioned-textile relative humidity.