SCANDINAVIAN PULP, PAPER AND BOARD

TESTING COMMITTEE

Paper and board

Oil Absorbency

Cobb-Unger method

1   Scope

This SCAN-test Method specifies the procedure for determining the oil absorbency of paper and board by the Cobb-Unger method. The Method is intended primarily for newsprint and uncoated magazine papers, but it is also applicable to other kinds of paper and board.

2   Reference

ISO 187   Paper, board and pulps – Standard atmosphere for conditioning and testing and procedure for monitoring the atmosphere and conditioning of samples

   Note – SCAN-test has withdrawn a number of test methods and refers instead to the corresponding ISO and/or EN Standards.

3   Definition

For the purpose of this Method, the following definition apply:

3.1   Cobb-Unger oil absorbency – The mass of castor oil absorbed per unit area by one side of a paper or board under specified conditions.

4   Principle

A conditioned test piece is weighed before and after one side of the piece has been exposed to castor oil under specified conditions. Surplus oil is removed from the surface of the test piece before the final weighing and the oil absorption per unit area is calculated.

5   Apparatus and equipment

5.1   *Cobb-Unger oil absorbency tester* consisting of a cylindrical cup with an internal cross sectional area of 100 cm^2, having a lid which can be tightly closed, *Figure 1*. The cup is fastened to a horizontal axle which makes it possible to turn it upside down quickly. A vertical pin, 25 mm in height, is attached to the inside base of the cup.

5.2   *Castor oil* meeting the following specifications:
a. General properties (in accordance with Pharmacopea Nordica)

Density	$952 - 966 \text{ kg/m}^3$
Optical rotation	$+3,50$ to $+5,00°$ (100 mm)
Saponification value	$177 - 187$
Iodine value	$82,0 - 90,0$

b. Viscosity
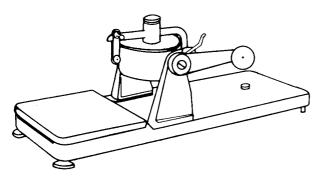   The viscosity at 23 ºC should be (785 ± 40) mPa s.

Figure 1. Cobb-Unger oil absorbency tester

5.3   *Template* for cutting test pieces, *Figure 2,* made of plate of approx. 1 mm thickness.

5.4   *Balance* having an accuracy of 5 mg and equipped with a hook for test pieces to be hung on.

Note − Some models of the tester are delivered with a simple quadrant scale for weighing test pieces. The graduation is such that a load of 0,01 g is read as 1 g/m^2. The difference between two readings thus gives the absorption in grams per square metre since the test area is 0,0100 m^2. The scale graduation interval is 1 g/m^2 and the scale should be read to the nearest 0,5 g/m^2.

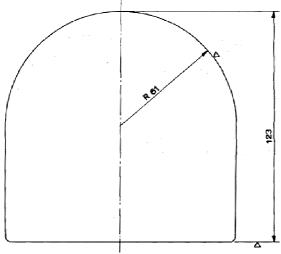5.5   *Stop watch.*

5.6   *Cellulose wadding.*

Figure 2. Template

6   Preparation of test pieces

Condition the specimens as specified in ISO 187, and keep them in the conditioning atmosphere throughout the test.

Cut test pieces using the template. The test pieces should be free from folds and wrinkles. Mark the wire side of the paper.

7   Procedure

Pour castor oil (5.2) into the cup (5.1) until the oil level reaches the tip of the pin attached to the base of the cup; the amount of oil in the container is then 250 ml. The temperature of the oil shall be (23,0 ± 0,5) °C.

Note − The amount and condition of the oil in the cup should be checked regularly. The oil should be completely renewed when 250 pieces of paper have been tested. If the quality of the paper which is tested is such that a considerable amount of lint is detached from it, the oil should be renewed at shorter intervals. If the tester has not been in use for some time the oil should be discarded.

Weigh a test piece to the nearest 5 mg and place it over the opening of the opened cup with the side to be tested downwards (towards the oil) and with the rectangular part of the test piece protruding from the cup towards the operator. Close the lid.

Select the absorption time to be used, i.e. the time from start of contact between oil and paper to start of the wiping off of surplus oil, from the alternatives given in *Table 1.*

Normally CU_{10} is measured. If the oil penetrates the paper, which often happens with newsprint of grammage less than 50 g/m^2, CU_6 should be measured. CU_{30} is recommended for papers of low oil absorbency.

Using the stop watch (5.5), carry out the following steps of the procedure according to the time schedule given in the table.

Table 1   Time schedule for the procedure

Step in procedure	Times from start of test, seconds		
	CU_6	CU_{10}	CU_{30}
Turn the cup upside down	0	0	0
Return the cup to its original position	3	5	25
Release the lever which closes the lid, extract the test piece and place it on the blotting paper	4	8	28
Start wiping off the surplus oil	6	10	30
Stop wiping off the oil	8	12	32

When the cup has been returned to its original position release the lever which closes the lid, but do not open the lid itself. Extract the test piece from beneath the lid by pulling the protruding part so that most of the surplus oil on the test piece is wiped off by the inner

edge of the cup and flows back into the cup. Place the test piece on a clean sheet of blotting paper, the oily side of the test piece facing upwards. At the time indicated in the table, start wiping off the surplus oil still present on the surface of the test piece with a piece of cellulose wadding (5.6). Do this with fast strokes pressing the cellulose wadding fairly hard against the test piece, but not so hard that its surface is damaged. If the oil has penetrated the test piece or the surface remains glossy, indicating that the surplus oil has not been fully removed within the specified time, discard the test piece. Weigh the test piece to the nearest 5 mg.

Clean the lid and the rim of the container with cellulose wadding moistened with ethanol, before making the next test.

Test at least 10 test pieces, 5 on the wire side and 5 on the top side of the paper. Record the results separately.

8   Calculation

Calculate the Cobb-Unger oil absorbency from the expression:

$$X = \frac{G_2 - G_1}{A} \qquad [1]$$

where
X = Cobb-Unger oil absorbency, in grams per square metre;
G_1 = mass of test piece before it has absorbed oil, in grams;
G_2 = mass of test piece after it has absorbed oil, in grams;
A = test area, in square metre, (here 0,0100 m^2).

Calculate the mean. Report the mean oil absorbency, separately for the top and wire sides, to the nearest 0,5 g/m^2.

9   Report

The test report should include reference to this SCAN-test Method and the following particulars

(a) date and place of testing;
(b) identification of the sample;
(c) the test results, separately for the top and wire sides, reported as CU_6, CU_{10} or CU_{30}, whichever is applicable, and expressed in grams per square metre;
(d) when applicable, a note that oil has penetrated the test piece;
(e) any departure from the procedure described in this Method or any other circumstances which might have affected the results.