INTERNATIONAL STANDARD

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Textiles — Determination of deodorant property —

Part 1: General principle

Textiles — Détermination des propriétés de neutralisation d'odeurs —

Partie 1: Principe général

Reference number
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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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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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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 38, *Textiles.*

ISO 17299 consists of the following parts, under the general title *Textiles — Determination of deodorant property:*

— *Part 1: General principle*

— *Part 2: Detector tube method*

— *Part 3: Gas chromatography method*

— *Part 4: Condensation sampling analysis*

— *Part 5: Metal-oxide semiconductor sensors method*

Introduction

Unpleasant odours in daily human life are toilet odour, sweat odour, body odour (nonenal mixture odour), excrement odour, etc. Textile products that reduced these unpleasant odours from ambient air or around the human body were offered in the market by using advanced technology.

However, the evaluation method for such deodorant textiles did not develop as an International Standard. This fact has been making it difficult to evaluate correctly the deodorant property of the textile products for consumers as well as manufactures worldwide.

A current practical method for the evaluation of odour is a human sensory testing method in which a person is directly judged by the human sense of smell if there is an odour or not. This human sensory testing method is difficult to standardize as an objective indicator. Considering this situation, test methods using instruments or ultra-microanalysis testing methods have been developed.

Unpleasant odours are compounds of an infinitesimal quantity of chemicals. ISO 17299 provides a definition for the major component chemicals of odours and specifies the test methods by using several kinds of instruments in which the reduction rate of odour from ambient gas of the textile products is determined.

This part of ISO 17299 describes the general principle of testing methods for the deodorant property of textile products. Actual testing methods are described in ISO 17299-2 to ISO 17299-5.

Textiles — Determination of deodorant property —

Part 1: General principle

1 Scope

This part of ISO 17299 specifies the general principle of the deodorant textile products and deodorant testing methods for textile products, such as woven fabric, knit, nonwoven, fibres and yarns, braiding products, tapes and slings.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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*

3 Terms and definitions

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

3.1 General

3.1.1
unpleasant odour
uncomfortable odour related to the human living environment, such as toilet odour, sweat odour, body odour (nonenal mixture odour), and excrement odour, etc.

3.1.2
major component chemicals of unpleasant odour
chemicals that compose the unpleasant odour in the living environment

Note 1 to entry: These chemicals are as follows:

— toilet odour: ammonia;

— sweat odour: ammonia, acetic acid, and isovaleric acid;

— body odour (nonenal mixture odour): ammonia, acetic acid, isovaleric acid, and nonenal;

— excrement odour: ammonia, acetic acid, hydrogen sulfide, methyl mercaptan, and indole.

Note 2 to entry: Other chemicals might be relevant. The selected chemicals are conceived as representative.

3.1.3
quasi-unpleasant odour
mixed odour produced artificially similar to unpleasant odour

Note 1 to entry: Mixed odours are produced artificially for the purpose of ISO 17299-5. The component chemicals for each odour are defined as follows:

— quasi-sweat odour: ammonia, acetic acid, isovaleric acid;

— quasi-body odour (nonenal mixture odour): ammonia, acetic acid, isovaleric acid, nonenal;

— quasi-excrement odour: ammonia, acetic acid, hydrogen sulfide, methyl mercaptan, indole.

3.1.4
deodorant textile
textile with the ability to reduce the unpleasant odour in the ambient air around textile products

Note 1 to entry: The unpleasant odour is caused by the chemicals listed in 3.1.2 and 3.1.3.

3.1.5
deodorant property
ability to reduce the unpleasant odour in ambient air

Note 1 to entry: The unpleasant odour is caused by the chemicals listed in 3.1.2 and 3.1.3.

3.1.6
deodorant substance
substance able to interact physically or chemically with unpleasant odours

Note 1 to entry: The unpleasant odour are listed in 3.1.2 and 3.1.3.

Note 2 to entry: Examples of deodorant substances are shown in Annex A.

3.1.7
deodorant processing
process giving a deodorant property to textile products through a production process for application of deodorant substances on the surface or inside of the textile products by a padding and drying process, to be absorbed by a chemical treatment process, to be blended in the polymer by a spinning process, or to be applied using other techniques

3.2 Deodorant testing

3.2.1
evaluation of a deodorant property
measurement of the reduction of chemical concentration in a container with test specimen, comparing to without specimen

Note 1 to entry: The measuring methods of the concentration of odour chemicals are described in 3.2.2 to 3.2.6.

3.2.2
human sensory testing
judgement of strength of the smell by the human sense of smell

Note 1 to entry: The human sensory testing method is described in Annex C as an example. Although human sensory testing is not suitable for a standard, the procedure was used to develop the instrument testing method to determine the details of testing conditions.

3.2.3
detector tube method
concentration of odour component chemicals is measured by using the detector tube

Note 1 to entry: The detector tube method is described in ISO 17299-2 which is applied to the test of acetic acid, hydrogen sulphide, and methyl mercaptan.

3.2.4
gas chromatography method
concentration of odour component chemicals is measured by gas chromatography

Note 1 to entry: The gas chromatography (GC) method is described in ISO 17299-3, which is applied to the test of nonenal, indole, isovaleric acid, and the mixture liquid of acetic acid and NaCl.

3.2.5
condensation sampling analysis
odour component chemicals are condensed by the condensation sampling method for each chemical, and then, the appropriate analytical instruments are chosen to obtain the concentration of odour chemicals

Note 1 to entry: The method is described in ISO 17299-4 for the test of indole, methyl mercaptan, hydrogen sulfide, isovaleric acid, and nonenal.

3.2.6
metal-oxide semiconductor sensor method
concentration of quasi-unpleasant odour chemicals are measured by using the metal-oxide semiconductor sensors

Note 1 to entry: This method is described in ISO 17299-5 for the test of quasi-sweat, quasi-body odour (nonenal mixture odour), and quasi-excrement odour.

4 Principle

Concentration of gaseous odour component chemicals of the gas in containers with a specimen denoted as A, and without specimen denoted as B, is measured by using the specified instruments after the designated contacting time. The reduction rate is determined from the chemical concentration with and without specimen as $(B - A)/B \times 100$ %. The test shall be done either with the odour chemical individually or with mixed odour component chemicals as described in each part of ISO 17299.

5 Reagents

Unless otherwise specified, analytical grades have to be used.

5.1 **Ammonia water (NH_3)**, reagent with concentration of 28 % in water.

5.2 **Acetic acid (CH_3COOH)**, reagent with purity of 99,7 %.

5.3 **Methyl mercaptan (CH_3SH)**, standard gas with concentration of 100 µl/l or 1 000 µl/l by nitrogen dilution.

5.4 **Hydrogen sulfide (H_2S)**, standard gas with concentration of 100 µl/l by nitrogen dilution.

5.5 **Indole (C_8H_7N)**, reagent.

5.6 **Isovaleric acid**, solution with purity of 98,0 %.

5.7 **2-Nonenal ($C_9H_{16}O$)**, reagent with purity of 95,0 %.

5.8 **Diluent gas**, dry air obtained from the mixture cylinder of nitrogen gas and oxygen gas with purity of at least 99,99 %, or nitrogen gas from the nitrogen gas cylinder with a purity of at least 99,99 %.

NOTE Nitrogen gas obtained from a nitrogen cylinder (purity of at least 99,999 9 %) can be used.

5.9 **Ethanol**, reagent with purity of 99,5 % in water.

6 Materials and apparatus

6.1 **Plastic bag**, made of vinyl fluoride film, polyester and polyester laminated film, polyvinyl alcohol film, etc. A volume of 1 l, 3 l, 5 l, and 50 l is available depending on the purpose. A plastic or rubber tube is installed to the bag before testing.

6.2 **Air pump**, capable of drawing air with a flow rate of 0,2 l/min and 5 l/min with the attached flow meter. If the attached flow meter is not available, the integrating flow meter shall be used.

6.3 **Integrating flow meter**, capable of measuring the gas flow of 500 ml/min or more.

6.4 **Hand dryer**, with an electric consumption of 1 kWh to be used to warm up ammonia to 40 °C to 50 °C to evaporate in the 1 l bag.

6.5 **Syringe**, made of a glass cylinder with a capacity of 0,5 ml, 100 ml, and 200 ml.

6.6 **Micro-syringe**, with a capacity of 10 µl.

6.7 **Heat seal**, to seal the opened parts of the plastic bag. The tape can be used with the same sealing capability as an alternative.

6.8 **Aspirator**, capable of evacuating all air in the 5 l plastic bag after sealing. A vacuum pump could be used.

6.9 **Airtight stopper**.

6.10 **Oven**, capable of using at 80 °C

6.11 **Parmeator or cylinder**, alternative standard gas generator.

7 Testing environment and sample conditioning

The testing environment shall be kept at a temperature of 20 °C and relative humidity of 65 % in accordance with ISO 139. The samples are conditioned under the same condition for at least 24 h.

NOTE The condition with a temperature of 23 °C and relative humidity of 50 % according to ISO 139 can be used for this test, then record the condition used on the test report.

8 Test procedure

The test procedure will be described in ISO 17299-2 to ISO 17299-5 as follows:

— ISO 17299-2*: Detector tube method*;

— ISO 17299-3*: Gas chromatography method;*

— ISO 17299-4*: Condensation sampling analysis*;

— ISO 17299-5*: Metal-oxide semiconductor sensors method*.

In all parts, the concentration of testing gas without a specimen and with a specimen are denoted as B and A, respectively.

9 Odour reduction rate

The reduction rate of the concentration is calculated from Formula (1).

$$ORR = \frac{(B - A)}{B} \times 100 \quad (1)$$

where

ORR is the odour reduction rate in percentage;

B is the average of the concentration of testing gas without a specimen;

A is the average of the concentration of testing gas with a specimen.

10 Determination of deodorant property of the textile products

The purpose of this test method is to determine the deodorant property of textile products.

The labelling for the appropriate deodorant property should be presented when the chemical concentration reduction is larger than the values referred to in Annex E as an example.

11 Test report

The following items are at least recorded in the test report:

a) a reference to this part of ISO 17299 (i.e. ISO 17299-1) and the test method used;

b) kind, origin, and designation of the sample (partial specimen, if applicable);

c) individual odour concentration data, average, and reduction rate;

d) any deviation from this part of ISO 17299.