

# ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

## ISO RECOMMENDATION R 1959

CARPETS

DETERMINATION OF MEASURED SURFACE PILE DENSITY  
AND MEASURED PILE FIBRE VOLUME RATIO

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1st EDITION

April 1971

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## BRIEF HISTORY

The ISO Recommendation R 1959, *Carpets – Determination of measured surface pile density and measured pile fibre volume ratio*, was drawn up by Technical Committee ISO/TC 38, *Textiles*, the Secretariat of which is held by the British Standards Institution (BSI).

Work on this question led to the adoption of Draft ISO Recommendation No. 1959, which was circulated to all the ISO Member Bodies for enquiry in April 1970. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

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

The following Member Body opposed the approval of the Draft :

U.S.A.

This Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided to accept it as an ISO RECOMMENDATION.

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ISO/R 1959:1971

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ISO Recommendation

R 1959

April 1971

## CARPETS

DETERMINATION OF MEASURED SURFACE PILE DENSITY  
AND MEASURED PILE FIBRE VOLUME RATIO

## 1. SCOPE

This ISO Recommendation describes 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. DEFINITIONS

- 2.1 *Measured surface pile density.* The ratio of mass to volume of the pile above the backing measured under the standard pressure of  $1.96 \times 10^{-3}$  N/mm<sup>2</sup> (0.2 gf/mm<sup>2</sup>).
- 2.2 *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 clause 8.3).

## 3. 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.

## 4. APPARATUS

- 4.1 *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 should be agreed between the parties interested in the test results.
- 4.2 *Carpet thickness tester,* capable of measuring thickness in accordance with the standard procedure specified in ISO Recommendation R 1765, *Machine-made textile floor coverings - Determination of thickness.*
- 4.3 *Sharp pointed knife, or scissors.*
- 4.4 *Rule,* graduated in millimetres.
- 4.5 *Balance,* accurate to 0.001 g.
- 4.6 *Press and cutter* of known area ( $S_2$ ) of at least 10 000 mm<sup>2</sup>, which may be circular or square in shape.

## 5. ATMOSPHERE FOR CONDITIONING AND TESTING

The atmosphere for conditioning and testing should be one of the standard atmospheres for testing specified in ISO Recommendation R 139, *Standard atmospheres for conditioning and testing textiles*.

## 6. TEST SPECIMENS

6.1 Select the specimens according to the standard procedure described in ISO Recommendation R 1957, *Machine-made textile floor coverings – Sampling and cutting specimens for physical tests*. 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.

6.2 Condition the specimens in the standard atmosphere chosen for testing (see section 5), until they are in equilibrium with this atmosphere; alternatively, condition the specimens in this atmosphere for a period of 72 hours.

## 7. PROCEDURE

7.1 Measure the thickness of each specimen at five places, under the standard pressure using the method specified in ISO Recommendation R 1765, *Machine-made textile floor coverings – Determination of thickness*.

7.2 Determine the mass of the pile using the method specified in the Annex to this ISO Recommendation.

7.3 Measure the thickness of each shorn specimen as specified in clause 7.1.

## 8. CALCULATION AND EXPRESSION OF RESULTS

8.1 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  $t$  for all specimens in millimetres to the nearest 0.1 mm.

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

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

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

$$= \frac{10^3 \left( \frac{m_1}{S_1} - \frac{m_2}{S_2} \right)}{t} \text{ g/cm}^3$$

where

$\frac{m_1}{S_1}$  is the total mass per square millimetre of carpet for each specimen, as described in clause A.3.2 of the Annex;

$\frac{m_2}{S_2}$  is the mass per square millimetre of carpet after shearing, as described in clause A.3.4 of the Annex;

$t$  is the pile thickness in millimetres.

8.3 Calculate the measured pile fibre volume ratio using the formula

$$\frac{10^3 \left( \frac{m_1}{S_1} - \frac{m_2}{S_2} \right)}{t \times D}$$

where  $D$  is the pile fibre density in grammes per cubic centimetre\*.

## 9. TEST REPORT

The test report should include the following information:

- (a) that the test was conducted in accordance with this ISO Recommendation, giving details of any optional requirements that have been met;
- (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 grammes per square metre;
- (d) the measured surface pile density under the standard pressure in grammes per cubic centimetre;
- (e) the measured pile fibre volume ratio;
- (f) the standard atmosphere used (temperate or tropical).

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\* If the pile consists of two or more types of fibre, the average density  $D$  may be calculated as follows :

$$D, \text{ mixture} = \frac{100}{\frac{C_1}{D_1} + \frac{C_2}{D_2} + \dots + \frac{C_n}{D_n}}$$

where

$C_1$  is the percentage, by mass, of fibre of density  $D_1$ ;

$C_2$  is the percentage, by mass, of fibre of density  $D_2$ , etc.