INTERNATIONAL STANDARD 1959

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Carpets — Determination of measured surface pile density and measured pile fibre volume ratio

First edition — 1973-12-15

UDC 645.12 : 677.017.25 : 531.751

Ref. No. ISO 1959-1973 (E)

Descriptors : textiles, floor coverings, carpets, density measurement, pile density.

Price based on 3 pages

FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up 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.

Prior to 1972, the results of the work of the Technical Committees were published as ISO Recommendations; these documents are now in the process of being transformed into International Standards. As part of this process, International Standard ISO 1959 replaces ISO Recommendation R 1959-1971, drawn up by Technical Committee ISO/TC 38, *Textiles*.

The Member Bodies of the following countries approved the Recommendation :

Australia	Iran	Spain
Belgium	Israel	Sweden
Brazil	Japan	Switzerland
Chile	Korea, Rep. of	Thailand
Denmark	Netherlands	Turkey
Egypt, Arab Rep. of	New Zealand	United Kingdom
France	Norway	U.S.S.R.
Germany	Poland	
India	South Africa, Rep. of	

The Member Body of the following country expressed disapproval of the Recommendation on technical grounds :

U.S.A.

Printed in Switzerland

Carpets — Determination of measured surface pile density and measured pile fibre volume ratio

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies a method for the determination of

a) measured surface pile density, and

b) measured pile fibre volume ratio

of a carpet. It is applicable to carpets with pile capable of being shorn from the backing.

2 REFERENCES

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

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

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

3 DEFINITIONS

3.1 measured surface pile density : The ratio of mass to volume of the pile above the backing measured under the standard pressure of $2{,}0 \times 10^{-3}$ N/mm².

3.2 measured pile fibre volume ratio : The proportion of the volume of the pile actually occupied by fibre. It may be estimated by expressing the measured surface pile density as a percentage of the pile fibre density (see 9.3).

4 PRINCIPLE

Determination of the thickness and mass of each specimen before and after the pile has been shorn. Calculation, from the values obtained, of the measured surface pile density and the measured pile fibre volume ratio.

5 APPARATUS

5.1 Carpet-shearing machine. Any machine capable of shearing the pile close to the backing may be used. The particulars of the shearing machine and details of its operation shall be agreed between the parties interested in the test results.

5.2 Carpet thickness tester, capable of measuring thickness in accordance with the standard procedure specified in ISO 1765.

5.3 Sharp pointed knife, or **scissors.**

5.4 Rule, graduated in millimetres.

5.5 Balance, accurate to 0,001 g.

5.6 Press and cutter of known area (A_2) of at least 10 000 mm², which may be circular or square in shape.

6 ATMOSPHERE FOR CONDITIONING AND TESTING

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

7 TEST SPECIMENS

7.1 Select the specimens according to the standard procedure specified in ISO 1957. Cut four specimens, each at least 200 mm × 200 mm, in line with warp and weft and following precisely one warp and one weft thread.

7.2 Condition the specimens in the standard atmosphere chosen for testing (see section 6), until they are in equilibrium with this atmosphere; alternatively, condition the specimens in this atmosphere for a period of 72 h.

8 PROCEDURE

8.1 Measure the thickness of each specimen at five places, under the standard pressure using the method specified in ISO 1765.

8.2 Determine the mass of the pile using the method specified in the Annex.

8.3 Measure the thickness of each shorn specimen as specified in 8.1.

9 CALCULATION AND EXPRESSION OF RESULTS

9.1 For each specimen calculate the mean thickness unshorn and the mean thickness shorn. For each specimen calculate the thickness of pile as the difference between these two values, in millimetres to the nearest 0,1 mm.

Calculate the mean pile thickness δ for all specimens, in millimetres to the nearest 0,1 mm.

9.2 Calculate the mean value of the mass of pile above unit area of backing as described in A.3.6 of the Annex.

The measured surface pile density under standard pressure (in grams per cubic centimetre) is equal to

$$\frac{10^6 \times \text{mass of pile above unit area of backing (g/m}^2\text{)}}{\text{pile thickness (mm)}}$$

$$= \frac{10^3 \left[(m_1/A_1) - (m_2/A_2)\right]}{\delta} \text{ g/cm}^3$$

where

m_1/A_1 is the total mass per square millimetre of carpet for each specimen, as described in A.3.2 of the Annex;

m_2/A_2 is the mass per square millimetre of carpet after shearing, as described in A.3.4 of the Annex;

δ is the pile thickness, in millimetres.

9.3 Calculate the measured pile fibre volume ratio using the formula

$$\frac{10^3 \left[(m_1/A_1) - (m_2/A_2)\right]}{\delta \times \rho}$$

where ρ is the pile fibre density, in grams per cubic centimetre[1].

10 TEST REPORT

The test report shall give the following particulars :

a) that the test was conducted in accordance with this International Standard and details of any operations not included or optional;

b) the pile thickness for each specimen, and the mean pile thickness, to the nearest 0,1 mm;

c) the mass of pile above unit area of backing for each specimen and the mean mass, in grams per square metre;

d) the measured surface pile density under the standard pressure, in grams per cubic centimetre;

e) the measured pile fibre volume ratio;

f) the standard atmosphere used (temperate or tropical).

1) If the pile consists of two or more types of fibre, the average density ρ may be calculated as follows :

$$\rho, \text{mixture} = \frac{100}{(C_1/\rho_1) + (C_2/\rho_2) + \ldots + (C_n/\rho_n)}$$

where

C_1 is the percentage, by mass, of fibre of density ρ_1;

C_2 is the percentage, by mass, of fibre of density ρ_2, etc.

ANNEX

DETERMINATION OF MASS PER UNIT AREA OF PILE THAT CAN BE SHORN AWAY FROM THE BACKING

A.1 ATMOSPHERE FOR CONDITIONING

Condition the specimens in the standard atmosphere chosen for testing (see section 6), until they are in equilibrium with this atmosphere.

A.2 PROCEDURE

A.2.1 Weigh each specimen to the nearest 0,01 g (mass m_1).

A.2.2 Measure the length and width at four places on the back of each specimen to the nearest millimetre.

A.2.3 Shear the pile from the specimen, using forward strokes with the clipper in all directions. Shear as close as possible to the backing by running the points of the comb and cutter along the backing without digging in. Avoid plucking any tufts or damaging the backing yarns. Clean the specimen by brushing, blowing or suction during and after the shearing. Continue shearing until no further significant amount of pile yarn dust appears on the shearing blades or falls away when the specimen is shaken, pile down, over a smooth surface of contrasting colour. It is not necessary to shear to the edges of the specimen provided that an area of at least 10 000 mm^2 in the centre is closely shorn.

A.2.4 After shearing, cut from the centre of each specimen a completely shorn area of not less than 10 000 mm^2 using the cutter or press, ensuring that the area is taken not less than 25 mm from the edge of the specimen. The backing yarns in the area taken must be undamaged, and no tufts must have been plucked from it.

A.2.5 Condition each area cut out of the shorn carpet specimens in the standard atmosphere chosen for testing (see section 6), until successive weighings at intervals of 2 h do not show progressive change in mass greater than 0,25 %. Record the final conditioned mass (m_2) of the shorn area to the nearest 0,01 g.

A.3 CALCULATION AND EXPRESSION OF RESULTS

A.3.1 From the measurements made according to A.2.2, calculate for each specimen the average length and width, and the area, A_1, in square millimetres.

A.3.2 Calculate the total mass per square millimetre of carpet for each specimen separately (m_1/A_1).

A.3.3 The area A_2, in square millimetres of each specimen of shorn carpet taken as described in A.2.4, is determined from the area of the cutter used.

A.3.4 Calculate the mass per square millimetre (m_2/A_2) for each area of shorn carpet taken as described in A.2.4.

A.3.5 For each specimen, calculate the mass of pile above unit area of backing, using the formula

$$10^6\left(\frac{m_1}{A_1}-\frac{m_2}{A_2}\right)\text{g/m}^2$$

A.3.6 Calculate the mean value of the mass of pile above the unit area of backing from the values obtained from all the specimens.