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Repulpability of splices/splicing tape

Scope

This method permits the study of the repulpability of splices in water.

This method simulates the results obtained when splices are added to the stock pulper for reprocessing.

Safety precautions

Care should be taken when using any cutting device.

Significance

This method is useful to simulate splices being added to the stock pulper for reprocessing. Spliced tape can come in with repulpable materials and can cause issues such as blade lines, holes, pop outs, etc.

Apparatus

1. *Blender*, laboratory (Waring type) with a heavy duty motor, having a high speed setting (nominally 22,000 rpm) and low speed setting (nominally 18,000 rpm) with at least a 1-L capacity (a 1-qt container of nominal capacity of 1.06 L is considered suitable) and a cover. The rotor in the bottom of the container shall have 4 blades that have square edges, that is, they shall not have sharpened knife edges.

2. *Blotter paper*, sheets of standard blotting paper. The blotters shall be white, produced from fully bleached chemical pulp free of any additives. They shall be flat, uniform, and free of wrinkles and dirt. Blotter paper meeting the requirements specified in T 205 is considered suitable for this test procedure.

3. *TAPPI Standard Sheet Machine of 159-mm diameter*, with stirrer as described in T 205 including couch roll, and sheet press, drying plates and rings or an 8 in. × 8 in. square sheet machine with fixed or removable forming wire, press, and drier.

4. TAPPI Transparent size estimation chart, or similar transparent chart containing areas of known areas or a transparent copy (to equal scale) of mm-chart paper.

5. Single sided or double sided splicing tape as required for evaluation

6. Cutting device

7. Graduated beakers, capacity greater than 250 mL.

8. Light source, direct and transmitted. A transmitted light source which has been found suitable can be made from a 22-W Circline type florescent-tube lamp mounted in a viewing box with a frosted glass or plastic viewing surface mounted parallel to the tube plane.

9. Balance, weighing to the nearest 0.01 g.

Sampling, test specimens and test units

1. Approximately 15 g of blotter paper cut into ½-in. (13-mm) squares should be available for each test.

2. Double-faced tape requires 8 in.² (52 cm²) of tape placed between two strips of blotter paper of 12 in.² in size. (One set of sizes that has been found suitable is to use a length of tape 1 in. wide by 8 in. long sandwiched between two strips of blotter paper cut to 1.5 in. wide by 8 in. long.) The splice, layered, sample is cut into ½-in (13-mm) squares and sufficient blotter paper, also cut in ½-in (13-mm) squares is added to make a total sample weight of 15 g.

3. Single-faced tape requires in total 8 in.² (26 cm²) of tape. Place a strip of tape 1 in. wide by 4 in. long (4 in.²) on opposite sides of a strip of blotter paper to simulate a double-tape butt splice. This sample is cut into ½-in. (13-mm) squares and sufficient blotter paper, also cut, in ½-in. (13-mm) squares is added to make a total sample weight of 15 g.

Procedure

1. Place layered sample and blotter squares weighing a total of 15 g in blender with 500 mL of room temperature tap water.

2. Run blender run for 20 s at low speed (18,000 rpm).

3. Stop blender for 1 minute. During this minute, use 50 mL of tap water to wash down into the blender the stock which splattered up the sides or onto the cover of the blender (thorough washing is extremely important).

4. After the 1 minute rest time, run blender at low speed (18,000 rpm) for 20 s.

5. Stop blender for 1 minute and thoroughly wash down blender and cover as before with 50 mL of tap water.

6. After the second washing and 1 minute rest time, run blender for a final 20 s at low speed.

7. Remove all of the stock from blender including the sides and top. The final quantity of wash water is not critical but all of the fibers and tape residue must be removed from inside the blender container.

8. Make the stock into handsheets using a sheet mold. For the 6-in. diameter sheet mold, divide the stock into 11 about equal portions. Each portion will make about a 1.4-g handsheet of nominal basis weight of 75 g/m². Make a minimum of 5 “good” sheets. In the case of the 8 in. × 8 in. handsheet machine divide the stock into 5 about equal portions. This will produce about a 3 g handsheet of nominal basis weight of 74 g/m². Make 4 “good” sheets for evaluation.

NOTE 1: These two sheet making procedures do not produce equal test areas for evaluation. Caution: small pieces of film from the tape may adhere to sides of equipment or become attached to the wires or pressing surfaces.

9. Place couched sheets from the mold between dry blotter paper and press to remove excess moisture and to compact the sheets.

10. Remove sheets from the blotters and dry.

NOTE 2: If a better understanding of the nature of repulpability of a splicing tape is desired, then multiple runs and sheets can be made and evaluated at the end of 20, 40, and 60 s.

Evaluation

1. Examine sheets in both direct and transmitted light for particles of unrepulped splicing tape. The presence of one or two specks or particles does not necessarily constitute a failure of the repulpability test, since these can be due to dirty equipment or screens. When a test specimen is truly non-repulpable, the particles will be

dispersed throughout all of the sheets. Unrepulped material will usually be observed in two different ways. (1) Unrepulped adhesive will usually be seen as translucent spots on the sheet. (2) Unrepulped paper from the tape will appear as darker spots in transmitted light because of opacity greater than that of the rest of the sample sheet.

2. If two or more tapes are being compared the report will consist of visual observations and a determination or ranking of the better tapes in regard to their dispersibility.

3. If need is to have quantified data in regard to the dispersibility of a tape then the sheets produced can be evaluated for the relative area of tape residue versus the measured area using a transparent size estimating chart either based on T 564 "Transparent chart for the estimation of defect size" or a transparent copy (1:1 size ratio) of a piece of high quality graph paper. The results to be reported as either the total measured area (mm² of residual splicing tape and the total area evaluated, or calculated as the ppm of residual tape area. The determination of ppm can be found in T 564.

Report

Report the type of tape evaluated, type of handsheet machine used, and the sheet weight evaluated. Report any differences between the procedure of this Useful Method and the procedure used. Report the area evaluated and the resulting amount of tape area found, or in the case of a ranking experiment the rankings of the tapes.

Precision

The precision determination work was done in a single laboratory using two rolls of splicing tape; one roll of single-sided and one roll of double-sided tape.

Double-sided tape evaluation: Two sheets of blotter paper, followed by dispersion in a blender using the prescribed procedure in this UM. Handsheets were prepared using both the TAPPI Standard Handsheet machine and an 8 x 8 inch removable wire sheet mold with equivalent sheet basis weights and pressing and drying methods. The resulting sheets were evaluated under transmitted and reflected light using the TAPPI Transparent Size Estimation Chart for small particles and a transparent copy of mm-square graph paper for larger tape residual areas. Three laboratory technicians were assigned the task of evaluating the relative contaminant areas. The results were compared using the TAPPI Useful Method Repeatability Calculations spreadsheet for the "Like Specimens Procedure" (available on the TAPPI Website). A total of 15 sheets were selected and evaluated for relative tape contaminant areas resulting in an average relative tape area of 29 ppm (mm²/m²) and a repeatability of 70%.

Single-sided tape evaluation: To be done using the corrected procedure.

Keywords

Repulping, Pulpability, Splices

Additional information

1. Effective date of issue: Published prior to 1991; reviewed and retained in the UM set August 10, 2012.

2. This revision includes several changes including the substitution of blotter paper for the originally specified 30 lb bond. This change was made because blotter paper disperses easily and does not interfere with viewing of tape after handsheets are made. The area of the tape to the weight of blotter paper has been maintained from the original to the revised version.

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