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Nonwovens — Test methods —

Part 1: Determination of mass per unit area

Nontissés — Méthodes d'essai —

Partie 1: Détermination de la masse surfacique

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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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This document was prepared by Technical Committee ISO/TC 38, *Textiles,* 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 9073-1:1989), which has been technically revised.

The main changes compared to the previous edition are as follows:

— the title has been changed from "*Textiles — Test methods for nonwovens — Part 1: Determination of mass per unit area*" to "*Nonwovens — Test methods — Part 1: Determination of mass per unit area*";

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

— the text has been reviewed and improved.

A list of all parts in the ISO 9073 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.

Nonwovens — Test methods —

Part 1: Determination of mass per unit area

SAFETY WARNING — This document does not claim to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this document to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use. It is expected that the person performing this test has been fully trained in all aspects of this procedure.

1 Scope

This document specifies a method for the determination of the mass per unit area of nonwoven fabrics.

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 186, *Paper and board — Sampling to determine average quality*

ISO 9092, *Nonwovens — Vocabulary*

ISO 11224, *Textiles — Web formation and bonding in nonwovens — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 9092, ISO 11224 and the following 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
sample
product or portion of a product taken from a production lot for testing purposes, identifiable and traceable back to the origin

3.2
test specimen
specific portion of the identified *sample* (3.1) upon which a test is performed, many specimens sometimes being tested from the same sample, using different locations

4 Principle

A precisely measured area of the nonwoven is weighed and the mass is divided by this area, leading to the measurement of the mass per unit area.

5 Apparatus

5.1 Apparatus for cutting the test specimens, chosen from among the following:

5.1.1 Die, which cuts a test specimen of an area of at least 50 000 mm^2.

5.1.2 Template, with an area of at least 50 000 mm^2 (e.g. 250 mm x 200 mm), and a razor blade.

5.1.3 Steel rule, accurately graduated in mm, and a razor blade.

5.2 Balance, to accuracy of ±0,1 % of the determined mass

6 Sampling

6.1 General

Carry out sampling in accordance with ISO 186, ensuring that the areas from which samples are taken, have no visible flaws and are not creased.

If provided in the customer specification, take random sample as directed. If no requirements are provided, ISO 2859-1 or ISO 3951-1 can be used. In and of themselves, these are not valid sampling plans by default. An agreement between the purchaser and supplier requires taking into account process stability, producer's risk, consumer's risk, acceptable quality level and also the cost needs to be established.

In general, if the test characteristic can be considered normally distributed, the sampling procedures for inspection by variables will require fewer samples.

However, small samples cannot reflect that normal distribution and the estimated percent defective can therefore be over or underestimated. In this case, as well as for attribute data, the sampling procedures for inspection by attributes should be used.

In the absence of any sampling size requirement, Table 1 and Table 2 can be used. Switching rules are required to maintain the AQL protection.

Table 1 — Attributes (1.0 AQL, General Inspection Level II)

Number of units in the lot inclusive	Number of units that comprise the lot sample
1 to 150	13
151 to 280	32
281 to 500	50
501 to 1 200	80

Table 2 — Variables ("s" method, General Inspection Level II)

Number of units in the lot inclusive	Number of units that comprise the lot sample
1 to 15	3
16 to 25	4
26 to 50	6
51 to 90	9
91 to 150	13
151 to 280	18
281 to 500	25
501 to 1 200	35

NOTE An adequate specification or other agreement between the purchaser and supplier requires taking into account the variability between rolls of nonwoven fabric and between specimens from a swatch from a roll of material to provide a sampling plan with meaningful producer's risk, consumer's risk, and the intended quality level.

6.2 Preparation of test specimen

Take the test specimens from areas of the sample that are free of folds, wrinkles and any distortions that can make these specimens abnormal from the rest of the test material.

Attention is drawn to the fact that with nonwovens, sampling errors can be greater than testing error.

7 Conditioning

Bring test specimen to moisture equilibrium in the standard atmosphere for testing nonwovens as directed in ISO 139. Equilibrium is considered to have been reached when the increase in mass of the test specimen in successive weighing made at intervals of not less than 2 h does not exceed 0,25 % of the mass of the test specimen.

While conditioning for a fixed time cannot be accepted in cases of dispute, it can be sufficient in routine testing to expose the material to the standard atmosphere for testing textiles for a reasonable period of time before the specimens are tested in a tension-free condition.

8 Procedure

8.1 Mass measurement based on cutting test specimens to the proper size 50 000 mm^2

8.1.1 From each sample, cut at least three test specimens, each of an area of at least 50 000 mm^2, using either the die, or the template and a sharp razor blade (5.1). If there is insufficient material available to allow this, cut the largest rectangle possible of the available nonwoven and measure its area and mass (see 8.2). This should be noted in the result.

8.1.2 Determine the mass of each test specimen, using the balance, to an accuracy of at least 0,1 % of the mass.

8.1.3 Calculate the mass per unit area of each test specimen, the mean value in g/m^2 and, if required, the coefficient of variation, as a percentage.

8.2 Mass measurement of small/unique test specimens, where the largest rectangle possible is cut

8.2.1 Using an accurate ruler, determine the total area of the test specimen in mm^2.

8.2.2 Determine the mass of the test specimen, using the balance, to an accuracy of at least 0,1 % of its mass.

8.2.3 Calculate the mass per unit area of each test specimen, the mean value in g/m^2 and, if required, the coefficient of variation, as a percentage.

9 Expression of results

9.1 For each test specimen, calculate the mass per unit area (M) in g/m^2 from Formula (1):

$$M = \frac{m}{A} \times 10^6 \quad (1)$$

where

m is mass of test specimen, in g;

A is the area of the test specimen, in mm^2.

9.2 Calculate the mean value of mass per unit area, in g/m^2 to three significant figures.

9.3 Calculate the coefficient of variation, expressed as a percentage to the nearest 0,1 %, if required.

10 Precision

The precision for this method is not available at the time of publication.

11 Test report

In addition to the individual test results, the report shall include the following information:

a) a reference to this document, i.e. ISO 9073-1:2023;

b) test procedure number, complete identification of all tested materials and sampling method;

c) name and address of testing institution;

d) date of the test;

e) laboratory testing conditions;

f) number and size of test specimens tested;

g) mean value in g/m^2 and, if required, the coefficient of variation, as a percentage;

h) anything unusual noted during the testing;

i) any unusual features observed;

j) readable name and signature of the test runner.

SI values are regarded as the official standard system of measurement for this standard procedure. If other systems of measurement are used in place of SI units, their values shall be reported independently. Systems of measurement shall not be combined in any way, but shall be regarded and reported separately.