
Tekstilije in tekstilni izdelki - Mikroplastika iz tekstilnih virov - 3. del: Merjenje mase zbranega materiala, sproščenega iz končnih tekstilnih izdelkov pri metodi pranja v gospodinjstvu (ISO/DIS 4484-3:2021)

Textiles and textile products - Microplastics from textile sources - Part 3: Measurement of collected material mass released from textile end products by domestic washing method (ISO/DIS 4484-3:2021)

Textilien und textile Erzeugnisse - Mikroplastik aus textilen Quellen - Teil 3: Messung der gesammelten Materialmasse, die von textilen Fertigerzeugnissen durch Haushaltswäsche freigesetzt wird (ISO/DIS 4484-3:2021)

Textiles et produits textiles - Microplastiques d'origines textiles - Partie 3: Mesurage de la masse de matériaux collectés libérés par les produits finis textiles par la méthode de lavage domestique (ISO/DIS 4484-3:2021)

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Textiles and textile products — Microplastics from textile sources —

Part 3:

Measurement of collected material mass released from textile end products by domestic washing method

*Textiles et produits textiles - Microplastiques d'origines textiles —**Partie 3: Mesure de la masse de matériaux collectés libérés par les produits finis textiles par la méthode de lavage domestique*

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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.

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 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*.

A list of all parts in the ISO 4484 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

Regarding human life, daily washing of clothes generates fibre fragments, which are discharged from washing machine, passed through inappropriate or no wastewater treatments, flow into the river, and then flow out into the ocean as the final sink.

Many papers have been published on the fibre fragments that are discharged from the washing of textile products and are of great concern in the apparel industry. Among them, there is no clear evaluation standard, and therefore they are adopting their own evaluation conditions.

The textile end product mentioned here is a finished clothing product such as shirt, pants, fleece, blouse, etc., the home textile end products such as a blanket, a rug, etc., and does not include a cut test sample of the fabric or the products.

Although there are many types of washing machines used at home, ISO has developed the ISO 6330 domestic washing test method, which describes the domestic washing machines and test conditions. In addition, a care label specified by ISO 3758 is attached to textile products worldwide, and this care label specifies washing conditions as well.

The purpose of this test method is to collect the fibre fragments, actually that is the collected materials that are discharged from the domestic washing machine during washing.

Due to the complicated structure of the washing machine, the cleaning of the washing machines is very important issue and this document proposes the verification of the cleanness of washing machine.

The identification or quantification of components contained in the collected material during washing will be investigated by applying the ISO 4484-2.

It is considered that this information can be utilized by the textile industry for the development of clothes, textile products, etc.

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Textiles and textile products — Microplastics from textile sources —

Part 3: Measurement of collected material mass released from textile end products by domestic washing method

1 Scope

This document specifies a method of measurement of the collected material mass released from outlet of washing machine described in ISO 6330 during washing of textile end products by a washing condition indicated by care label of ISO 3758.

If the countries use the own care label system, set the washing condition indicated by the care label.

This document applies to all textile end products which are composed of all fibres such as natural fibres, and man-made fibres, including mixture of the fibres.

The textile end products applied for this test method are clothing, garments, such as fleece, shirts, trousers, blouse, etc., and home textile end products, such as, blankets, rugs, curtains, etc. This document is not applicable to fabrics and cut textile products, and the test for washing machines and detergents as well.

2 Normative references [oSIST prEN ISO 4484-3:2022](https://standards.iteh.ai/catalog/standards/sist/98b7e883-3097-4cca-a2d9-ce161855400e/osist-pr-en-iso-4484-3-2022)

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*

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

ISO 3758, *Textiles — Care labelling code using symbols*

ISO 6330, *Textiles — Domestic washing and drying procedures for textile testing*

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 <https://www.electropedia.org/>

3.1

collected material

material collected by the filter attached at the outlet hose of washing machine during washing, which include fibre fragments and others

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3.2

textile end products

consumer textile-products, such as garments, clothing, etc., home textiles products, such as blankets, rugs, curtains, etc., and industrial textile products, such as uniforms, etc.

4 Principle

A given mass of textile end product is washed in a washing machine under certain conditions temperature and mechanical action for a given number of washing cycles. The material shed during the washing is collected and weighed after its collection using a filter bag which is attached at the outlet hose of the washing machine.

5 Apparatus

5.1 Washing machine, specified in ISO 6330 and remove the built-in filters attached to the washing machine. The cleanness of the washing machine shall be checked according to [Annex B](#).

5.2 Filter bag, with an opening size of woven fabric of $(10 \pm 4) \mu\text{m}$ and the specification for the materials and the construction is described in [Annex A](#). The preparatory work on the pore size of the filter is shown in [Annex I](#) and recovery rate of fibre fragments is shown in [Annex H](#).

5.3 Analytical balance, with a resolution of 0,1 mg or better.

5.4 Balance, with a resolution of 1 g or better.

5.5 Oven, capable of maintaining a temperature of $(105 \pm 2) ^\circ\text{C}$, without fan.

5.6 Cable ties, made of synthetic resin.

5.7 Polycarbonate membrane filter, approximately 47 mm in diameter with 10 μm pore size. Stainless steel filter is also available.

5.8 Weighing bottle or dish, with a minimum diameter, approximately 47 mm, with a lid.

5.9 Vacuum filtration device, consisting of separating sintered filter platform and funnel, with vacuum pump.

5.10 Squeezable wash bottle.

5.11 Water, distilled or grade 3 according to ISO 3696.

5.12 Tweezers.

5.13 Glass beaker, with a minimum capacity of 1 000 ml.

5.14 Desiccator, with drying agent.

6 Material

6.1 Reference detergent, with liquid form, without optical brightener (Another designation is AATCC HE standard reference detergent as shown in [Annex D](#)).

7 Test condition

7.1 Standard atmosphere for preparation of specimens and mass measurement

The conditions for specimen preparation and mass measurement are at the temperature of $(20 \pm 2) ^\circ\text{C}$ and relative humidity of $(65 \pm 4) \%$ according to ISO 139.

7.2 Test atmosphere for washing process

The condition for the washing process is ambient condition.

8 Specimen preparation

One kind of textile end products is applied for this test and do not mix the different kind of textile end products in one test. The amount of the specimens for one test of this test method (S_n) is at least two textile end products and the maximum dry volume which is a half of the washing tub. 3 sets of the sample are prepared for this test for 3 test runs.

The amount of the specimens could affect to the test result which is shown in [Annex G](#) as an example.

Prepare number of the specimens as for the test. Condition the test specimens according to ISO 139 5.3 Pre-conditioning and [5.4](#) Conditioning. Weigh the conditioned total specimen by the balance ([5.4](#)). Record the mass of the total specimen (M_p) to an accuracy of 1 g.

Describe the actual weight of the total specimens put into washing machine in the test report.

9 Test procedure

9.1 Blank test

9.1.1 Mounting of the filter bag

Mount the filter bag ([5.2](#)) to the outlet hose of the washing machine ([5.1](#)) and tied up by cable tie ([5.6](#)).

9.1.2 Washing procedure

Make sure there is nothing in the washing tub and run the washing program once. The washing program is the same as [9.2.2](#).

9.1.3 Remove of the filter bag

After confirming that the water in the washing tub has been completely drained, take the filter bag off from outlet hose.

Follow the next steps from [9.4](#) to [9.7](#) for wash out the filter bag and measurement collected material and 10 for calculation and record the result in the test report.

9.2 Test for sample

9.2.1 Mounting of the filter bag

Mount the filter bag ([5.2](#)) to the outlet hose of the washing machine ([5.1](#)) and tied up by cable tie ([5.6](#)).

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9.2.2 Washing procedure of sample

Put the test specimens into the washing tub and start a washing program in accordance with the care label or, if there is no label, a washing program agreed between the interested parties for one cycle of the washing program.

The detergent (6.1) may be used for washing test and the preferable detergent is introduced in Annex D.

When taking procedure of the repeated washing agreed by the interested parties, repeat the washing cycle until determined cycles of repetition in reference to Annex E. An example of the result of the repeated washing test is shown in Annex E.

For the repeated washing test, the number of repetition and timing of the collection of the collected materials are determined between the interested parties. After completion of the washing program, remove the test specimens from the washing machine.

9.2.3 Washing procedure of empty tub

Repeat non-load running of the washing machine twice as for to wash out the remaining materials from the washing machine.

The results based on the number of washing procedure of empty tub after washing the specimen are described in Annex C as an example.

9.2.4 Remove of the filter bag

After confirming that the water in the washing tub has been completely drained, take the filter bag off from outlet hose.

9.3 Number of tests for repeatability

For the remaining two sets of specimens prepared, use the washing machine continuously for operations 9.2. In total, the number of samples tested separately is 3 sets.

9.4 Weighing of membrane filter and bottle

Weigh 4 polycarbonate membrane filters (5.7) with weighing bottles (5.8) as a set by the analytical balance (5.3). Record the mass of each set of membrane filter and bottle before testing (M_{f1}) to an accuracy of 0, 1 mg by using tweezers (5.12) for handling of membrane filter. To prevent contamination from the environment, the membrane filter should be kept in a weighing bottle.

9.5 Washing out of the collected materials

Turn the filter bag described in 9.2.4 over and wash in a separate glass beaker (5.14) containing 1 l of water (5.11). Set the membrane filter prepared in 9.4 on a vacuum filtration device (5.9). This suspension is filtered through the filter using the vacuum filtration device. Add 1 l of fresh water (5.11) to the beaker again, wash the filter bag again and filter the suspension. Repeat the washing and filtering operations from this filter bag at least twice. Finally, the surface of the filter bag and the inside of the beaker are washed with running water (5.11) using a washing bottle (5.10), and the suspension is also filtered by the vacuum filtration device.

9.6 Drying membrane filter with the collected materials and bottle

The membrane filter with collected materials is returned in the same bottle used in 9.4 and dried temporarily for 2 h at $(105 \pm 2) ^\circ\text{C}$ in the oven (5.5). Then place the bottle with the membrane filter and collected materials in desiccator to cool down to the room temperature.