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Shive content of mechanical pulp (laboratory flat screen)

Scope

The objective of this method is to determine the harmful shive content of mechanical pulps by screening on a laboratory flat screen.

Safety precautions

There are no specific safety precautions for this method.

Significance

This method gives a clear-cut separation of shives from a pulp sample and can be used to relate to newsprint runnability, pulp screen efficiency, etc.; numerical results are obtained.

Apparatus

1. *Laboratory flat screen*, which can be fitted with conventionally slotted flat screen plates and having the following characteristics:

- Screening plate area: 104 × 28.3 cm (41 × 11¹/₈ in.).
- Slit width: 0.20 mm (0.008 in.).
- Number of slots: 880
- Length of slot: 44 mm (1³/₄ in.)

Approved by a Working Group of TAPPI in accordance with the Useful Method Guidelines

- Revolutions per minute of flat screen shaft: 150.
- Shaft has four eccentrics on the one cam resulting in 600 throws/minute.
- Throw of eccentric: 4.8 mm (0.1875 in.).
- Adjustable dam: top of dam should be even with top of flat screen section when running test.

Screen is fitted with four reciprocating evenly-spaced showers which fan out to cover entire screen section. Water rate from each shower is 6.6 L/min (1.75 gal/min) at 68.9 kPa (10 psig) and 20–23°C. Shower water should be filtered. Average height of showers above screen section is about 254 mm (10 in.).

2. *Drying oven*, with free air circulation capable of maintaining a temperature of $105 \pm 2^\circ\text{C}$ or a hotplate with a controllable temperature not to exceed 150°C .

NOTE 1: Although there are a variety of laboratory flat screens in use in the industry, most should be adaptable to produce a clear-cut separation of shives from a pulp sample.

NOTE 2: Some producers have used slit widths of 0.13 mm (0.005 in.), 0.15 mm (0.006 in.), etc. Because of different end uses of the pulp, the slit width is left to the discretion of each mill. Check slit width periodically with a gauge.

Test specimen

Obtain a representative sample of the pulp in accordance with a predetermined sampling procedure. Select about 1.1 kg (2.5 lb) (o.d. basis) for the test specimen.

Procedure

1. Dilute the specimen of the pulp to be tested to 249.8 L (66.0 gal) and accurately determine its consistency so the exact quantity of pulp can be calculated.
2. Adjust dam height, level with top surface of flat screen.
3. Start screen, adjust shower water rate to 26.5 L/min (7.0 gal/min), then add the pulp slurry onto screen at a rate of 11.4 L/min (3.0 gal/min).
4. After all the pulp slurry has been run into the flat screen, allow the screen to run 3 more minutes with showers held at the 26.5 L/min (7.0 gal/min) rate.
5. Lower dam an inch or two, shut off showers and stop screen. Wash the shives to one corner of flat screen with small low-pressure stream. Transfer the shives on to a pre-dried and tared piece of filter paper, dry on a hot plate, or in an oven, until constant weight is achieved. Calculate the weight of the dry shives.

Report

Report shives in percent or in weight per o.d. ton of pulp.

Precision

Duplicate tests should agree within 10%.

Keywords

Pulps, Mechanical pulps, Shives, Laboratories, Screens, Flat screens

Additional information

One disadvantage of this method is that it is somewhat slow, each test requiring 35–45 min. Another disadvantage is that it gives results in terms of weight of shives and does not state the number of shives per pound of pulp. This, however, can be determined by counting methods (which are also rather slow and tedious).