# International Standard ISO 8543

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## Textile floor coverings — Methods for determination of mass

*Revêtements de sols textiles — Méthodes de détermination de la masse*

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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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 8543 was prepared by Technical Committee ISO/TC 38, *Textiles*.

It cancels and replaces International Standards ISO 1764-1975, ISO 1958-1973, ISO 1959-1973 and ISO 2095-1977, of which it constitutes a technical revision.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.





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# Textile floor coverings — Methods for determination of mass

## 1 Scope

This International Standard specifies methods for the determination of the total mass per unit area, total pile mass per unit area, and mass of pile per unit area above the substrate, and for the calculation of measured surface pile density and measured pile fibre volume ratio, of textile floor coverings.

## 2 References

ISO 139, *Textiles — Standard atmospheres for conditioning and testing.*

ISO 1765, *Machine-made textile floor coverings — Determination of thickness.*

ISO 1766, *Carpets — Determination of thickness of pile above the substrate.*

ISO 1957, *Machine-made textile floor coverings — Sampling and cutting specimens for physical tests.*

## 3 Definitions

For the purpose of this International Standard, the following definitions apply.

**3.1 constant mass:** The mass attained when successive weighings at hourly intervals over a period of 3 h do not vary by more than 1 %.

**3.2 total pile mass per unit area:** The mass of the pile yarn in a unit area, including that forming the base of the tufts or held in the substrate but excluding any backing compound adhering to the pile yarn, determined in equilibrium with the standard atmosphere for conditioning and testing described in clause 4.

**3.3 measured surface pile density:** The ratio of mass to volume of the pile above the substrate measured under a pressure of 2,0 kPa*.

**3.4 measured pile fibre volume ratio:** The proportion of the volume of the pile actually occupied by fibre.

## 4 Atmosphere for conditioning and testing

The specimens shall be conditioned and the test conducted in one of the standard atmospheres for conditioning and testing textiles specified in ISO 139.

## 5 Number of specimens

The number of specimens for each determination in accordance with clauses 6, 7 and 8 shall be sufficient to give 95 % confidence limits of ± 6 %. Four specimens shall be tested initially and if the coefficient of variation (CV) calculated from these tests is >4 %, then further specimens shall be tested as follows:

if 4 % < CV ⩽ 5,5 %, test a further two specimens (total six);

if 5,5 % < CV ⩽ 7 %, test a further four specimens (total eight);

if CV > 7 %, test a further eight specimens (total twelve).

NOTE — Confidence limits $= \pm \frac{t \cdot CV}{\sqrt{n}}$

where

$t$ is the appropriate value for Student's $t$-test;

$n$ is the number of specimens tested.

## 6 Determination of total mass per unit area

### 6.1 Field of application

The method is applicable to textile floor coverings including those with varying pile height or density. It can be used prior to, and in conjunction with, the methods specified in clauses 7 and 8, with which it is compatible.

* 1 kPa = $10^3$ N/m$^2$

### 6.2 Principle

The mass of a measured area of textile floor coverings is determined in its entirety.

### 6.3 Apparatus

**6.3.1 Sharp pointed knife.**

**6.3.2 Rule**, graduated in millimetres.

**6.3.3 Balance**, accurate to 0,01 g.

### 6.4 Specimens

Select the specimens according to the standard procedure specified in ISO 1957. Cut out, using the sharp knife, at least four rectangular specimens, each at least 200 mm × 200 mm, with the sides parallel with, and at right angles to, the machine production direction.

NOTE — More than four specimens may be required in order to achieve the desired confidence limits (see clause 5).

### 6.5 Preparation of specimens

Lay the specimens out flat, singly and with the use-surface uppermost in the atmosphere for conditioning and testing described in clause 4, until they reach constant mass as defined in 3.1.

### 6.6 Procedure

**6.6.1** Determine the mass, $m$, in grams, of each specimen to the nearest 0,01 g.

**6.6.2** Measure the length and width of each specimen on the back, to the nearest millimetre, each in four places.

### 6.7 Expression of results

For each specimen, calculate the average length and width, in millimetres, and multiply these to obtain the area, $A$, in square millimetres. For each specimen, calculate the total mass per unit area, in grams per square metre, using the formula

$$10^6 \times \frac{m}{A}$$

Calculate the coefficient of variation (CV) and, if necessary, test further specimens according to clause 5. Calculate the mean and CV of all the results.

### 6.8 Test report

The test report shall include the following information:

a) that the procedure was conducted in accordance with clause 6 of this International Standard;

b) the identity (source and type) of the sample from which the specimens were taken, and whether it was of varying pile height or density;

c) the standard atmosphere used for conditioning and testing;

d) the number of specimens tested;

e) the total mass per unit area of each specimen, in grams per square metre;

f) the mean total mass per unit area, in grams per square metre, and the overall coefficient of variation.

## 7 Determination of total pile mass per unit area

### 7.1 Field of application

The method is applicable to textile floor coverings with uniform or varying pile height or density, but is not appropriate for those where backing compound has been applied to the tufts. It can be used in conjunction with the method specified in clause 6, with which it is compatible.

### 7.2 Principle

A known area of the textile floor coverings is weighed and dissected completely. The pile yarn is separated from the other components and is weighed separately.

NOTE — For the definition of total pile mass per unit area, see 3.2.

### 7.3 Apparatus

**7.3.1 Sharp pointed knife.**

**7.3.2 Rule**, graduated in millimetres.

**7.3.3 Balance**, accurate to 0,01 g.

**7.3.4 Dissecting needles** and **forceps.**

### 7.4 Specimens

Select specimens according to the standard procedure specified in ISO 1957. Cut out, using the sharp pointed knife, at least four square specimens, each at least 200 mm × 200 mm, selected at random from the area available. Trim them so that each side of each specimen is formed by a complete row of pile or line of stitches.

Measure the length and width at four places on the back of each specimen, to the nearest millimetre.

NOTE — More than four specimens may be required in order to achieve the desired degree of accuracy (see clause 5).

### 7.5 Procedure

**7.5.1** With the needle and forceps, carefully remove all the yarn forming tufts and collect it together for each specimen.

NOTE — In analysing multi-frame Wilton carpets, treat buried pile yarn from dead frames as pile yarn, irrespective of whether it forms tufts in the specimen under examination or not.

**7.5.2** Condition the tufts and buried pile (if present) in the atmosphere for conditioning and testing specified in clause 4, until they reach constant mass as defined in 3.1.

**7.5.3** Determine the mass $m$, in grams, of the conditioned yarn forming tufts and of the buried pile (if present) to the nearest 0,01 g.

NOTE — In some multi-frame Wilton carpets, the buried pile yarn may be of a different composition from the working pile. If this is so in the specimen under test, determine the mass of the buried pile separately from that of the working pile.

### 7.6 Expression of results

Calculate the area $A$ of each specimen, in square millimetres. Then calculate the total pile mass per unit area, in grams per square metre, for each specimen, using the formula

$$10^6 \times \frac{m}{A}$$

Calculate the coefficient of variation (CV) and, if necessary, test further specimens according to clause 5. Calculate the mean and CV of all the results.

### 7.7 Test report

The test report shall include the following information:

a) that the test procedure was conducted in accordance with clause 7 of this International Standard;

b) the identity (source and type) of the sample from which the specimens were taken, and whether it was of varying pile height or density;

c) the standard atmosphere used for conditioning and testing;

d) the number of specimens tested;

e) the total pile mass per unit area, in grams per square metre, for each specimen;

f) the mean total pile mass in grams per square metre and the overall coefficient of variation;

g) if, in a multi-frame Wilton carpet, the buried pile is of a different composition from the working pile, state this fact and report the buried pile mass separately from that of the working pile.

## 8 Determination of mass of pile per unit area above the substrate

### 8.1 Field of application

This method is applicable to textile floor coverings with a pile of cut and/or looped yarn, and may be used for textile floor coverings with varying pile height or density. It may be used in conjunction with the methods specified in clauses 6 and 9, and in ISO 1766, on the same specimens.

### 8.2 Principle

The masses of specimens of textile floor coverings of known dimensions are determined before and after the pile has been shorn.

### 8.3 Apparatus

**8.3.1 Sharp pointed knife.**

**8.3.2 Balance**, accurate to 0,01 g.

**8.3.3 Rule**, graduated in millimetres.

**8.3.4 Band knife machine** or **hand-held clippers**, capable of shearing the pile close to the substrate.

NOTES

1 The particulars of the shearing machine and details of its operation should be agreed between the interested parties.

2 The results from the two types of apparatus may not be identical.

**8.3.5 Press and cutter**, or other apparatus, either circular or square, of known areas $A_2$, not less than 25 000 mm$^2$.

### 8.4 Specimens

Select specimens according to the standard procedure specified in ISO 1957. Cut out, using the sharp pointed knife, at least four specimens, each at least 200 mm × 200 mm, with the sides parallel with, and at right angles to, the direction of manufacture.

NOTE — More than four specimens may be required in order to achieve the desired degree of accuracy (see clause 5).

### 8.5 Preparation of specimens

Lay the specimens out flat, singly and with the use-surface uppermost in the atmosphere for conditioning and testing described in clause 4, until they reach constant mass as defined in 3.1.

### 8.6 Procedure

**8.6.1** Determine the mass of each specimen, $m_1$, in grams, to the nearest 0,01 g.