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Revised

ISO RECOMMENDATION

R 535

DETERMINATION OF THE WATER ABSORPTION OF PAPER OR BOARD (COBB METHOD)

1st EDITION
January 1967

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BRIEF HISTORY

The ISO Recommendation R 535, *Determination of the Water Absorption of Paper or Board (Cobb Method)*, was drawn up by Technical Committee ISO/TC 6, *Paper, Board and Pulps*, the Secretariat of which is held by the Association Française de Normalisation (AFNOR).

Work on this question by the Technical Committee began in 1960 and led, in 1964, to the adoption of a Draft ISO Recommendation.

In April 1965, this Draft ISO Recommendation (No. 791) was circulated to all the ISO Member Bodies for enquiry. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies:

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

Two Member Bodies opposed the approval of the Draft:

Ireland
U.S.A.

The Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided, in January 1967, to accept it as an ISO RECOMMENDATION.

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ISO Recommendation R 535 January 1967

DETERMINATION OF THE WATER ABSORPTION OF PAPER OR BOARD (COBB METHOD)

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 appreciation of the writing properties.

1. SCOPE

This ISO Recommendation describes a method of determining the water absorption capacity of paper or board under standard conditions.

2. DEFINITION

Water absorption of paper or board (Cobb value). The amount of water in grammes 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 Recommendation R 187*.

3. PRINCIPLE

To weigh the test piece immediately before beginning the test and again after exposure to water under the conditions stated in the test method.

4. REAGENTS

Use distilled or de-mineralized water.

The temperature of the water is important and should be maintained at 20 ± 1 °C or at one of the other temperatures specified in ISO Recommendation R 187, at the time of test.

5. APPARATUS

5.1 The 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.

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.

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* ISO Recommendation R 187, *Method for the Conditioning of Paper and Board Test Samples.*
See also ISO Recommendation R 554, *Standard Conditioning and/or Test Atmospheres – Standard Reference Atmosphere – Specifications.*

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5.2 Blotting apparatus

Blotting paper having a substance of 200 to 250 g/m² and having absorbent properties, measured by the Klemm method (see Appendix Z), around 75 mm.

A smooth metal roller, face width 20 cm and weighing 10 ± 0.5 kg is used for blotting.

5.3 Auxiliary apparatus

An analytical balance, sensitive to 1 mg over the working range corresponding to the test piece having an area of 100 cm²

A stop-watch

A glass measuring cylinder.

6. SAMPLING, CONDITIONING AND PREPARATION OF TEST PIECES

6.1 Sampling and conditioning should be carried out in accordance with ISO Recommendation R 186* and R 187 respectively.

6.2 The standard Cobb method recommends a standard test area of 100 cm² and states that sufficient material should be available to provide at least 10 test pieces 12.5 cm square (5 for each side of the paper or board, unless otherwise stated). When the test pieces available are too small to conform with standard conditions, a smaller test area may be used, by agreement between buyer and seller.

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7. PROCEDURE

The test should be carried out in a standard reference atmosphere in accordance with ISO Recommendation R 187.

7.1 Care should be taken to see 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.

The test piece is weighed to the nearest 1 mg and then placed with the surface to be tested uppermost on the piece of sheet rubber. The cylinder is then placed on the test piece with the machined edge in contact with the test piece and clamped sufficiently firmly to prevent any leakage of water between it and the test piece; 100 ml of water, or proportionately less for a smaller test area, is poured into the cylinder, thus providing a head of 1 cm, and the stopwatch started immediately. The water should be renewed for each determination.

This procedure is based on the apparatus described in clause 5.1. The order of operation may be varied according to the design of the apparatus used.

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* ISO Recommendation R 186, *Method of Sampling Paper for Testing.*

7.2 Time of test

For the purpose of this ISO Recommendation, 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, the exposure time being selected according to the degree of water absorption capacity. If, for example, a test time of 60 seconds has been selected, the excess of water is poured off after 45 seconds, care being taken that no water comes into contact with the surface of the test piece outside the test area. The cylinder is quickly unclamped and removed. The test piece is then removed and placed, with the test side uppermost, on a sheet of blotting paper previously positioned on a flat rigid surface. At exactly 60 seconds after the commencement of the test, a second sheet of blotting paper is placed on top of the test piece and the excess of water removed using the hand roller with two rollings (once forward and once back) without exerting any pressure on the roll.

After blotting, the test piece should be folded with the wet side inside and weighed immediately so that the increase in mass, through absorption of water, can be determined before loss by evaporation occurs.

7.3 Rejected test pieces

Reject the test pieces

- showing excess of water after blotting (which is indicated by the gloss of the surface) or
- having been penetrated by the water through to the reverse face.

If the percentage of rejects exceeds 20 per cent, consideration should be given to reducing the time of test until a satisfactory result is obtained, bearing in mind a minimum test time of 30 seconds.

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

(1) **Recommended time of test** seconds	(2) **Symbol**	(3) **Time at which excess water is removed*** seconds	(4) **Time of blotting*** seconds
30	C_{30}	20	30
60	C_{60}	45	60
120	C_{120}	105	120
300	C_{300}	285	300

* The times given are calculated from the moment the water comes into contact with the test piece (see clause 7.2.).

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 column (3) and column (4) is always 15 seconds.

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8. EXPRESSION OF RESULTS

Results should be expressed as follows:

For each side of the paper or board

8.1 The result should be given for each test piece in grammes per square metre to the first decimal place.

8.2 Each result should be the mean ($\overline{X}$) of at least five determinations, expressed in grammes per square metre to the first decimal place.

8.3 The standard deviation (s) should be calculated.

8.4 The number of determinations (n) should be stated.

8.5 A standard notation should be used e.g.:

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

$Cobb_{300}$ (value in grammes per square metre) at t °C

dependent on the time of test in seconds.

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

8.6 In the case of tests made with a cylinder of cross-sectional area other than 100 cm^2 the value of that non-standard area should be stated in the expression of results.

9. TEST REPORT

The test report should give the results obtained. It should, in addition, mention any details of operation not provided for in this ISO Recommendation or optional, as well as particulars of any circumstances which may have affected the results.

The number of rejected test pieces and the reason for rejection should be given.

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