WESTERN MICHIGAN UNIVERSITY

OCC-E CERTIFICATION
PERFORMED AT WESTERN MICHIGAN UNIVERSITY

Repulpability & Recyclability

Repulping and Recycling Corrugated Fiberboard
With Fiber Based Packaging

Submitting Company: SONOCO

Test Sample Name: Foil-Based Eco Seal

Control Sample Name: OCC Control

Test Dates: 5/29/2019

Date Report Completed: 6/6/2019

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REPORT RESULTS: REPULPABILITY PROCESS (PART 1)

Trial: SONOCO Date Run: 3/22/2017

Sample: **Test 2: Foil Lined Canisters (Separate Ends)**

	Set #1:	Set #2:	Set #3: (if required)
Is sample representative of the material as a whole? (Y/N)	Y	Y	
STARTING SAMPLE			
Moisture Content	4.1 %	4.1 %	%
Temperature Range	125 °F	125 °F	°F
Amount of Fiber in Charge	30 g	25 g	g
Temp & pH Maintained? (Y/N)	Y	Y	
Hot Slurry Charged to Flat Screen, as Instructed? (Y/N)	Y	Y	
FINISHED SAMPLE: Oven dry mass			
Amount of Fiber Rejects	3.167 g	2.692 g	g
Amount of Fiber Accepts	22.5 g	18.81 g	g
Yield of Sample (% Accepts)	87.7 %	87.5 %	%
Observe and note deposition on vessel walls, screens, moving parts, etc.			
Deposition Observed? (Y/N) If yes, detail below.	N	N	
SUMMARY Operational Impact: (Pass/Fail)	PASS	PASS	
Yield: (Pass/Fail)	PASS	PASS	

To pass % accepts must be no less than 85%

Note, details:

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REPORT RESULTS: RECYCLABILITY PROCESS (PART 2)

Trial: Foil-Based Eco Seal Date Run: 5/29/2019

Sample: C-1 T-1

	Untreated Control	Recyclability Test Sample
Is sample representative of the lot as a whole? (Y/N)	Y	Y
Moisture Content	6 %	6.5 %
Pulping		
At 6% Consistency? (Y/N)	Y	Y
20/80% Charged by weight? (Y/N)		Y
If greater than 20/80%, specify ratio here:		%
Temp & pH maintained, per App. B, #3? (Y/N)	Y	Y
Number of batches required?	1	1
0.0625 Screens		
2% (note if different) Consistency, Temp & pH, per App.B, #5? (Y/N)	Y	Y
10% Volumetric Reject Rate? (Y/N)	Y	Y
0.010 Basket:		
Temp, pH, & Reject Rate, per App B, #6? (Y/N)	Y	Y
Reverse Cleaners:		
Temp & Pressure Differential, per App B, #7? (Y/N)	Y	Y
Determine Volumentric Reject Rate	15.0 gpm	26.0 gpm
Was it necessary to stop the test to clean any apparatus at any time during this procedure? (Y/N)	N	N
Deposition observed? (Y/N) If yes, detail below.	N	Y
Were the required Temp & pH maintained throughout the entire protocol? (Y/N)	Y	Y

Note, details:

Foil backing in pulper caught by extraction plate. See picture.

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TEST REPORT: HANDSHEET FORMATION AND PRODUCT PERFORMANCE

Trial: Foil-Based Eco Seal Date Run: 5/29/2019

Sample: C-1 T-1

Was TAPPI T-205 used to form the handsheets, and were temp & pH maintained, dried to 7% mositure content under restrain at 250-275°F, per App. B, #8? (Y/N) Y

Product Performance

1. Slide Angle T-815 (Note: Test blotter side to blotter side.)

Control Handsheet #	Test Data (°)	Recyclability Test Sample Handsheet #	Test Data (°)
C-1-6,C-1-3	23	T-1-9,T-1-3	22
C-1-10,C-1-8	29	T-1-14,T-1-6	29
C-1-15,C-1-12	28	T-1-19,T-1-8	30
C-1-21,C-1-18	29	T-1-22,T-1-12	28
C-1-27,C-1-23	32	T-1-26,T-1-15	33

$Average_C$ = 28.2 ° $Average_R$ = 28.4 °

85% $Average_C$ = 23.97 °

Is $Average_R \geq 85\%\ Average_C$? (Y/N) Y

Initials: CW

2. Water-Drop Penetration T-831 (Note: Test five drops each on the wire and on the blotter sides.)

Control Handsheet #	Test Data (sec) Wire	Blotter	Recyclability Test Sample Handsheet #	Test Data (sec) Wire	Blotter
C-1-6	0.66	0.6	T-1-9	0.64	0.6
C-1-10	0.58	0.6	T-1-14	0.58	0.56
C-1-15	0.58	0.58	T-1-19	0.56	0.6
C-1-21	0.62	0.6	T-1-22	0.62	0.58
C-1-27	0.62	0.58	T-1-26	0.62	0.6

$Average_C$ of 10 drops = 0.602 sec $Average_R$ of 10 drops = 0.596 sec

200 + $Average_C$ = 200.602 sec

Is $Average_R \leq 200 + Average_C$? (Y/N) Y

Initials: CW

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TEST REPORT: PRODUCT PERFORMANCE (CONTINUED)

Trial: Foil-Based Eco Seal Date Run: 5/29/2019

Sample: C-1 T-1

Product Performance

3. Short Span Compression (STFI) T-826

Control					Recyclability Test Sample				
Handsheet #	Handsheet Weight (g)	Basis Wt. (lbs/1000ft^2)	STFI Value (lbf/inch)	Indexed Value	Handsheet #	Handsheet Weight (g)	Basis Wt. (lbs/1000ft^2)	STFI Value (lbf/inch)	Indexed Value
C-1-5	3	30.996	14.29	0.461	T-1-1	3	30.996	15.21	0.491
C-1-9	2.98	30.789	16.28	0.529	T-1-7	3	30.996	16.81	0.542
C-1-14	2.93	30.273	15.13	0.5	T-1-10	2.89	29.859	14.6	0.489
C-1-20	2.79	28.826	15.52	0.538	T-1-13	2.86	29.55	15.51	0.525
C-1-26	3	30.996	16.06	0.518	T-1-17	3.04	31.409	15	0.478
Average$_C$ =		30.376	15.46	0.509	Average$_R$ =		30.562	15.43	0.505
Indexed Average$_C$ - 10% =				0.458					

Is Indexed Average$_R$ ≥ Indexed Average$_C$ - 10%? (Y/N) Y

Initials: CW

Notes:

4. Burst Strength T-403

Control					Recyclability Test Sample				
Handsheet #	Handsheet Weight (g)	Basis Wt. (lbs/1000ft^2)	Burst Value (psi)	Indexed Value	Handsheet #	Handsheet Weight (g)	Basis Wt. (lbs/1000ft^2)	Burst Value (psi)	Indexed Value
C-1-3	3	30.996	63.5	2.049	T-1-3	3.07	31.719	64.5	2.033
C-1-8	2.94	30.376	68	2.239	T-1-6	3.07	31.719	66	2.081
C-1-12	2.98	30.789	66.25	2.152	T-1-8	3.04	31.409	66.75	2.125
C-1-18	3.03	31.306	66.75	2.132	T-1-12	3.07	31.719	65.75	2.073
C-1-23	2.94	30.376	66.5	2.189	T-1-15	3.13	32.339	66.75	2.064
Average$_C$ =		30.769	66.2	2.152	Average$_R$ =		31.781	65.95	2.075
Indexed Average$_C$ - 10% =				1.937					

Is Indexed Average$_R$ ≥ Indexed Average$_C$ - 10%? (Y/N) Y

Initials: CW

Notes:

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TEST REPORT: PRODUCT PERFORMANCE (CONTINUED)

Trial: Foil-Based Eco-Seal Date Run: 5/29/2019

Sample: C-1 T-1

Product Appearance

STICKIES/SPOT COUNT TEST VALUES AVERAGE COUNT FOR THREE SHEETS

Material	Trial #1	Trial #2	Trial #3	Average
Control	2	11	3	5.3
Test Sample	3	35	4	14.0

Is the spot count ≤ 15, or, no more than 30% greater than the control? (Y/N) Y

Initials: CW

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REPORT RESULTS: RECYCLABILITY PROCESS (PART 2)

Trial: Foil-Based Eco Seal Date Run: 5/29/2019

Sample: C-2 T-2

	Untreated Control	Recyclability Test Sample
Is sample representative of the lot as a whole? (Y/N)	Y	Y
Moisture Content	6 %	6.5 %
Pulping		
At 6% Consistency? (Y/N)	Y	Y
20/80% Charged by weight? (Y/N)		Y
If greater than 20/80%, specify ratio here:		%
Temp & pH maintained, per App. B, #3? (Y/N)	Y	Y
Number of batches required?	1	1
0.0625 Screens		
2% (note if different) Consistency, Temp & pH, per App.B, #5? (Y/N)	Y	Y
10% Volumetric Reject Rate? (Y/N)	Y	Y
0.010 Basket:		
Temp, pH, & Reject Rate, per App B, #6? (Y/N)	Y	Y
Reverse Cleaners:		
Temp & Pressure Differential, per App B, #7? (Y/N)	Y	Y
Determine Volumentric Reject Rate	18.0 gpm	12.0 gpm
Was it necessary to stop the test to clean any apparatus at any time during this procedure? (Y/N)	N	N
Deposition observed? (Y/N) If yes, detail below.	N	Y
Were the required Temp & pH maintained throughout the entire protocol? (Y/N)	Y	Y

Note, details:

Foil backing in pulper caught by extraction plate. See picture.

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TEST REPORT: HANDSHEET FORMATION AND PRODUCT PERFORMANCE

Trial: Foil-Based Eco Seal Date Run: 5/29/2019

Sample: C-2 T-2

Was TAPPI T-205 used to form the handsheets, and were temp & pH maintained, dried to 7% mositure content under restrain at 250-275°F, per App. B, #8? (Y/N) Y

Product Performance

1. Slide Angle T-815 (Note: Test blotter side to blotter side.)

Control Handsheet #	Test Data (°)	Recyclability Test Sample Handsheet #	Test Data (°)
C-2-6,C-2-3	22	T-2-4,T-2-3	23
C-2-10,C-2-8	30	T-2-10,T-2-8	31
C-2-15,C-2-12	32	T-2-15,T-2-14	30
C-2-21,C-2-18	28	T-2-20,T-2-19	31
C-2-27,C-2-23	33	T-2-26,T-2-24	30

$Average_C$ = 29 ° $Average_R$ = 29 °

85% $Average_C$ = 24.65 °

Is $Average_R \geq 85\% Average_C$? (Y/N) Y

Initials: CW

2. Water-Drop Penetration T-831 (Note: Test five drops each on the wire and on the blotter sides.)

Control Handsheet #	Test Data (sec) Wire	Blotter	Recyclability Test Sample Handsheet #	Test Data (sec) Wire	Blotter
C-2-6	0.7	0.64	T-2-4	0.58	0.6
C-2-10	0.74	0.8	T-2-10	0.6	0.68
C-2-15	0.98	0.84	T-2-15	0.6	0.58
C-2-21	0.72	0.7	T-2-20	0.64	0.6
C-2-27	0.7	0.64	T-2-26	0.62	0.62

$Average_C$ of 10 drops = 0.746 sec $Average_R$ of 10 drops = 0.612 sec

200 + $Average_C$ = 200.746 sec

Is $Average_R \leq 200 + Average_C$? (Y/N) Y

Initials: CW

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TEST REPORT: PRODUCT PERFORMANCE (CONTINUED)

Trial: Foil-Based Eco Seal Date Run: 5/29/2019

Sample: C-2 T-2

Product Performance

3. Short Span Compression (STFI) T-826

Control					Recyclability Test Sample				
Handsheet #	Handsheet Weight (g)	Basis Wt. (lbs/1000ft^2)	STFI Value (lbf/inch)	Indexed Value	Handsheet #	Handsheet Weight (g)	Basis Wt. (lbs/1000ft^2)	STFI Value (lbf/inch)	Indexed Value
C-2-5	2.98	30.789	16.41	0.533	T-2-5	3.1	32.029	16.23	0.507
C-2-9	2.98	30.789	16.15	0.525	T-2-9	2.93	30.273	15.32	0.506
C-2-14	3.18	32.856	17.74	0.54	T-2-16	3.18	32.856	15.08	0.459
C-2-20	3.26	33.682	16.77	0.498	T-2-21	3.08	31.823	15.04	0.473
C-2-26	3.25	33.579	16.75	0.499	T-2-27	2.97	30.686	14.11	0.46
Average$_C$ =		32.339	16.76	0.519	Average$_R$ =		31.533	15.16	0.481
Indexed Average$_C$ - 10% =				0.467					

Is Indexed Average$_R$ ≥ Indexed Average$_C$ - 10%? (Y/N) Y

Initials: CW

Notes:

4. Burst Strength T-403

Control					Recyclability Test Sample				
Handsheet #	Handsheet Weight (g)	Basis Wt. (lbs/1000ft^2)	Burst Value (psi)	Indexed Value	Handsheet #	Handsheet Weight (g)	Basis Wt. (lbs/1000ft^2)	Burst Value (psi)	Indexed Value
C-2-3	3.25	33.579	73.5	2.189	T-2-1	2.87	29.653	62.5	2.108
C-2-8	3.17	32.752	72	2.198	T-2-3	3.01	31.099	61.5	1.978
C-2-12	3.19	32.959	70.5	2.139	T-2-7	2.94	30.376	60.5	1.992
C-2-18	3.29	33.992	72	2.118	T-2-19	3.09	31.926	59	1.848
C-2-23	3.25	33.579	74.25	2.211	T-2-24	3.1	32.029	63.25	1.975
Average$_C$ =		33.372	72.45	2.171	Average$_R$ =		31.017	61.35	1.98
Indexed Average$_C$ - 10% =				1.954					

Is Indexed Average$_R$ ≥ Indexed Average$_C$ - 10%? (Y/N) Y

Initials: CW

Notes:

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TEST REPORT: PRODUCT PERFORMANCE (CONTINUED)

Trial: Foil-Based Eco Seal Date Run: 5/29/2019

Sample: C-2 T-2

Product Appearance

STICKIES/SPOT COUNT TEST VALUES AVERAGE COUNT FOR THREE SHEETS

Material	Trial #1	Trial #2	Trial #3	Average
Control	6	27	3	12.0
Test Sample	2	12	3	5.7

Is the spot count ≤ 15, or, no more than 30% greater than the control? (Y/N) Y

Initials: CW

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PASS/FAIL SUMMARY

	Trial #1	Trial #2	Trial #3
1. For both treated and untreated were the substrate, samples, specimens appropriate? (Y/N)	Y	Y	
2. Fibre Yield ≥ 85%? (Y/N)	Y	Y	
3. Operational impact acceptable? (Y/N)	Y	Y	
4. Product performance acceptable? (Y/N)	Y	Y	
5. Product appearance/spot count acceptable? (Y/N)	Y	Y	
Overall Pass / Fail - by trial: (Pass/Fail)	Pass	Pass	

MATERIAL AS SUBMITTED "PASSES" VOLUNTARY STANDARD.

Pass or Fail: Pass

Signed: 

Print name: Shawn Mortimore

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TEST REPORT (CONTINUED)

Affirmation:

The facilities and equipment in this lab are suitable for testing the tendered product within the instructions and tolerances of the current voluntary standard.

Personnel running and reporting these tests are competent and trained to accurately do so. They have followed the letter and spirit of the subject voluntary standard.

Objective and subjective information, as contained herein, is accurate.

Signed: _____ Lab Manager

Shawn Mortimore Print Name

Director Pilot Plants Title

269-276-3532 Phone

6/6/2019 Date

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