
INTERNATIONAL STANDARD



536

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

Paper and board – Determination of grammage

Papier et carton – Détermination du grammage

First edition – 1976-06-15

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UDC 676.2.017.25

Ref. No. ISO 536-1976 (E)

Descriptors : papers, paperboards, determination, surface 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.

International Standard ISO 536 was drawn up by Technical Committee ISO/TC 6, *Paper, board and pulps*, and was circulated to the Member Bodies in August 1975.

It has been approved by the Member Bodies of the following countries :

Australia	Iran	Romania
Belgium	Ireland	South Africa, Rep. of
Czechoslovakia	Israel	Spain
Finland	Mexico	Sweden
France	Netherlands	Switzerland
Germany	New Zealand	Turkey
Hungary	Norway	United Kingdom
India	Poland	

The Member Bodies of the following countries expressed disapproval of the document on technical grounds :

Bulgaria
Canada

This International Standard cancels and replaces ISO Recommendation R 536-1967, of which it constitutes a technical revision.

Paper and board – Determination of grammage

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies a method of determining the grammage of paper and board.

2 REFERENCES

ISO/R 186, *Method of sampling paper for testing*.

ISO 187, *Paper and board – Conditioning of test samples*.¹⁾

ISO/R 287, *Paper – Method for the determination of moisture content of paper (Oven-drying method)*.

3 DEFINITION

For the purposes of this International Standard the following definition applies.

grammage: The mass of a unit area of paper or board determined by the specified method of test.

4 PRINCIPLE

Measurement of the area of the test pieces and their mass and calculation of the mass per square metre.

5 APPARATUS

5.1 Cutting device

The cutting device shall normally be capable of repeatedly cutting out test pieces whose area, in at least 95 instances out of 100, falls within $\pm 1\%$ of a known area. This shall be checked frequently by the method given in 5.3.1 and, provided that the above accuracy is attained, the mean area obtained in these check tests shall be used for calculating grammage.

With certain types of paper and board it will be found, after carrying out this determination of area, that test pieces cannot be cut with the accuracy just defined; in such instances the area of every test piece shall be determined individually (see 5.3.1).

5.2 Weighing device

The weighing device shall be accurate enough, over the range of mass for which it is used, to measure to within 0,5 % of the actual mass. It shall be sensitive enough to detect a change of $\pm 0,2\%$ of the mass to be weighed and, if the device is of the direct-reading type, it shall be graduated so that readings may be taken to this degree of accuracy. For checking of the weighing device, see 5.3.2.

Special sheet-weighing devices, designed to weigh test pieces of a given size and indicating grammage, may be used provided that the above conditions are fulfilled and that the area of each test piece in a single weighing is not less than 500 cm² (see clause 8 and 9.2).

When in use, the weighing device shall be shielded from air currents.

5.3 Calibration of apparatus

5.3.1 Checking of cutting device

The area cut shall be checked frequently by measuring 20 test pieces and calculating their areas (see clause 8). The cutting accuracy specified in 5.1 is attained when the standard deviation of the individual area is less than 0,5 % of the mean area, in which case this mean area shall be used for calculating grammage in subsequent tests. If the standard deviation exceeds this value, the area of every test piece shall be determined individually.

5.3.2 Checking of weighing device

The weighing device shall be checked frequently by applying accurately measured masses with both increasing and decreasing loads.

6 SAMPLING

The selection of units and sheets and the taking of specimens shall be carried out in accordance with ISO/R 186. The number of specimens taken shall be at least five and their combined area shall be sufficient for at least 20 test pieces.

1) At present at the stage of draft. (Revision of ISO/R 187-1961.)

7 CONDITIONING

For reference purposes, the specimens shall be conditioned in the preferred atmosphere specified in ISO 187.

If a determination is made in the oven-dry or "as-taken" condition (see annex), or if any other conditioning atmosphere is used, the reported results shall be qualified by a statement indicating the condition of the test pieces at the time of weighing.

8 PROCEDURE

Take at least 20 test pieces in all from at least five conditioned specimens, if possible the same number from each specimen. Each test piece shall have an area of not less than 500 cm², preferably 200 mm × 250 mm; it may, if necessary, be composed of several smaller rectangular pieces. Determine the area of the test piece by calculation from measurements taken to the nearest 0,5 mm. If the cutting device does not satisfy the accuracy requirements of 5.1, measure the dimensions of each test piece.

Weigh each test piece.

9 EXPRESSION OF RESULTS

9.1 If the procedure in clause 8 is followed, the grammage g of each test piece is given, in grams per square metre, by the formula

$$g = \frac{m}{A} \times 10\,000$$

where

m is the mass of the test piece, in grams;

A is the area of the test piece, in square centimetres.

9.2 If a specified sheet-weighing device as described in 5.2 is used, then the grammage g is given, in grams per square metre, by the formula

$$g = \frac{A'}{A} \times g'$$

where

g' is the indicated grammage of the test piece, in grams per square metre;

A' is the area of the test piece for which the device is calibrated, in square centimetres;

A is the area of the weighed test piece, in square centimetres.

9.3 Calculate the mean of the results, and express in grams per square metre to three significant figures.

10 TEST REPORT

The test report shall include the following particulars :

- a) reference to this International Standard;
- b) the result as indicated in 9.3;
- c) the conditioning atmosphere used;
- d) the number of tests;
- e) the standard deviation.¹⁾

If specimens have been taken from more than one position across a reel or sheet and information on grammage variation is required, the details in b), c), d) and e) shall be reported for each position separately.

¹⁾ It is suggested that, in addition, the precision of the mean (confidence limits) at the 95 % probability level should be quoted for information.

ANNEX

DETERMINATION OF GRAMMAGE ON OVEN-DRY AND "AS-TAKEN" BASES

A.1 DETERMINATION OF GRAMMAGE ON AN OVEN-DRY BASIS

Determine the area after conditioning in the preferred atmosphere (see clause 7) and the mass, after oven drying, according to ISO/R 287.

A.2 DETERMINATION OF GRAMMAGE "AS TAKEN"

This is based on the material in the condition pertaining at the time of sampling. Select specimens and cut and weigh test pieces from them as quickly as the need for accuracy will allow. When taking the specimens from a roll, cut them out from such a depth that their moisture content has remained unaffected by having not been in equilibrium with the ambient atmosphere.

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