

Fluff

Knot content

1 Scope

This SCAN-test Method describes a method of determining the amount of knots in fluff. The Method is applicable to all kinds of fluff from chemical or mechanical pulp, including that prepared in the laboratory.

2 References

- ISO 187 Paper, board and pulps – Standard atmosphere for conditioning and testing and procedures for monitoring the atmosphere and conditioning of samples
- ISO 3310-1 Test sieves – Technical requirements and testing – Part 1: Test sieves of metal wire cloth

Note – SCAN-test has withdrawn a number of test methods and refers instead to the corresponding ISO and/or EN Standards.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

3.1 Knots (in fluff) – Fibre bundles and other particles that do not pass through a specified wire screen when tested under conditions specified in this Method.

4 Principle

A test piece of fluff having a mass of 5,0 g is subjected to an oscillating stream of air in a tube, each end of which is covered with a wire screen. Small particles and individual fibres are separated and carried away through the screens, leaving the knots in the tube.

5 Apparatus

5.1 Knot tester, the principle of which is shown in *Figure 1*.

5.1.1 Rotary valve, the principle of which is shown in *Figure 2*. The valve is electrically driven at a speed of rotation of $2,5 \pm 0,2 \text{ s}^{-1}$ ($150 \pm 12 \text{ rpm}$). The valve has four openings, one of which is connected to a vacuum cleaner, one is open to the atmosphere and two are connected to the tubes described in 5.1.3.

5.1.2 Pin mixer, the principle of which is shown in *Figure 3*. The purpose of the pin mixer is to facilitate the separation of individual fibres. The speed of rotation of the pin shafts is about 33 s^{-1} (2000 rpm).

5.1.3 Two tubes, made of, for example, glass or transparent polyacrylic plastic, 50 mm in inner diameter. The length of the tubes is such that, when the apparatus is assembled, the distance between the wire screens (5.1.5) is 1,00 m. The apparatus should be arranged so that the tubes are horizontal.

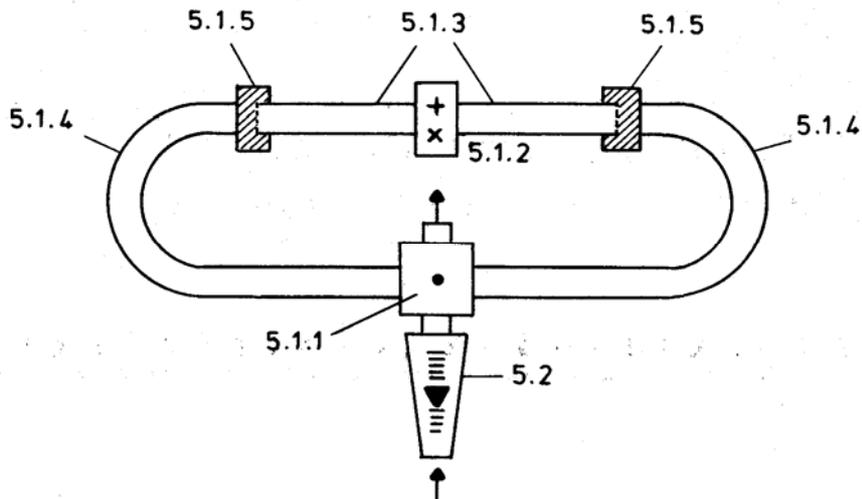


Figure 1. Knot tester

- | | |
|--------------------|----------------------|
| 5.1.1 Rotary valve | 5.1.4 Flexible hoses |
| 5.1.2 Pin mixer | 5.1.5 Wire screens |
| 5.1.3 Tubes | 5.2 Flow meter |

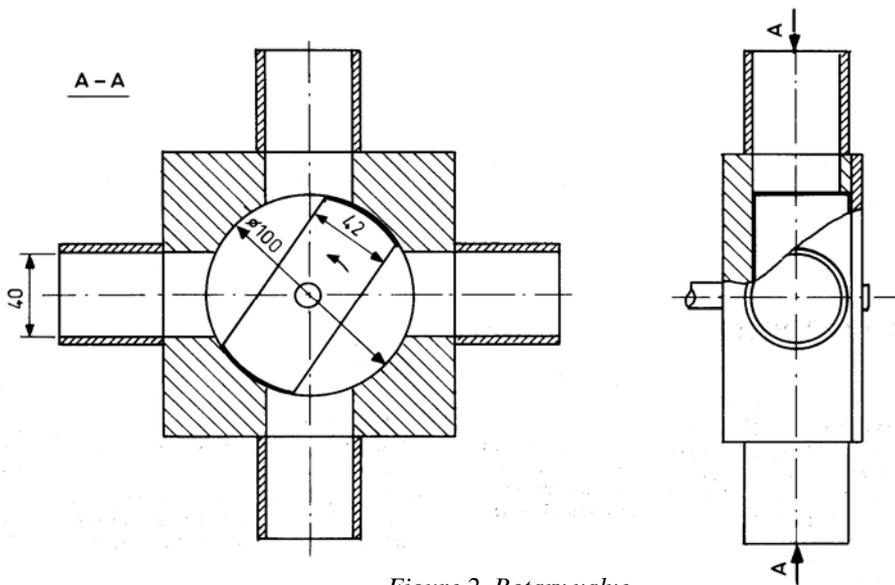


Figure 2. Rotary valve

5.1.4 Two hoses, 50 mm in inner diameter. The hoses connect the tubes (5.1.3) to the rotary valve. The ends of the hoses that are attached to the tubes are covered with wire screens (5.1.5). They are equipped with suitable clamps to facilitate connection of the hoses to the tubes. The length of each hose is such that the distance from each wire screen to the centre of the rotary valve is 1,00 m.

5.1.5 Two wire screens of metal wire cloth, aperture 850 µm as specified in ISO 3310-1. This wire cloth corresponds to wire cloth no. 20 as specified in ASTM E11.

5.2 A flow meter, preferably of the rotameter type, suitable for measuring air flow in the range 50 to 100 m³/h. The flow meter is connected to the free opening of the rotary valve (see Figure 1).

5.3 Vacuum cleaner, with an adjustable suction capacity to maintain the flow of air in the knot tester. The suction capacity should be adjusted to give an air flow of 65 m³/h (NPT) when measured without any sample in the apparatus. The dust bag of the vacuum cleaner should be emptied regularly.

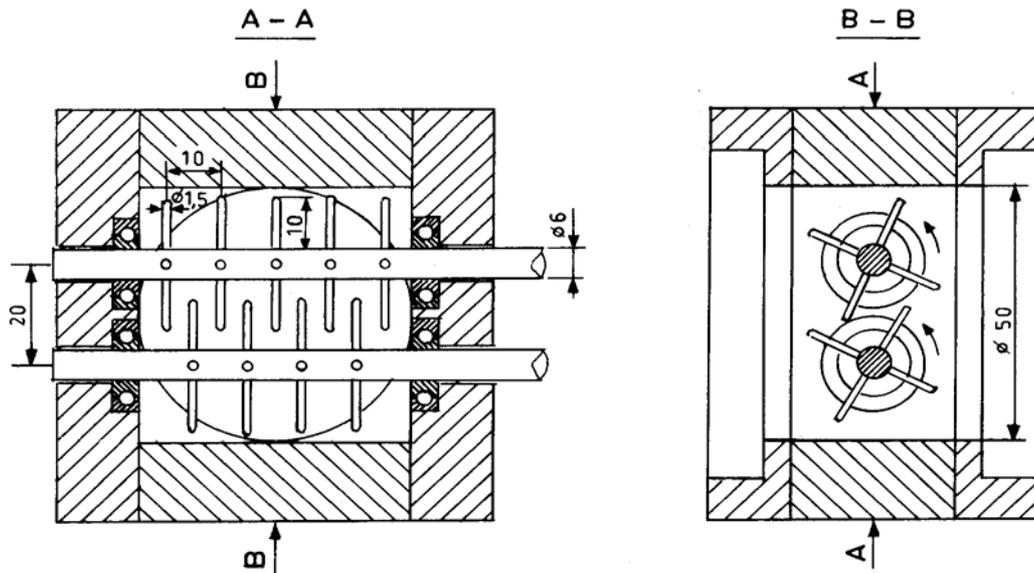


Figure 3. Pin mixer

5.4 A revolution counter, equipped with a device that automatically stops the rotary valve after 1500 revolutions.

6 Procedure

Condition the fluff samples at 23 °C and 50 % relative humidity as described in ISO 187, and keep them in the conditioning atmosphere throughout the test.

At least three parallel tests should be carried out.

Weigh 5,0 g of fluff. Switch on the vacuum cleaner. Open one of the tubes at the end connected to the hose. Turn the shaft of the rotary valve by hand so that air flows into the tube, and feed the fluff into it.

Close the tube and start the motor driving the rotary valve. After 10 s start the pin mixer (5.1.2). Allow the fluff to oscillate between the two wires for 1500 rev. of the rotary valve (about 10 min). Turn the valve shaft by hand so that the remaining fluff is collected on one of the wire screens. Disconnect the hose and switch off the vacuum cleaner. Collect the fluff from the wire screen and weigh it.

7 Calculation

Calculate the mean knot content from the expression

$$X = \frac{100m}{m_o} \quad [1]$$

where

- X is the knot content, expressed as a percentage;
 m is the mass of the residual fluff, in grams;
 m_o is the initial mass of the fluff sample, in grams (normally 5,0 g).

8 Report

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

- date and place of testing;
- identification and mark of the sample tested;
- the number of replicates carried out;
- the test result for the knot content, expressed as a percentage as a whole number;
- any departure from the procedure described in this Method or any other circumstances that may have affected the result.

9 Precision

Three samples of fluff were tested at four laboratories. The ranges of all the results were as follows:

Fluff sample no.	1	2	3
Knot content, %	1,7 - 3,5	7,4 - 10,4	23,7 - 30,6

SCAN-test Methods are issued and recommended by KCL, PFI and STFI-Packforsk for the pulp, paper and board industries in Finland, Norway and Sweden. Distribution: Sekretariat, Scandinavian Pulp, Paper and Board Testing Committee, Box 5604, SE-114 86 Stockholm, Sweden.