



International
Standard

ISO 7211-2

**Textiles — Methods for analysis of
woven fabrics construction —**

Part 2:

**Determination of number of threads
per unit length**

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

Partie 2: Détermination du nombre de fils par unité de longueur

**Second edition
2024-08**

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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 document 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*, Subcommittee SC 24, *Conditioning atmospheres and physical tests for textile fabrics*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 248, *Textiles and textile products*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 7211-2:1984), which has been technically revised.

The main changes are as follows:

- in [Clause 5](#), two columns from the former Table have been deleted;
- in [Clause 12](#), "Test report", mandatory items have been added;
- the Annex has been deleted.

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.

Textiles — Methods for analysis of woven fabrics construction —

Part 2: Determination of number of threads per unit length

1 Scope

This document specifies three methods for the determination of the number of threads per centimetre in woven fabrics. Any of the three methods can be used, the choice depending on the character of the fabric. However, in case of dispute, method A takes precedence.

- Method A: Dissection of fabric, suitable for all fabrics. This is the most laborious method but has fewer limitations than the others; in particular, it is the only one that is really suitable for the examination of certain folded structures and other complicated weaves.
- Method B: Counting glass, suitable for fabrics with more than 50 threads per centimetre.
- Method C: Traversing thread counter, suitable for all fabrics.

Where the number of threads per centimetre is low, it can be convenient to express the results as the number of threads per decimetre.

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*

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 <http://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

4 Principle

Three methods of determining the number of threads per centimetre are specified, any of which can be used, the choice depending on the character of the fabric. The principles are as follows:

Method A: A section of fabric of dimensions in accordance with those given in [Clause 5](#) is dissected and the number of threads counted. The threads that are to be counted are preferably short, 10 mm or 20 mm being suitable.

Method B: The number of threads visible within the aperture of a specified counting glass is determined.

Method C: The number of threads per centimetre of the fabric is determined with the aid of a traversing thread counter.

5 Minimum measuring distance

Use the appropriate minimum measuring distance specified in [Table 1](#).

Table 1 — Minimum measuring distance

Number of threads per centimetre	Minimum measuring distance cm
Less than 10	10
10 to 25	5
25 to 40	3
More than 40	2

For the method A, take test specimens containing at least 100 threads.

For narrow fabrics having a width of 10 cm or less, count all warp threads including the selvedge ends and express the result as threads per full width.

When fabrics are patterned by areas of large differences in the density of thread spacing, select test specimens containing at least one weave repeat (see [Clause 11](#)).

6 Conditioning and testing atmosphere

The atmosphere for conditioning and testing shall be as specified in ISO 139.

7 Preparation of test specimens

No test specimens shall be selected from within 150 mm of either edge of the laboratory sample.

No specially prepared test specimens are required except for method A (see [8.2](#)). Count the threads in at least five different places in the fabric so that they do not contain the same yarns (ends and picks) and represent the fabric as fully as possible. The count of threads is based on the number of the individual threads that are actually present.

Condition the fabric or test specimens in the standard atmosphere (see [Clause 6](#)) for a minimum of 16 h, prior to testing in a tension free state.

8 Method A — Dissection of fabric

8.1 Apparatus

8.1.1 Clamp, holding two short pins parallel and with their points being within $\pm 0,2$ mm of the minimum measuring distance specified in [Clause 5](#).

Alternatively, when a clamp is not available:

8.1.2 Two dissecting needles,

8.1.3 Heavy steel rule, graduated at 0,5 mm,

8.1.4 A pair of pointed forceps.

8.2 Procedure

Take five test specimens at random (see [Clause 7](#)) 4 mm to 6 mm longer than the minimum measuring distance specified in [Clause 5](#) and sufficiently wide to facilitate handling. Take care not to disturb the distribution of threads, especially in a loosely woven fabric.

Pass the pins in the clamp ([8.1.1](#)) through a test specimen 2 mm to 3 mm from each end. Remove the shorter threads (those in the direction to be counted) from the test specimen outside the two pins, so that the measuring distance of fabric between the pins remain. Then remove the short threads from the test specimen and count them. Count any threads impaled on a pin as half a thread. It is usually convenient to employ a pair of pointed forceps ([8.1.4](#)) to remove the threads. The threads may be arranged in groups of ten for convenience in counting.

An approved alternative method where a clamp is not available is to insert two dissecting needles ([8.1.2](#)) the required distance apart by sliding their points down the appropriate graduation marks of a heavy steel rule ([8.1.3](#)) placed on edge.

9 Method B — Counting glass

9.1 Apparatus

Counting glass, the aperture width of which shall be $(20,00 \pm 0,05)$ mm or $(30,00 \pm 0,05)$ mm at all places. The thickness of the base plate at the edges of the aperture shall not exceed 1 mm.

9.2 Procedure

Use a measuring distance in accordance with [Clause 5](#).

Lay the fabric flat on a horizontal surface and place the counting glass ([9.1](#)) on the fabric so that one of the edges of its aperture is parallel to the warp threads.

In some fabrics, it is possible to see and count every thread. If this is not possible, weave repeats may be counted. Select a thread in the weave pattern which can be identified readily and position the counting glass so that this thread is adjacent to one side of the aperture of the counting glass. Count the number of whole repeats in the measuring distance, plus the remaining individual threads. Determine the number of threads in a pattern by analysis of the weave or dissection of the fabric.

Count the number of warp threads, or the number of weave repeats, or the number of warp thread units and fractions of a unit bounded by the appropriate pair of opposite sides of the aperture. Repeat with one of the edges of the aperture parallel to the weft threads, and count the number of weft threads or weave repeats or number of weft thread units in a similar manner.

If the face of the fabric is composed mainly of one set of threads, as with certain twills, satins, etc., it may be found easier to count on the back of the fabric, where the weave design is more readily recognizable.

10 Method C — Traversing thread counter

10.1 Apparatus

Traversing thread counter, incorporating a low power microscope, of $\times 4$ to $\times 20$, mounted so that it can be traversed by means of a screw over a graduated base sufficiently long to meet the minimum measuring distance requirements of [Clause 5](#). Types with an index line in the eyepiece or a pointer traversing with and visible through the microscope are equally suitable.

10.2 Procedure

Use a measuring distance in accordance with [Clause 5](#).

Lay the fabric flat on a horizontal surface and place the thread counter (10.1) upon it in such a way that when the screw is turned the microscope moves across the fabric in a direction that is either parallel to the warp or parallel to the weft, depending on which set of threads is being counted. Count the number of threads over the appropriate minimum measuring distance.

In some fabrics, it is possible to see and count every thread passed by the pointer or index line as it moves across the fabric. If this is not possible, weave repeats may be counted. Begin counting from a thread in the weave pattern which can be readily identified. Count the number of whole repeats in the measuring distance, plus the remaining individual threads. Determine the number of threads in a pattern by analysis of the weave or dissection of the fabric.

If the face of the fabric is composed mainly of one set of threads, as with certain twills, satins, etc., it may be found easier to count on the back of the fabric, where the weave design is more readily recognizable.

11 Calculation and expression of results

Calculate the number of warp and weft threads individually per centimetre. Quote the mean of individual results for each direction, that for the warp threads as ends per centimetre and that for the weft as picks per centimetre. If required, the number of threads per square centimetre is given by the sum of the mean ends and picks per centimetre.

When the number of threads is lower than 10 threads per centimetre, the results may be expressed and reported as the number of threads per decimetre.

For narrow fabrics (see [Clause 5](#)), report the results as the number of threads per full width.

When fabrics are patterned by areas of large differences in the density of thread spacing, if required, determine the number of threads in each area and report the number of threads per centimetre for different areas of the pattern.

EXAMPLE Fabrics, involving fancy weaving, with small area patterns of two or more types of yarns in the warp and weft directions.

12 Test report

The test report shall include at least the following particulars:

- a) a reference to this document, i.e. ISO 7211-2:2024;
- b) the atmosphere used for conditioning and testing;
- c) identification of laboratory sample;
- d) the actual method used (A, B or C);
- e) the measuring distance used;
- f) the number of measurements made;
- g) the number of warp ends per centimetre and weft picks per centimetre, and the mean value of warp ends per centimetre and weft picks per centimetre. If the fabric is patterned by broad areas of greater and lower density, and if required, this information can be given for each different portion of the pattern.

Where the number of threads is lower than 10 threads per cm, it is permissible to express and report the results as the number of threads per decimetre. For narrow fabrics (see [Clause 5](#)), report the results as the number of threads per full width;

- h) if required, the number of threads per square centimetre (or square decimetre);
- i) any deviations from the procedure;
- j) any unusual features observed;