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Textiles — Professional care, drycleaning and wetcleaning of fabrics and garments —

Part 5: Procedure for testing performance when cleaning and finishing using dibutoxymethane

Textiles — Entretien professionnel, nettoyage à sec et nettoyage à l'eau des étoffes et des vêtements —

Partie 5: Mode opératoire pour évaluer la résistance au nettoyage et à la finition lors du traitement au dibutoxyméthane

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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).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on 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 the following URL: 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*.

A list of all parts in the ISO 3175 series can be found on the ISO website.

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

Drycleaning is a process for cleaning textiles in an organic solvent that dissolves oils and fats and disperses particulate dirt substantially without the swelling and creasing associated with washing or wet cleaning. Small quantities of water can be incorporated in the solvent with the aid of a surfactant for the purpose of obtaining better soil and stain removal. Some moisture-sensitive articles are preferably drycleaned without the addition of water to the solvent. A surfactant is often used to assist with soil removal and reduce the risk of greying, but it should be borne in mind that surfactants contain varying amounts of water in their formulations.

Drycleaning is normally followed by an appropriate restorative finishing procedure. In most cases, this comprises some form of steam treatment and/or hot pressing.

Properties of the textile or garment may change progressively on drycleaning and steaming and/or pressing and in some cases a single treatment can give little indication of the extent of dimensional and other changes that can arise after repeated treatments and which can affect the useful life of the article. Generally, most of the potential changes become apparent after three to five of the drycleaning and finishing treatments specified in this document. This progressive change should be borne in mind when the parties determine the number of repeat cycles to be given.

The properties which should be considered in an assessment for drycleanability together with the methods for their assessment are given in ISO 3175-1.

The use of diether compounds for chemically cleaning textile, leather or fur goods is patented.

Textiles — Professional care, drycleaning and wetcleaning of fabrics and garments —

Part 5: Procedure for testing performance when cleaning and finishing using dibutoxymethane

SAFETY PRECAUTIONS — When using drycleaning equipment, safety precautions should be observed.

1 Scope

This document specifies drycleaning procedures for dibutoxymethane [1-(butoxymethoxy) butane], using commercial drycleaning machines, for fabrics and garments. It comprises procedures for normal and sensitive materials.

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 3175-1, *Textiles — Professional care, drycleaning and wetcleaning of fabrics and garments — Part 1: Assessment of performance after cleaning and finishing*

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
material
garment, composite test specimen or fabric

[SOURCE: ISO 3175-2:2017, 3.1]

3.2
composite test specimen
test specimen consisting of all component parts used in the finished item, and combined in a representative assembly

[SOURCE: ISO 3175-1:2017, 3.1]

3.3
normal material
material consisting of all components parts which are able to withstand the normal drycleaning process as specified in this document without modification

3.4
sensitive material
material consisting of all components parts which may require restrictions as to mechanical action and/or drying temperatures and/or water additions

4 Principle

The specimen is drycleaned in a commercial machine and finished according to one of the specified procedures. This process is a precursor to the assessment of the cleaned specimen in accordance with ISO 3175-1.

5 Reagents

5.1 Dibutoxymethane, $CH_3CH_2CH_2CH_2OCH_2OCH_2CH_2CH_2CH_3$ (CAS 2568-90-3), flashpoint 62 °C, boiling point 182,5 °C, distilled, sold for the purpose of drycleaning.

5.2 Sorbitan mono-oleate.

NOTE Sorbitan mono-oleate is used as a model for a standard drycleaning detergent. Sorbitan mono-oleate is used as an emulsifier for water in the drycleaning solvent.

In order to prevent foaming, it is important to use distilled, clean solvent solution and not overfill the still.

6 Apparatus

6.1 Drycleaning machine, consisting of a reversible rotating cage and safety system, intended for use with dibutoxymethane. The diameter of the rotating cage shall be 600 mm minimum and 1 080 mm maximum. Its depth shall be 300 mm minimum. It shall be fitted with three or four lifters. The speed shall be such as to give a *g*-factor of between 0,5 and 0,8 for cleaning and between 100 and 300 for extraction.

The *g*-factor is calculated according to Formula (1):

$$g = 5,6 n^2 d \times 10^{-7} \quad (1)$$

where

n is the rotational frequency, in rotations per minute;

d is the rotating cage diameter, in millimetres.

6.1.1 The machine shall be fitted with a means of controlling solvent and air temperature as required (see Table 1).

6.1.2 The machine shall have suitable facilities (such as dosing apparatus) to allow the emulsion (see 9.2.3.) to be introduced gradually into the solvent while avoiding direct contact with the textiles.

6.1.3 The machine shall be equipped with a means of measuring the temperature of the solvent during drycleaning as well as that of either the incoming or the outcoming air during drying within ±2 °C.

6.1.4 The machine shall be equipped with an automatic solvent dryness control.

6.2 Apparatus for applying the appropriate finishing treatment, consisting of the following:

6.2.1 Iron, with an approximate mass of 1,5 kg and a sole surface area of 150 cm^2 to 200 cm^2.

6.2.2 Steam press, consisting of two bucks, one fixed and the other movable, each buck having a surface area of approximately 0,35 m^2. Steam being conducted to the bucks shall be released under a pressure of approximately 500 kPa. The pressure exerted by the bucks shall be approximately 350 kPa.

6.2.3 Steam table, having a shape and dimensions suitable to the dimensions of the specimens. The steam shall be released at a pressure of approximately 500 kPa.

6.2.4 Steam former (mannequin), which may or may not be specific in shape for garments. The steam shall be released at a pressure of approximately 500 kPa.

6.2.5 Steam cabinet, which needs to be specific for garments. The steam shall be released at a pressure of approximately 500 kPa.

6.3 Ballast, consisting of clean textile pieces which shall be either white or of a light colour and which shall consist of approximately 80 % wool pieces and 20 % cotton pieces by mass. Each piece shall comprise two layers of fabric sewn together at the edges and shall be (300 ± 30) mm × (300 ± 30) mm.

7 Conditioning

Condition all specimens, except the first, for at least 16 h in the standard atmosphere (20 °C, 65 % RH) for conditioning and testing textiles specified in ISO 139. Specimens shall be tested immediately after removal from the conditioning atmosphere, otherwise they shall be placed in sealed plastic bags and tested within 30 min.

8 Test specimen

8.1 Garments shall be tested in the as-received condition.

8.2 Fabrics shall be cut into square test pieces, preferably not smaller than 500 mm × 500 mm and stitched on all sides with polyester thread to prevent unravelling.

8.3 Composite test specimens are prepared as for fabrics (see 8.2) or are tested in the as-received condition.

8.4 If assessments/comparisons are required according to ISO 3175-1, at least two identical test specimens shall be required (one for comparison, one for testing).

Testing may be an iterative procedure since alternative processes of varying severity may be used. It is advisable to obtain sufficient specimens for all the testing which may be required.

9 Procedure

9.1 General

Selection of the procedure to be used for normal materials (see 9.2) or for sensitive materials (see 9.3) depends on the textile item and it shall also take into consideration the end use of the item since this

has a bearing on the likely type and degree of soiling. Localized staining and stain removal are outside the scope of this document.

Apply appropriate parameters as given in Table 1 to normal materials or sensitive materials.

If parties have not agreed on the number of test cycles, there shall be a minimum of three.

NOTE Generally, the less severe the process, the less effective is the cleaning.

9.2 Procedure for normal materials

9.2.1 The mass of the complete load, measured to ±0,1 %, shall be calculated from the cage volume. Unless the mass of a single specimen (fabric, composite or garment) exceeds 50 % of the mass of the load, the mass of the test specimen(s) shall not exceed 10 % of the mass of the load. The remainder of the load shall consist of ballast.

9.2.2 Place the conditioned load in the machine and charge the machine with distilled dibutoxymethane, containing sorbitan mono-oleate (detergent charge 1 g/l as shown in Table 1) so that the liquor ratio, calculated from the volume of solvent in the drum, is (5,0 ± 0,5) l/kg of the load.

Maintain the solvent at (30 ± 3) °C (see Table 1) throughout the cleaning operation.

9.2.3 Prepare a fresh emulsion by mixing, per kilogram of load, 10 ml of sorbitan mono-oleate (to bring the detergent concentration to 3 g/l for the normal process) with 30 ml of dibutoxymethane and then, while stirring, adding 20 ml of water. This corresponds to 2 % of water calculated on the mass of the load.

If the mixing of the detergent with dibutoxymethane outside the machine is not permitted, a mixture of the detergent and water may be added directly into the machine. Precautions should be taken to avoid uneven distribution of the individual components in the load. Any deviation from the procedure shall be noted in the test report.

Start the machine with the filter circuit shut off, and 2 min after the cage inlet has closed, add the emulsion slowly over a period of (30 ± 5) s to the machine using a suitable facility (such as dosing apparatus).

9.2.4 Switch the machine on and run in pump circuit for 15 min. Do not use the filter circuit for the duration of the test.

9.2.5 Drain the solvent and centrifugally extract the solvent from the load for 2 min (including at least 1 min at full extraction speed).

9.2.6 Introduce pure dry solvent at the same liquor ratio as that given in 9.2.2 and rinse for 5 min. Drain and extract again for 5 min (including at least 3 min at full extraction speed).

9.2.7 Dry the load in the drying circuit of the machine for an appropriate time, preferably using an automatic solvent dryness control. In case of vacuum drying an inlet temperature of 90 °C is allowed. The outlet temperature shall not exceed the temperature given in Table 1. After the end of the drying process switch off the heating and reduce ventilation speed while the load is rotated with reverse rhythm in the cage for at least 5 min (deodorization time).

9.2.8 Immediately remove the test specimen from the machine. Place garments individually on hangers and place fabric specimens on a flat surface, for at least 30 min before finishing.

9.2.9 Carry out finishing treatments appropriate to the test specimen from the following methods and record the processing conditions used:

— method A: no finishing required;

— method B: finishing with an iron (6.2.1);

— method C: finishing with a steam press (6.2.2);

— method D: steaming on a press or table (6.2.3);

— method E: steaming on a mannequin (6.2.4) or in a cabinet (6.2.5);

— method F: no suitable finishing method could be found. Report methods and conditions attempted and reasons for unsuitability.

Record actual steaming times to allow for the reaction times of steam pedal switches and timer mechanisms.

The purpose of finishing after drycleaning is to restore an article to its original condition before use. The amount and type of finishing shall be consistent with the fabric/garment properties and the restorative requirements.

Steaming in method C shall be top steam, only to equate to good pressing practice.

NOTE 1 Steaming/vacuuming times for methods C and D will vary, e.g. from (2 ± 1) s actual steam/(5 ± 1) s vacuum for a light weight garment to (4 ± 1) s/(8 ± 1) s for heavy garments.

NOTE 2 It is likely that method E is used with methods B or C to achieve a good standard of finish.

9.3 Procedures for sensitive materials

Proceed as in 9.2, but with the appropriate parameters at the reduced levels given in Table 1.

10 Test report

The test report shall include the following information:

a) a reference to this document, i.e. ISO 3175-5:2019;

b) name of testing authority and report identification;

c) date of testing;

d) details of the item evaluated (description and reference);

e) cross-reference to any test report relating to the specimen(s) issued under ISO 3175-1;

f) type of drycleaning and finishing equipment used;

g) procedures used taken from Table 1;

h) variations in procedures and parameters specified in Clause 9;

i) total number of cleaning and finishing procedures;

j) details of any deviation from the specified procedure.