
**Textiles and textile products —
Microplastics from textile sources —
Part 1:
Determination of material loss from
fabrics during washing**

*Textiles et produits textiles — Microplastiques d'origines textiles —
Partie 1: Détermination des pertes de matière des étoffes pendant le
lavage*

[ISO 4484-1:2023](https://standards.iteh.ai/catalog/standards/sist/a3b81a19-009f-46bd-bc49-55c841a9fd93/iso-4484-1-2023)

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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).

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 38, *Textiles*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC248, *Textiles and textile products*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

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

There is significant evidence that during laundering of textiles, release of fragments can occur. The purpose of this document is to provide a method of assessment, to be used in laboratories, of the degree to which different fabrics shed fibres and fibre fragments of all types. The results obtained by using this document should enable manufacturers of textile articles to make an informed choice about the type of fabric to use to reduce/minimize shedding as well as to test different methods of manufacture that minimize material loss during laundering.

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Textiles and textile products — Microplastics from textile sources —

Part 1: Determination of material loss from fabrics during washing

1 Scope

This document describes a method for systematically collecting material loss from fabrics under laundering test conditions to achieve comparable and accurate results. There is no direct correlation to material loss during domestic and commercial laundering. The method is designed to assess material loss of all types.

NOTE In this document, any collected debris is assumed to be fibre fragments. For the identification of the nature/composition of this debris, the method described in ISO 4484-2 can be used.

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 3696:1987, *Water for analytical laboratory use — Specification and test methods*

ISO 4915, *Textiles — Stitch types — Classification and terminology*

ISO 4916, *Textiles — Seam types — Classification and terminology*

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>

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

4 Principle

The test specimen is subjected to an accelerated laundering process under conditions of temperature, time, and mechanical action. The resultant wash liquor is vacuum filtered. Material loss is assessed gravimetrically to approximate material loss during simulated domestic laundering. The ratio of the mass of the material loss by the test specimen mass is then reported.

Note Consideration on detergent can be found in [A.1](#).

5 Reagents

5.1 **Water**, distilled or grade 3 according to ISO 3696.

6 Apparatus

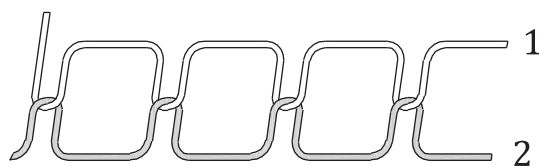
6.1 Lab gloves, which shall be worn during all stages of method execution to prevent contamination by foreign matter(s).

6.2 Lab coat, which shall be worn during all stages of method execution to prevent contamination by foreign matter(s).

NOTE Consideration on contamination reduction can be found in [A.2](#).

6.3 Cutting device, e.g. scissors or cutting press.

6.4 Sewing machine, single needle, capable of lock stitch, type 301 in accordance with ISO 4915 (see [Figure 1](#)).



Key

- 1 needle thread
- 2 bobbin thread

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Figure 1 — Stitch type 301

6.5 Sewing needle, size appropriate for sewing thread, point appropriate for specimen fabric.

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6.6 Sewing thread, 100 % polyester or polyamide continuous filament thread, size appropriate for the specimen fabric.

6.7 Oven, capable of maintaining a temperature of $(50 \pm 3) ^\circ\text{C}$, without air circulation.

6.8 Analytical balance, with a resolution of at least 0,1 mg.

6.9 Glass fibre filter, 1,6 μm pore size, 47 mm diameter, no binder.

6.10 Aluminium pans/specimen tray (non-plastic), with a minimum diameter of 47 mm to support filter when not in use in the filter assembly.

6.11 Suitable mechanical device, consisting of a water bath containing a rotatable shaft, which supports radially, stainless steel containers lying horizontally on the shaft, see [Figure 2](#).

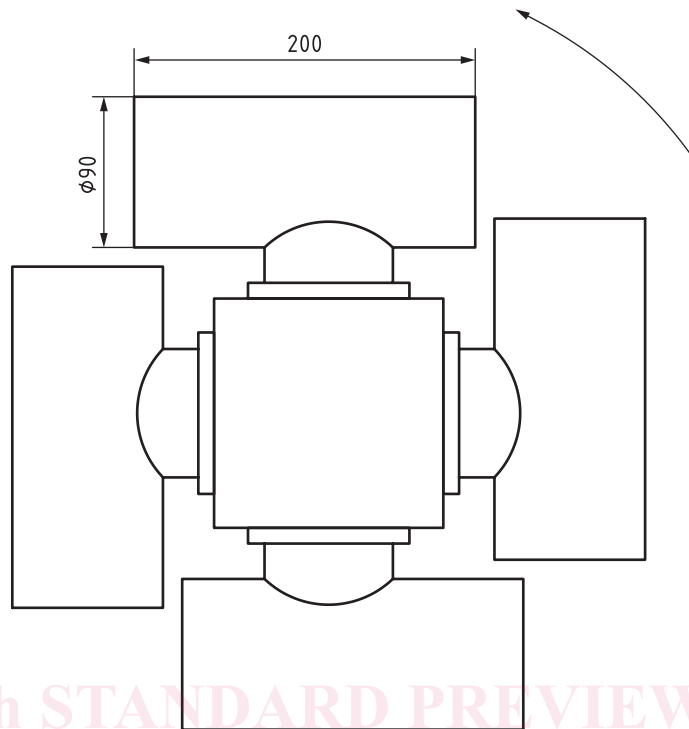


Figure 2 — Orientation of containers around the rotatable shaft

The shaft/container assembly is rotated at a frequency of $(40 \pm 2) \text{ min}^{-1}$. The temperature of the water bath is thermostatically controlled to maintain the test solution at the prescribed temperature $\pm 2 \text{ }^\circ\text{C}$.

Other mechanical devices may be used for this test, provided that the results are identical to those obtained using the apparatus described.

6.12 Stainless steel containers, $(1\ 200 \pm 50)$ ml capacity with diameter of (90 ± 5) mm and depth of (200 ± 10) mm, with lids and seals.

Note Consideration on further investigations can be found in [Annex C](#).

6.13 Non-corrodible (stainless) steel balls, approximately 6 mm in diameter.

6.14 Vacuum filtration device, consisting of a separating sintered non-plastic filter platform and cylindrical glass or stainless-steel funnel with a suitable vacuum source. Shall be suitable for use with 47 mm diameter filters.

6.15 Squeezable wash bottle.

6.16 Stainless steel sieve, with capture holes between 2 mm and 6 mm diameter.

6.17 Glass beaker, with a minimum capacity of 1 500 ml.

6.18 Tweezers, round nosed, non-serrated.

6.19 Desiccator with suitable desiccant.

Before testing thoroughly, clean all work surfaces and working areas to reduce risk of contamination.

7 Preparation of test specimen

7.1 General

For each laboratory sample, a set of test specimens shall be cut as described in 7.2. A set shall consist of a minimum of 4 specimens.

7.2 Sampling

A test specimen is prepared by cutting a rectangle of dimensions (150 ± 10) mm \times (290 ± 10) mm with cutting device (6.3).

Test specimens should be taken from the fabric roll ensuring they are at least 100 mm from the cut edge of the laboratory sample and at least 150 mm from the selvedge.

Take an equal number of specimens with their long dimensions parallel to both fabric directions. Specimens for a given fabric direction should be spaced along a diagonal of the fabric to allow for representation of different warp and filling yarns, or machine and cross direction areas, in each specimen.

7.3 Preparation of test specimens

Fold each edge towards the reverse of the specimen twice to form a double rolled hem ≈ 10 mm wide (type 6.03.01 in accordance with ISO 4916) (see Figure 3) working on a total seam allowance of 25 mm.

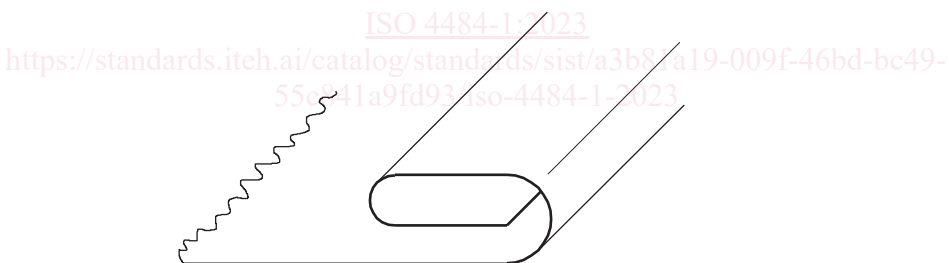


Figure 3 — Double rolled hem type 6.03.01

Finish all hems by sewing (6.4) along the centre line using a lock stitch type 301 as described in ISO 4915 (see Figure 1), ensuring that the needle (6.5) is passing through all layers of the hem to fully enclose the cut edge.

Where possible, sew a continuous row of stitching along all edges and carefully around all corners. It may be necessary to hand turn the sewing machine (6.4) handwheel through the corner sections. In exceptional cases where it is not possible to sew continuously around the corners due to fabric bulk, stop the row of stitching just before the corner section, raise the needle and presser foot and reposition the specimen to recommence the row of stitching just after the corner section. Note in the test report which hemming procedure has been followed.

Repeat the hemming procedure on all edges of the specimen such that the resultant specimen size is (100 ± 10) mm \times (240 ± 10) mm.

Some fabrics thickness can make it difficult to produce this hem. In this instance, the seam allowance can be increased to 50 mm. It is important that the finished specimen size is (100 ± 10) mm \times (240 ± 10) mm.