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**Paper and board — Determination of water absorption —
Cobb method**

Papier et carton — Détermination de l'absorption d'eau — Méthode de Cobb

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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.

ISO 535-1976, the revision of ISO Recommendation R 535-1967, was drawn up by Technical Committee ISO/TC 6, *Paper, board and pulps*; it contains the notes to sub-clauses 6.1 and 6.2 which were circulated, in the form of an Addendum, to the Member Bodies in February 1975.

This Addendum was approved by the Member Bodies of the following countries :

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

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

U.S.A.

This International Standard cancels and replaces ISO/R 535-1967, which had been approved by the Member Bodies of the following countries :

Australia	Germany	Portugal
Austria	Greece	Romania
Belgium	India	South Africa, Rep. of
Brazil	Israel	Spain
Canada	Italy	Sweden
Czechoslovakia	Japan	Switzerland
Chile	Morocco	Turkey
Denmark	Netherlands	United Kingdom
Egypt, Arab Rep. of	New Zealand	U.S.S.R.
Finland	Norway	Yugoslavia
France	Poland	

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

Ireland
U.S.A.

Paper and board — Determination of water absorption — Cobb method

0 INTRODUCTION

This test permits the determination of the quantity of water that can be absorbed by a paper or board in a given time.

Water absorption capacity is a function of various characteristics of paper or board such as sizing, porosity, etc. It cannot be used for a precise evaluation of the writing properties.

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies a method of determining the water absorption capacity of paper or board under standard conditions.

2 REFERENCES

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

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

ISO 554, *Standard atmospheres for conditioning and/or testing — Specifications.*

3 DEFINITION

For the purpose of this International Standard, the following definition applies :

water absorption of paper or board (Cobb value) : The mass of water, in grams, absorbed by 1 m² of paper or board in a specified time under a head of 1 cm of water and at 20 ± 1 °C or at one of the other temperatures specified in ISO 187.

4 PRINCIPLE

Weighing of a test piece immediately before beginning the test and again after exposure to water, followed by blotting, under specified conditions.

5 REAGENT

Use for the test only distilled water or water of equivalent purity.

The temperature of the water is important and should be maintained during the test at 20 ± 1 °C or at one of the other temperatures specified in ISO 187 (see also ISO 554).

6 APPARATUS

6.1 Cobb absorbency tester

For determining water absorption capacity, any type of apparatus may be used which permits

- an immediate and uniform contact of the water with the part of the test piece submitted to the test, and
- the rapid withdrawal of the test piece without the risk of contact with the water outside the test area.

The test area is 100 cm².

In its simplest form, the apparatus consists of a rigid metal cylinder of 100 ± 0,2 cm² internal cross-sectional area (corresponding to a diameter of 112,8 ± 0,2 mm) and about 5 cm high with means for clamping it on the surface of the test piece. The thickness of the cylinder wall is not important but should be such as not to damage the surface of the test piece. The lower edge of the cylinder in contact with the test piece should be flat and machined smooth.

NOTE — For materials where leakage between the clamp and the upper surface of the test piece may occur during the test, a soft, elastic, non-absorbent gasket may be used to prevent this. The gasket should have the same internal dimensions as the upper clamp.

The test piece is placed on a flat base which has been previously covered with a piece of sheet rubber so that a leakproof seal is formed when the cylinder is clamped in the testing position.

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

6.2 Blotting apparatus

6.2.1 Blotting paper having a grammage of 200 to 250 g/m² and having absorbent properties, measured by the Klemm method (see the annex), of about 75 mm.

6.2.2 Smooth metal roller, face width 20 cm and mass 10 ± 0,5 kg.

6.3 Auxiliary apparatus

6.3.1 Analytical balance, sensitive to 0,001 g over the working range corresponding to the test piece of area 100 cm².

6.3.2 Stop-watch.

6.3.3 Glass measuring cylinder.

7 SAMPLING, CONDITIONING AND PREPARATION OF TEST PIECES

7.1 Sampling and conditioning shall be carried out in accordance with ISO/R 186 and ISO 187 (see also ISO 554) respectively.

7.2 The standard Cobb method recommends a standard test area of 100 cm² and states that sufficient material should be available to provide at least ten test pieces 12,5 cm square (five for each side of the paper or board, unless otherwise stated). When the test pieces available are too small to comply with standard conditions, a smaller test area may be used, by agreement between the interested parties.

8 PROCEDURE

Carry out the test in a standard reference atmosphere in accordance with ISO 187 (see also ISO 554).

8.1 Mounting of test piece

Ensure that the edge of the cylinder, which will come into contact with the test piece, and the surface of the piece of sheet rubber, are dry before starting each test.

Weigh the test piece to the nearest 0,001 g and place it with the surface to be tested uppermost on the piece of sheet rubber. Place the cylinder on the test piece with the machined edge in contact with the test piece and clamp sufficiently firmly to prevent any leakage of water between it and the test piece; pour 100 ml of water, or proportionately less for a smaller test area, into the cylinder, thus providing a head of 1 cm, and start the stop-watch immediately. Renew the water for each determination.

This procedure is based on the apparatus described in 6.1. The order of operation may be varied according to the design of the apparatus used.

8.2 Exposure to water, and blotting

For the purpose of this International Standard, the time of test is defined as the time between the moment the water comes into contact with the test piece and the commencement of blotting.

The test procedure for any selected exposure time should, where possible, conform to the conditions summarized in the table in 8.4, the exposure time being selected according to the water absorption capacity of the paper or board under consideration. If, for example, a test time of 60 s has been selected, pour off the excess water after 45 s, taking care that no water comes into contact with the surface of the test piece outside the test area. Quickly unclamp the cylinder and remove it. Remove the test piece and place it, with the test side uppermost, on a sheet of blotting paper (6.2.1) previously positioned on a flat, rigid surface. Exactly 60 s after the commencement of the test, place a second sheet of blotting paper on top of the test piece and remove the excess water, using the hand roller (6.2.2), with two rollings (once forward and once back) without exerting any pressure on the roller.

NOTE - On corrugated fibreboard the roller should be applied with its axis parallel to the flutes.

After blotting, fold the test piece with the wet side inside and weigh it immediately so that the increase in mass due to absorption of water can be determined before loss by evaporation occurs.

8.3 Rejection of test pieces

Reject test pieces

- which show excess water after blotting (which is indicated by the gloss of the surface), or
- which have been penetrated by the water.

If the percentage of rejects exceeds 20 %, reduce the time of test until a satisfactory result is obtained, the minimum test time being 30 s.

8.4 Time of test

The following table summarizes the recommended times of test together with the times at which excess water is removed and the times at which blotting is carried out :

Recommended time of test	Symbol	Time at which excess water is removed ¹⁾	Time at which blotting is carried out ¹⁾
s		s	s
30	C ₃₀	20	30
60	C ₆₀	45	60
120	C ₁₂₀	105	120
300	C ₃₀₀	285	300

1) The times given are calculated from the moment the water comes into contact with the test piece (see 8.2).

The time of test may be prolonged according to the water absorption capacity and to the special nature of the paper or board under consideration. In every case except the first, the difference between the values in the third and fourth columns is 15 s.

9 EXPRESSION OF RESULTS

9.1 For each side of the paper or board, express the results as follows :

9.1.1 Give the result for each test piece, in grams per square metre, to the first decimal place.

9.1.2 Calculate the mean, \bar{x} , of at least five determinations, expressed in grams per square metre, to the first decimal place.

9.1.3 Calculate the standard deviation, s .

9.1.4 State the number of determinations, n .

9.1.5 Use a standard notation, for example :

Cobb_{60} (value in grams per square metre) at t °C

Cobb_{300} (value in grams per square metre) at t °C
dependent on the time of test in seconds.

9.2 If the faces are not identifiable, give the mean and the standard deviation of the grouped results.

9.3 In the case of tests made with a cylinder of cross-sectional area other than 100 cm², state the value of that non-standard area.

10 TEST REPORT

The test report shall include the following information :

- a) a reference to this International Standard;
- b) the results obtained and the form in which they are expressed;
- c) any operational details not specified in this International Standard, or optional;
- d) any circumstances which may have affected the results;
- e) the number of rejected test pieces and reason for rejection.

ANNEX

MEASUREMENT OF ABSORBENT PROPERTIES – KLEMM METHOD

By the Klemm method, water absorption capacity is determined by cutting strips of blotting paper in both the machine and cross directions and immersing these strips vertically in water (see clause 5) for 10 min to a depth of 6 mm. The height to which the water rises above the level of the water in the container is measured and recorded in millimetres.

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