



Paper — Determination of bulking thickness and apparent density

Papier — Détermination de l'épaisseur moyenne et de la masse volumique

First edition — 1980-10-01

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UDC 676.3 : 676.017.25

Ref. No. ISO 438-1980 (E)

Descriptors : paper, tests, determination, bulk of paper, thickness, bulk density.

Paper — Determination of bulking thickness and apparent density

1 Scope and field of application

This International Standard specifies a method of measuring the bulking thickness of paper of grammage up to 224 g/m². It also specifies a method of calculating the apparent density of the paper.

The method of measurement is not suitable for measuring the bulking thickness of certain soft papers, such as some felts and tissues which are crêped and/or embossed, due to the slow or excessive compression which takes place when measurements are made on such materials.

It should be noted that two alternative pressures are permitted (see table 1); the pressure of 100 ± 10 kPa is preferred.

NOTE — It is stressed that the bulking thickness of paper, obtained by the method specified in this International Standard, is not necessarily identical with the thickness of a single sheet of paper, obtained by the method specified in ISO 534 using the same apparatus.

2 References

- ISO 186, *Paper and board — Sampling for testing.*
- ISO 187, *Paper and board — Conditioning of samples.*
- ISO 534, *Paper and board — Determination of the thickness of single sheets and the apparent density of board.*
- ISO 536, *Paper and board — Determination of grammage.*
- ISO 5725, *Precision of test methods — Determination of repeatability and reproducibility by interlaboratory tests.*

3 Definitions

3.1 bulking thickness : The thickness of a single sheet of paper, calculated from the thickness of several superimposed sheets (termed a pack), measured under an applied static load, using the standard method of test.

3.2 apparent density : The mass per unit volume of the paper, calculated from its grammage and bulking thickness, and expressed in grams per cubic centimetre.

4 Principle

- 4.1** Measurement of the thickness of a pack of sheets of paper over a specified area and under a specific static load by means of a high precision micrometer. Expression of results in terms of the bulking thickness per sheet.
- 4.2** Calculation of the apparent density of the paper from a knowledge of its grammage and bulking thickness.

5 Apparatus

5.1 Micrometer, provided with two plane parallel circular pressure faces, between which the paper is placed for measurement.

The pressure exerted between the pressure faces during the thickness measurement shall be as given in table 1. A dead weight shall be used, to ensure that the pressure between the faces is uniform within the limits stated.

Table 1 — Pressure between pressure faces

Pressure, kPa	Status of value
100 ± 10	Preferred
50 ± 5	Alternative

The pressure faces, two in number, shall form an integral part of the micrometer, such that one face is fixed and the second face is capable of movement in a direction perpendicular to the plane of the fixed face.

One face shall be 16,0 ± 0,5 mm in diameter, and the other face shall be of at least that diameter. Thus, a circular region of a test piece, nominally 200 mm² in area, is subjected, during the thickness measurement, to the pressure exerted between the faces.

The whole area of the smaller face shall be in contact with the larger face when the micrometer reading is zero.