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WI _____ 210809.02 _____

T _____ 278 _____

DRAFT NO. _____ 02 SARG _____

DATE _____ October 5, 2021 _____

WORKING GROUP
CHAIRMAN _____ To Be Determined _____

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 Material 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.

**Pulp screening (Valley-type screening device)
(Five-year review of Standard Practice T 278 sp-17)
(No changes from previous draft. Standard reaffirmed)**

1. Scope

1.1 This practice provides a laboratory screening procedure for pulps taken directly from a blow pit or discharged from digesters, eliminating time lapse and assuring uniform pulp properties.

1.2 This practice describes a method for separating debris from virgin or recycled pulps.

2. Significance

2.1 Prior to forming test handsheets, it is necessary to remove debris from pulp fibers for evaluating the physical properties of the pulp.

2.2 Separating impurities and contaminants from pulp fibers is the first step for analysis on the debris in the pulp, either qualitatively or quantitatively, or both. Shives, knots and chops are typical impurities found in virgin pulps and separated with a laboratory screen. Stickies, hot melts, and plastics are typical contaminants found in recycled pulps and separated with the screen.

3. Apparatus

3.1 *Vibratory screening device*

3.1.1 The screening device consists of a water shower, a screen compartment with an outlet valve, a screen plate, a diaphragm, a cam immersed in a gear oil reservoir, and a fractional AC motor (1/3 hp and 1725 rpm). The screen body is mounted on a base plate. The cam is connected to the motor through a gear speed reducer and two couplings. Driven by the motor, the cam generates an irregular motion to the diaphragm through a plunger. The movement of the diaphragm creates a periodic back flush towards the screen plate. The amplitude of this motion can be adjusted by a pressure spring.

3.1.2. The inside dimension of the screen compartment is approximately 305 mm x 254 mm x 87 mm. A screen plate is housed in the compartment. Multiple slots are inscribed in the screen plate, arranged in two columns. Each screen may be furnished with several screen plates of different slot sizes, ranging from 0.10 mm to 1.3 mm. The two most frequently used sizes are 0.10 +0.005 / -0.01 mm (0.004 +0.0002 / -0.0004 in) and 0.15 +0.005 / -0.01 mm (0.006 +0.0002 / -0.0004 in) with no individual slot more than a nominal average +0.015 / -0.030 mm (+0.0006 / -0.0012 in.).

3.2. *Standard disintegrator* as specified in TAPPI T 205 "Forming Handsheets for Physical Tests of Pulp."

3.3 *Büchner funnel*, 110 mm in diameter, and filtration flask.

3.4 *Filter paper*, 110 mm in diameter, coarse texture, tared, after drying at 105°C.

3.5 *Drying oven*, maintained at 105 ± 3°C.

4. Preparation

4.1 Unplug the screening unit from an electrical outlet. A lock-out device is always advisable to prevent the plug from being inserted.

4.2 Rotate the cam clockwise by grasping the motor shaft coupling and turning. While rotating the cam, check that the plunger is in full contact with the cam. A quality gear oil (~460 ISO viscosity units) should be used to fill the reservoir in which the cam rotates. The cam is partially submerged in an oil reservoir. The oil level in the reservoir should be inspected periodically.

4.3 Close the outlet valve of the screen.

4.4 Fill the screen compartment with water until a level of 3 cm is reached.

4.5 Turn the pressure adjustment knob counter-clockwise until the threaded rod, at its center, is flush with the top of the knob.

4.6 Start the motor by plugging the screen into a grounded electrical power source.

4.7 Turn the pressure adjustment knob clockwise to load the spring. This loading provides the necessary pressure on the cam that in turn moves the diaphragm up and down under the screen plate.

4.8 Turn the pressure adjustment knob while observing the water flow in the screen. A good motion of water passing back and forth through the screen plate is the indication of an adequate pressure.

4.9 If a poor water flow pattern persists, check for any excessive wear of the wood cam follower or for a damaged diaphragm. Replace the cam follower or diaphragm as necessary. Damage to the diaphragm is inspected by dismantling the screen plate.

5. Sampling

5.1 The users of this practice will determine the amount of the pulp to be screened, based on the purpose of testing, debris levels in the pulp, and the width of screen slots. Typically, 50-100 g o.d. fibers are used for a laboratory screening.

5.2 The pulp samples are usually disintegrated in a standard disintegrator for 3000 revolutions prior to screening.

5.3 If the sample is a thickened pulp, dilute to 1.2% consistency prior to disintegration.

5.4 In some cases, the pulps collected from certain locations (e.g. low-consistency screen accepts, headbox) in a pulp or paper mill do not require disintegration and are processed as described in Section 6.

6. Procedure

6.1 Thoroughly clean the screen of any residue, and flush the screen compartment with water for 5 min. Verify that a screen plate with the correct slot width is installed for the pulp being tested.

6.2 Fill the screen with water until the water level reaches 3-5 cm from the top of the screen compartment. Start the motor to release all air that may be trapped between the diaphragm and the screen plate. The water temperature should not exceed 50°C.

6.3 Keep the water flow rate constant. In the meantime, open the outlet valve and water shower to maintain the water level at 3-5 cm from the top.

6.4 Dilute the pulp sample to about 1% consistency, if necessary.

6.5 Slowly pour the pulp sample into the screen compartment so that the circulation of the pulp slurry is visible throughout the screening operation.

6.5.1 If the circulation stops while adding the pulp sample, stop adding the pulp and increase the shower water until the circulation resumes.

6.5.2 It may be necessary to increase the opening of the outlet valve to prevent overflowing.

6.6 Once all the pulp sample is added to the screen, continue to run the screen until the flow from the accept is clear of fibers. Hold a beaker containing the flow from the screen accepts against a light source to determine if any fibers remain in the accept flow. Fibers will be visibly seen floating the beaker. A typical screening operation takes 20 min.

6.7 Once the debris remaining in the screen compartment has been determined to be free of fiber, shut off water and the motor.

6.8 Collect all debris from the screen plate and screen compartment sidewalls. A rubber squeegee is helpful in scraping debris from screenplate.

6.8.1 Flush the debris into a beaker with water.

6.8.2 After all visible debris has been removed from the screenplate, add water to the screen compartment and re-start the motor.

6.8.3 Continue to run the screen for approximately 1 min to loosen any remaining debris, which may have been caught between slots.

6.8.4 Drain the water and shut off the motor. Remove any remaining debris from the screen plate and sidewalls. Flush into the beaker using water.

6.9 Filter off the debris onto a filter paper in a Büchner funnel, making sure to keep an even distribution of the residue on the filter paper. If it is not possible to keep an even distribution of debris on the filter paper due to a high amount of debris, use multiple filter papers.

6.10 If the debris is to be quantified, place the filter paper containing the debris in a drying oven set at 105 ± 3 °C until a constant weight is reached.

7. Report

Report the types of the debris found in the pulp samples, the amount of pulp used for screening, the width of the screen slots, and the actual screening time.

8. Precision

A precision statement is not required for a Standard Practice.

9. Keywords

Chemical pulp, Impurities, Debris, Defibering, Flakes, Mechanical pulps, Plastics, Pulping, Recycling, Repulping, Screening, Shives, Stickies

10. Additional information

Effective date of issue: To be assigned.

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