Pilot Plant Testing With Pre-Consumer & Post-Consumer Starbucks Cups & Sleeves

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Protocol for Repulpability & Recyclability Testing

Voluntary Standard
For Repulping and Recycling Corrugated Fiberboard Treated to Improve Its Performance in the Presence of Water and Water Vapor

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Purpose

1. This standard establishes a repeatable method for simulating a commonly used subset of repulping and recycling processes. It is intended to evaluate the impact of repulping and recycling treated corrugated fiberboard on containerboard mill operations and final products.

2. This standard establishes a method for identifying treated corrugated that can be repulped and recycled in this selected subset of processes. It establishes minimum levels of performance for the handsheets made from treated corrugated, repulped and recycled in accordance with a detailed test protocol given in Appendices A & B. This standard is not intended to preclude the development or use of any technological advances in mill or treatment processes. It is intended to encourage the development, use and repulping and recycling of treated corrugated products for use in high-moisture environments.

1. This standard applies repulping and recycling process technology either in effect or readily achievable in mills currently involved in recycling.

2. This standard establishes a screening method to determine the repulpability and recyclability of treated corrugated products that have not previously been considered recyclable.

3. The test method in this standard has two parts:

   **Part 1** determines the repulpability of treated corrugated by determining fiber-on-fiber yield when only the treated corrugated is processed in accordance with this standard (Appendix A).

   **Part 2** determines the recyclability of the treated corrugated by evaluating its effect on mill operations and finished products when it is added to untreated corrugated in the amounts specified (Appendix B).
Starbucks Cups And Sleeves
Hydropulper 80% OCC 20%  
Starbucks Cups
Part 2 Pilot Plant Procedure

Step 1

- Pulp at 3% consistency, 125° F (±10°), 7 (± 0.5 pH), Pulp 15 Minutes
Part 2 Pilot Plant Procedure
Step 2 & 3

High Pressure Screening
Maintain 125° F (±10°), 7 (± 0.5 pH)

1st Pass – 0.062 inch holes
Volumetric reject rate of 10% of the feed rate

2nd Pass – 0.010 Slotts
Volumetric reject rate of 10% of the feed rate
0.010 Slotted Screen Basket
Part 2 Pilot Plant Procedure

Step 4

Pass through a lightweights reverse centrifugal-type cleaner, maintaining the temperature at 125°F (±10°), consistency, and the pressure differential specified for the cleaners being used.
Basic Reverse/Low Density Cleaner

- **FEED**: water, paper fibers, and hot melt materials
- **REJECTS**: materials with density less than water and paper fibers
- **ACCEPTS**: water and paper fiber
Protocol Testing

Burst TAPPI – T- 403
Slide Angle/ COF Static – T – 815
STFI – Short Span Compression
Water Drop – TAPPI – T – 831 om-99
Appearance/ Stickies – FBA Protocol Version
Final product Hand Sheets

Hand Sheets for Stickies 2 grams
All others 3 grams
Strength Test Results From Pilot Plant

- Burst Strength (Mullen) 20% Pre-consumer
  Over 10% increase over 100% OCC
- Burst Strength (Mullen) 20% Post-consumer
  Over 10% increase over 100% OCC
Appearance/Stickies Test Results

All Pilot Plant Trials with Pre and Post Consumer Cups Significantly Reduce Stickies
Slide Angle and Water Drop

Both Water Drop and Slide Angle Have Passed All Testing With both Pre and Post Consumer Cups
What Happens If We Make Paper On The Paper Machine?

We saved as much fiber from the 1.5 protocol runs and pumped it to the paper machine chest approached system.

33# liner
Wet end additives – 6#/ton starch and 2#/ton AKD (internal sizing)
Sizepress – Corn Starch at 6#/ton pick up
Wet End Forming Section
80% OCC 20% Starbucks Cups
Dandy Roll, Vacuum and Couch Roll
Wet Press Section going into First Dryers
Pond Size Press Between First And Second Dryer Sections
Test Results

1. Mullen Min - 70 psi Target - Mullen is a must - 78
2. Ring Crush Min - 58 Target 66#/6 in - 62
3. STFI - Min 16.8 - Target 17.8#/in - 19.5
4. Roll Moisture 7% target - 6.8
5. Porosity - Min 15 - Target - 35 sec/100 cc - 18
6. Cobb Min 35 - Target 45-55 - Max 75 - 22

Numbers in orange are for the 33 # liner sheet composed of test material containing post-consumer 20% hot cups and sleeves.
Thank You!