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ISO/TC **38**/SC **24**

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Textiles — Methods for analysis of woven fabrics construction —

Part 5: Determination of linear density of yarn removed from fabric

Textiles — Méthodes d'analyse de la construction des tissus —

Partie 5: Détermination de la masse linéique d'un fil prélevé dans un tissu

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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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This document was prepared by Technical Committee ISO/TC 38, *Textiles*, Subcommittee SC 24, *Conditioning atmospheres and physical tests for textile fabrics*.

This second edition cancels and replaces the first edition (ISO 7211-5:1984), of which it constitutes a minor revision.

The changes compared to the previous edition are as follows:

— the normative reference to ISO/TR 5090 (withdrawn) has been replaced by ISO 1833-1;

— the normative reference to ISO/TR 6741-4 (withdrawn) has been replaced by a reference to the “agreed moisture regain” (same sentence as in ISO 1833-1);

— the mandatory Clause 3, Terms and definitions, has been added and subsequent clauses have been renumbered;

— the formulae in Clause 10 have been editorially revised to comply with the ISO Directives.

A list of all parts in the ISO 7211 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.

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Introduction

The method for determining the linear density of yarn from a fabric differs from that of yarn from a package in that, in the former instance, the crimp imposed upon the yarn by the interlacing of warp and weft should be taken into account. Also, the long lengths of yarn used in tests from a package might not conveniently be taken from a fabric. The results obtained might be subject to appreciable personal error unless a standard method is adopted and adequate samples are taken.

Clause 8 specifies the method for determination of the linear density of yarn removed from fabric, without removal of non-fibrous matter and Clause 9 specifies the method for determination of linear density of yarn removed from fabric after removal of non-fibrous matter.

It is noteworthy that the linear density of yarn obtained by these methods might not be same as that of the original yarn used in the fabric.

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Textiles — Methods for analysis of woven fabrics construction —

Part 5: Determination of linear density of yarn removed from fabric

1 Scope

This document specifies methods for the determination of linear density of yarn removed from fabric. It relates to yarns of nominally uniform linear density. It describes the method of removing threads from fabric, and specifies the number of threads whose straightened length is to be determined and the methods of determining the mass of all the threads.

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 1833-1, *Textiles — Quantitative chemical analysis — Part 1: General principles of testing*

ISO 7211-3, *Textiles — Woven fabrics — Construction — Methods of analysis — Part 3: Determination of crimp of yarn in fabric*

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3 Terms and definitions

No terms and definitions are listed in this document.

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/

4 Principle

Threads are removed from rectangular strips of fabric, the straightened length of a portion of them is determined and their mass is determined either in equilibrium with the standard atmosphere for testing (method A) or oven-dry plus the agreed moisture regain (method B). Linear density is calculated from the mass and the sum of the straightened lengths.

NOTE The agreed moisture regain of each fibre is specified in some regional legislation or after agreement between interested parties.

When heating to 105 °C is likely to cause appreciable loss of volatile matter other than water, it is recommended to use method A.

The determination can be carried out without removal of nonfibrous matter (see Clause 8), or after removal of non-fibrous matter (see Clause 9).

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5 Apparatus

5.1 Balance, accurate to 0,1 % of the smallest quantity to be weighed.

5.2 Apparatus for determining the straightened length of threads.

See apparatus specified in ISO 7211-3.

5.3 Ventilated drying oven (method B).

6 Conditioning and testing atmosphere

The standard atmospheres for pre-conditioning, conditioning and testing textiles specified in ISO 139 shall be used.

7 Test specimens

Expose to the atmosphere for testing for at least 24 h sufficient fabric, which should preferably include yarn from at least five weft packages, to provide the required number of test specimens.

Cut from the conditioned fabric at least two rectangular strips containing different warp ends for determining the linear density of warp yarns, and at least five rectangular strips representing different weft packages for determining the linear density of weft yarns.

All the strips should preferably be of the same length and about 50 cm long. Their width should be such as to contain at least 50 lengths of either warp or weft yarn, whichever is under examination.

Obtain the threads from these strips as required as specified in ISO 7211-3. During these operations, keep warp threads separate from weft threads.

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8 Procedure of determination of linear density of yarn removed from fabric without removal of non-fibrous matter

8.1 Separation of threads and measurement of length

Remove the first 10 threads from each strip and determine their straightened lengths, all as specified in ISO 7211-3. Then remove at least 40 more threads from each strip.

8.2 Method A — Conditioning to equilibrium with the standard atmosphere

Pre-condition the specimen for 4 h in the standard atmosphere for pre-conditioning specified in ISO 139.

After pre-conditioning, bring the specimens to moisture equilibrium with the standard atmosphere for testing by exposing them to that atmosphere for 24 h or until there is no progressive change in mass greater than 0,1 % in successive exposures of at least 30 min duration.

Weigh all the warp threads together and each group of 50 weft threads separately.

8.3 Method B — Oven-dry plus agreed moisture regain

Dry the specimens to constant mass in the ventilated drying oven (5.3) until successive weightings at intervals of 20 min (specimen weighed inside oven) or 40 min (specimen weighed outside oven) show no progressive change in mass greater than 0,1 %. Weigh all the warp threads together and each group of 50 weft threads separately.

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9 Procedure of determination of linear density of yarn removed from fabric after removal of non-fibrous matter

9.1 Separation of threads and measurement of length

Remove the first 10 threads from each strip and determine their straightened lengths, all as specified in ISO 7211-3. Then remove at least 40 more threads from each strip.

Where the non-fibrous matter interferes with the separation of threads, it is necessary to remove it first, but it should be noted that this might affect the length of the threads. If the non-fibrous matter is removed before the threads are separated, expose the extracted fabric to the standard atmosphere for testing for at least 6 h before determining the straightened length.

9.2 Removal of non-fibrous matter

Remove any non-fibrous matter, using a procedure given in ISO 1833-1.

After removal of non-fibrous matter from the specimens, follow the procedure in method A (see 8.2) or method B (see 8.3).

10 Calculation and expression of results

10.1 General

Calculate the linear density by converting the total length and total mass of warp threads and weft threads into units of the *tex* system, as shown in the formulae below.

10.2 Method A

Calculate the linear density of the conditioned yarns, Tt_c, expressed in *tex*, from the following Formula (1):

$$Tt_c = \times \frac{m_c \times 10^3}{L} \quad (1)$$

where

m_c is the mass of threads taken from fabric, expressed in g;

L is the total length of threads, expressed in m.

Calculate the total length of threads, L, from the following Formula (2):

$$L = l \times n \quad (2)$$

where

l is the mean straightened length, expressed in m;

n is the number of threads weighed.

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