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T _____ 275 _____

BALLOT NO. _____ 02 SARG _____

DRAFT NO. _____ 01 _____

DATE _____ 6/1/2023 _____

WORKING GROUP
CHAIR _____ N/A _____

SUBJECT
CATEGORY _____ Pulp Properties _____

RELATED
METHODS _____ See "Additional Information" _____

CAUTION:

This Test Method may include safety precautions which are believed to be appropriate at the time of publication of the method. The intent of these is to alert the user of the method to safety issues related to such use. The user is responsible for determining that the safety precautions are complete and are appropriate to their use of the method, and for ensuring that suitable safety practices have not changed since publication of the method. This method may require the use, disposal, or both, of chemicals which may present serious health hazards to humans. Procedures for the handling of such substances are set forth on Safety Data Sheets which must be developed by all manufacturers and importers of potentially hazardous chemicals and maintained by all distributors of potentially hazardous chemicals. Prior to the use of this method, the user must determine whether any of the chemicals to be used or disposed of are potentially hazardous and, if so, must follow strictly the procedures specified by both the manufacturer, as well as local, state, and federal authorities for safe use and disposal of these chemicals.

Screening of pulp (Somerville-type equipment) *(Five-year review of Standard Practice T 275 sp-18: Approval of T275 Draft 1)*

1. Scope

1.1 The purpose of this method is to separate contaminants such as shives in mechanical pulp, and macro stickies, plastics, sand, metal pieces, and flakes in recycled fiber from pulp fibers for subsequent examination and/or quantification. This method employs a screening device and the separation is based on size difference between fibers and contaminants. However, depending on their flexibility and/or geometry, not all of the contaminants that are larger in size than fiber can be captured by the screen.

1.2 The dimensional limits that separate contaminants from fibers, as well as the time length of screening are arbitrary.

1.3 Screen plates of various slit widths such as 0.10 mm, 0.15 mm, 0.20 mm, and 0.25 mm have been used in separating contaminants. Only the use of 0.15 mm slit is covered in detail in this method.

2. Significance

2.1 The adaptation of TAPPI UM 242 “Shive Content of Mechanical Pulp (Somerville Fractionator),” to the screening of other pulps such as recycled pulp is common. In the adaptation process, screening procedure variations were introduced. It is imperative that a common practice is defined so that the outcomes of the separation are comparable.

2.2 Contaminants such as shives, stickies, and plastics adversely affect paper machine operation and down grade final product. Qualitative and/or quantitative measurements of these contaminants are thus critical in evaluating the effectiveness of a process or a piece of equipment, as well as final product quality. This method provides a way to isolate the contaminants for the purposes of qualification and quantification.

3. Apparatus

3.1 *Somerville-type of screen* (see Figs. 1 and 2)

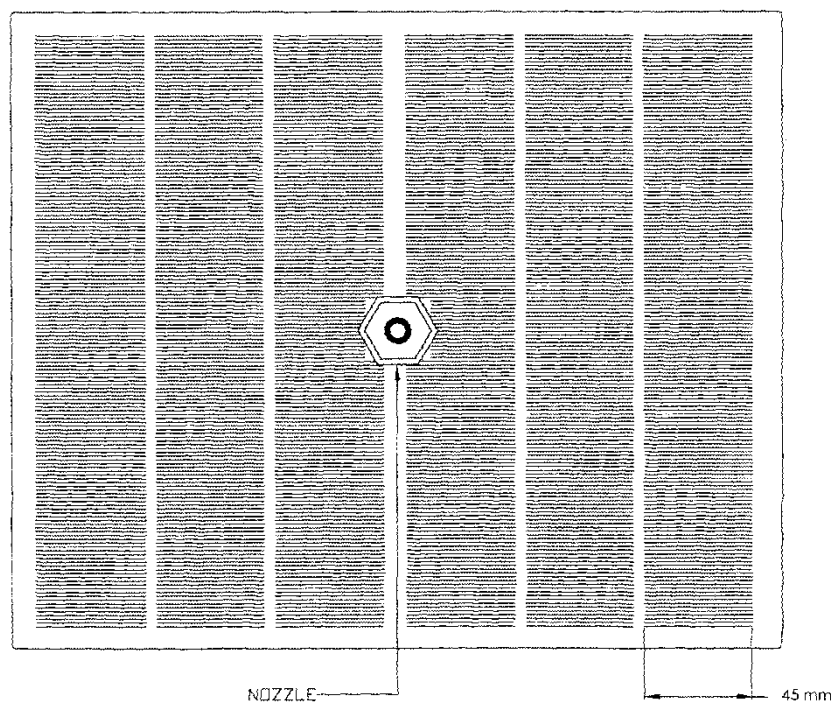


Fig. 1. Screen plate slit pattern.

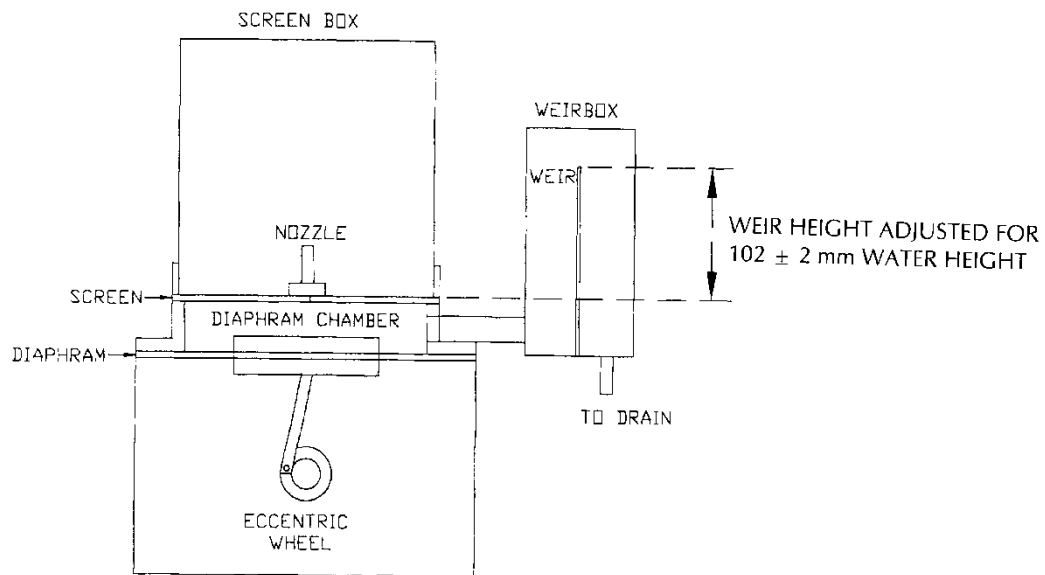


Fig. 2 Illustration of screen set up.

3.1.1 From top down, the screening device consists of a rectangular screen box, a screen plate, a diaphragm chamber with a weir box attached, and a stand. The diaphragm chamber is attached to the stand. Before each run the screen plate is secured between the diaphragm chamber and the screen box by locking clamps. Gaskets above and below the screen plate make the assembly water tight.

3.1.2 The inside dimensions of the screen box must not be over sized and at the same time must be such that no slits in the screen plate are obstructed by the structure of the box. The screen box must also be tall enough so that a water level of $102 \text{ mm} \pm 2 \text{ mm}$ over the screen plate can be maintained.

3.1.3 The screen plate is made of 316 stainless steel. There are 756 slits in the screen plate arranged in 6 columns of 126 slits each. Slit pitch within a column is 2 mm. The entire slit pattern on the screen plate must not exceed an area measuring $250 \times 300 \text{ mm}$. The slits are $45 \pm 0.5 \text{ mm}$ long by $0.15 + 0.005 / -0.01 \text{ mm}$ wide (0.140 to 0.155 mm). Some of the slits will actually be shorter than 45 cm due to the nozzle hose and mounting. This may vary with the manufacturer.

3.1.4 A spray nozzle with 12 equally spaced horizontal holes is mounted at the center of the screen plate. The holes are equal in size and are positioned 2 mm (measured from center of hole) above the screen plate surface. The spray nozzle is calibrated for a flow of $8.6 \pm 0.2 \text{ liter / minute}$ at a water supply of $124 \pm 5 \text{ kPa}$.

3.1.5 A rubber diaphragm in the diaphragm chamber is connected to an eccentric mechanism which in turn is driven by a motor. The eccentric mechanism runs at $700 \pm 10 \text{ rpm}$ and creates a vertical movement of $3.2 \pm 0.1 \text{ mm}$ maximum amplitude for the diaphragm.

3.1.6 At the flow rate of 8.6 liters/minute, the height of the weir in the weir box is adjusted to maintain the water level inside the screen box at 102 ± 2 mm above the screen plate surface.

3.2 *Other lab equipment*

3.2.1 Standard disintegrator as specified in TAPPI T 205, or in TAPPI T 262 for mechanical pulp.

3.2.2 Apparatus as specified in TAPPI T 240 for consistency determination.

3.2.3 Sample containers of 10 liter capacity.

3.2.4 Lab timer.

4. Procedure

4.1 If a sample is not in slurry form, follow the procedures in sections 6 and 7.1 of T 205 to transform the sample to pulp slurry. The disintegration time is one minute (or 3000 revolutions). In case of mechanical pulp, follow the procedures of T 262 to develop the latency properties of pulp.

4.2 Dilute a pulp sample (originally in slurry form or disintegrated in step 4.1) to a consistency of no more than 1%.

4.3 Determine the consistency of the diluted pulp in accordance to T 240.

4.4 Weigh into sample container(s) the amount of the diluted pulp equivalent to 50 ± 0.2 gram oven-dry material and record the exact weight to the nearest 0.1 gram.

NOTE 1: Depending on the contaminant concentration, the amount of oven-dry material used to run a test may be more or less than 50 grams. Always record the exact amount of diluted pulp weighed out. It is not recommended to use more than 80 or less than 20 grams of oven-dry material in a test.

4.5 Assemble the device by putting the screen plate and the screen box in position, followed by clamping the screen box and plate, and connecting the spray nozzle to water supply.

4.6 Add water into the screen box until the water level is about 25 mm above the screen plate surface.

4.7 Add the sample weighed out in step 4.4 into the screen box; rinse the sample container with small amounts of water and add the rinse water into the screen box.

4.8 Turn on the water supply to the spray nozzle and adjust the water pressure to 124 ± 5 kPa.

4.9 Start the motor when overflow occurs at the weir.

4.10 Stop the motor at the end of 20 ± 1 min.

4.11 Drain the screen box and rinse all the debris remaining on the walls of the screen box as well as on the spray nozzle and the connecting hose to the screen plate.

4.12 Disconnect the water hose and un-clamp the screen box; then remove the screen plate.

4.13 Wash all the debris on the top surface of the screen plate to a sample container.

4.14 The suspended debris in the container is now ready for further processing (such as forming a pad for observation or quantification).

4.15 Clean the screen after each run. Do not use hard objects such as feeler gauges, tweezers, and dissecting needles to clean the slits. A pressure washer is recommended for the purpose of cleaning the screen plate.

5. Calculation

Calculate the amount of oven-dry materials added into the device as follows:

$$W = C \times R / 100$$

where

W = the amount of oven-dry materials added into the screen, grams;

C = consistency of the sample added into the screen as obtained in step 4.3, %;

R = the amount of pulp slurry added into the screen as recorded in step 4.4, grams.

6. Report

6.1 Report W , the amount of oven-dry materials added into the screen, to the nearest 0.01 gram.

6.2 If, for a particular reason or purpose, slit width other than 0.15 mm is employed, report the actual slit size used as well as the tolerances.

7. Precision

A precision statement is not applicable for this Standard Practice.

8. Keywords

Fiber debris, Shives, Stickies, Plastics, Mechanical pulps, Recycling, Reclaimed fibers, Screening, Separation

9. Additional information

9.1 Effective date of issue: To Be Assigned

9.2 This method is an upgrade of UM 242. There are no changes from the 2002 version.

Your comments and suggestions on this procedure are earnestly requested and should be sent to the TAPPI Standards Department.

