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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.

Laboratory screening of pulp (MasterScreen-type instrument)

1. Scope

1.1 A general purpose practice for screening pulp using a specific screening device is described, which separates from a slurry of pulp fibers a contaminant fraction with size dimensions which are significantly greater than the diameter of a pulp fiber.

1.2 Separated contaminants include, but are not limited to, shives in virgin fibers, or macro stickies that are captured by the barrier screen plate, scleroids, dirt, stone cells, plastics, pitch, white pitch, and other contaminants in virgin and recycled fibers.

1.3 There are numerous screening instruments used for separation, classification, or quantitation of contaminants from pulp fibers, including T 278 “Pulp Screening (Valley-Type Screening Device)” and T 275 “Screening of Pulp (Sommerville-Type Equipment).” This procedure covers a specific screening procedure to concentrate contaminants by fiber removal, and does not cover use of screens for pulp size classification.

1.4 While this practice does not describe the specific procedure required to quantitatively measure the contaminant fraction separated, it should be noted that where this is done by the user of this practice, slightly different quantitative results may be found among or between results calculated using the device described in this Practice and the various devices in 1.3.

2. Significance

2.1 The qualitative and quantitative measurement of the contaminants in a pulp may be used to indicate the manner of production of the pulp and the effectiveness of the processes used to decontaminate the pulp.

2.2 Measuring the characteristic and nature of the contaminants in any pulp is fundamental to the control and reduction and elimination of its contaminant content.

2.3 Before measurement of the quantity or assessing quality of the contaminants present in a pulp may be achieved, the contaminants must be separated from the fibers. So, separation of contaminants from fiber is an significant step in evaluation and improvement of the pulping process and measurement of the quality of the resulting pulp.

3. Apparatus¹

¹Names of suppliers of testing equipment and materials for this method may be found on the Test Equipment Suppliers list, available

3.1 The central features of the MasterScreen - type instrument are as follows:

3.1.1 *Cylindrical screening chamber*, 8 in. in diameter and 1 in. thick, and containing baffles and a mixing bar, which, in combination with the volume and design of the chamber, ensure that all fibers when in the screening chamber, are maintained in a dispersed state.

3.1.2 *Cylindrical screening chamber front plate*, a removable plate forming the front of the screening chamber

3.1.3 *Cylindrical screening chamber back plate*, a metal plate with slits of specified dimensions forming the back of the cylindrical screening chamber.

3.1.3.1 Screen plates in 3.1.3 may be used having slit sizes in the range from 0.075 mm to 0,375 mm (0.003 to 0.015 in.) in width. The total length of all the slits on a screen is 3556 mm (140 in.).

3.1.3.2 For a specified (nominal) slit width, the repeatability between screen plates (the ability of two different screen plates with the same specified (nominal) slit size to yield the same retention value when processing the same pulp) depends on the actual distribution of slit sizes. For use in compliance with this practice, the slit width average must be within 0.005mm (0.0002 in.) of the specified (nominal) value e.g. an 0.015mm (0.006 in.) slit size screen plate will have an actual average slit width in the range 0.0145 to 0.0155mm (0.0058 in. to 0.0062 in.), and a single slit may not be more than 0.015mm (0.0006 in.) from that actual average value.

3.1.4 The screening chamber is fitted into an apparatus which automatically controls the rate of delivery of pulp slurry into the screening chamber from the top feed tank through the top feed tube, allows an appropriate period for fiber-contaminant separation to proceed to completion within the chamber, and then flushes out all contaminants from the screening chamber at the end of the cycle to either collect contaminants for weighing or display.

3.1.5 *Hydrorotor*, a device which produces a high frequency, pulsed reverse flow of water through the screen plate slits.

3.1.6 *Top entry tube*, a tube connecting the top of the cylindrical screening chamber to a top feed tank, and allowing pulp slurry to enter the cylindrical screening chamber.

3.1.7 *Top feed tank*, the reservoir holding the slurry of pulp which is to be screened

3.1.8 *Bottom entry tube*, a tube connected to the bottom of the cylindrical screening chamber used for the addition of dilution water.

3.2 Additional laboratory equipment as follows:

3.2.1 *Disintegration equipment*, as specified in T 205.

3.2.2 *Portable electrically driven laboratory stirrer*, for sample agitation.

3.2.3 *Container (plastic bucket or similar)*, to contain the dilute pulp slurry during agitation.

3.2.4 *Dipper (convenient type and style)*, for removing aliquot portions of slurry for testing.

3.2.5 *Balance*, accurate to 0.01 grams, for determining pulp dry weight.

3.2.6 *Oven*, controlled to $105^{\circ} \pm 3^{\circ}\text{C}$

3.2.7 *Filter paper*, qualitative fast flowing, for use with the screening device and the Büchner funnel, if used.

3.2.8 *Graduated cylinder*, as required for pulp dilution.

3.2.9 *Büchner funnel and flask*. Convenient size, for further treatment of contaminant fraction, if desired.

3.2.10 *Balance*, accurate to $\pm 0.0002\text{g}$, for determining contaminant weights.

4. Sampling

4.1 Sample the lot or process in a manner that will ensure that a representative random sample has been taken.

4.2 The sample size will vary depending upon the level of contaminants present. The test specimen required for screening may be as small as 2 grams or less, or as large as 100 grams or more, depending upon the level of contaminants present.

4.3 Special care must be taken in the sampling of pulp slurries, because of the highly non-uniform distribution of contaminants therein.

4.4 For a properly sampled pulp or pulp slurry, the combination of low consistency, intensive agitation and sampling of aliquot portions (see section 5) will minimize the impact of non-uniformity of contaminant distribution, and allow multiple test repeatability of contaminant retention from the same source pulp to be $\pm 5\%$.

as part of the CD or printed set of Standards, or on the TAPPI website general Standards page.