ISO/DTS 21256-4: ####(X2023(E)

ISO TC 281/WG 3

Date: YYYY-MM-DD2023-02-02

Fine bubble technology — Cleaning applications — Part 4: Test method for oil removal from polyester-based textile

WD stage

Warning for WDs and CDs

This document is not an ISO International Standard. It is distributed for review and comment. It is subject to change without notice and may not be referred to as an International Standard.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

A model manuscript of a draft International Standard (known as "The Rice Model") is available at https://www.iso.org/iso/model_document-rice_model.pdf

ISO copyright office

CP 401 • Ch. de Blandonnet 8

CH-1214 Vernier, Geneva

Phone: +41 22 749 01 11

Email: copyright@iso.org

Website: ~~www.iso.org~~www.iso.org

Published in Switzerland

Contents

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.

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).

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

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 281, *Fine bubble technology*~~, Working Group WG3, *[Fine bubble application]*~~.

~~This the first/ edition (ISO #####:####), which has been technically revised.~~

~~The main changes are as follows:~~

~~— xxx xxxxxxx xxx xxxx~~

A list of all parts in the ISO 21256 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

In recent years, the market has witnessed a proliferation of new products using fine bubble technology. In the field of textile industry, the introduction of fine bubbles can bring many interesting effects. Using fine bubbles can increase the cleaning efficiency by removal of the residual surface oil of textile in large-scale manufacturing in order to improve the quality of dyeing and finishing process. Especially, polyester -based textile takes very important role in the textile industry since its outstanding features. In addition, fine bubble washing is a physical cleaning method which can reduce the pollution of detergent to the water environment. So, it is needed to design a general test method, for textile manufacturers and related researchers, to evaluate the cleaning efficiency by removal of fine bubble water on polyester -based textile.

In order to adapt to complex usage scenarios in large-scale textile manufacturing, the proposed method uses the mass fraction of oil on polyester -based textile after and before washing to characterize the cleaning effect, and uses ISO brightness (R457)[1] to assist in expressing the degree of cleanliness. To demonstrate, a lubricant (The, whose main composition is high molecular hydrocarbon), is used as an identical contaminant in production, and an edible oil (The, whose main composition is fatty acid), is used as an identical contaminant in daily washing. The method is simple, reproducible and highly versatile.

With this method, the oil removal ability of fine bubble water with different bubble sizes and concentrations can be compared. Furthermore, it will further promote the civil and industrial application of oil removal from textile of fine bubbles. For, for example, washing during fabric recycling process or cleaning with less detergent.

Fine bubble technology — cleaning applications — Part 4: Test method for oil removal from polyester-based textile

1 Scope

This ~~doucument~~document specifies a test method to evaluate the oil removal performance from polyester-based textile with fine bubbles.

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 20480-1, *Fine bubble technology — Part 3: General principles for usage and measurement of fine bubbles — Part 1: Terminology.*~~

~~ISO 139, Textiles — Standard atmospheres for conditioning and testing.~~

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

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

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

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

4 Principle

In the textile industry, various types of manufacturing machines use different kinds of oils, surfactants and detergents. During the production either the oils are coated over the whole surface of the strings uniformly or the whole surface of the textile in different processes. To test the removal ability, identical samples should be used, e.g., always to use polyester-based textile, for better comparative consistency in the method.

The test method consists in determining the mass fraction of oil on a textile sample before and after cleaning. A weighed polluted sample is soaked in the circulated bubble water. To evaluate the degree of cleanliness, the mass fraction of residual oil on the sample is determined, and the brightness according to ISO[1],[2] is also evaluated.

5 Test methods

5.1 Equipment and material

5.1.1 Drying Oven

Figure 1 shows the drying oven's appearance. The power is 4 kW, and the working temperature Rangerange is approximately +10 °C to 250℃ °C with ±1℃ °C accuracy.

Figure 1 — Drying oven

5.1.2 Digital electronic scale

Figure 2 shows the digital electronic scale used in this test, whose Maximummaximum range is 220 g and resolution is 0.001 g.

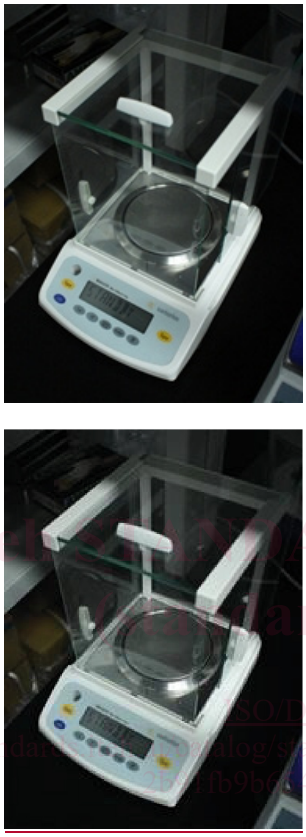

Figure 2 — Digital electronic scale

5.1.3 Dye

Sudan Red ~~III~~III ($C_{22}H_{16}N_4O$), AR.

5.1.4 Oil

Lubricant ~~(The~~, whose main composition is high molecular hydrocarbon~~)~~, and edible oil ~~(The~~, whose main composition is fatty acid~~). Two~~. The two typical kinds of oils are described in Annex A.

5.1.5 Substrate

The polyester-based textiles, such as ~~PET (~~Polyethylene terephthalate~~), PBT (~~ (PET), Polybutylene terephthalate~~), PTT (~~(PBT) and Polytrimethylene terephthalate (PTT) are used as substrates. The ability

of oil removing depends on all of their characteristics, i.e. weaving types of manufacturing, the diameter of thread. Therefore, the specification of the textile characteristics should be clarified in ~~details~~detail for cleaning applications to obtain the repeatability of the experiments. Annex~~.~~ A describes an example of oil removal performance comparison between tap water and fine bubble water, in which the substrate is clearly described.

5.1.6 Micropipette

Figure~~.~~ 3 shows the micropipette used in this test, whose resolution is 0~~.~~,01~~ mL~~ ml.

Figure~~.~~ 3 — Micropipette

5.1.7 Beaker

250~~ mL~~ ml and ~~2000 mL~~2 000 ml.

5.1.8 Tripod stand

Load polyester~~-~~based textile pieces at the tripod stand presented in Figure~~.~~ 4.