# OCC-E CERTIFICATION PERFORMED AT WESTERN MICHIGAN UNIVERSITY

Repulpability & Recyclability

# Repulping and Recycling Corrugated Fiberboard With Fiber Based Packaging

Submitting Company: Chilltainers

Test Sample Name: Reflective Corrugated

Control Sample Name: WMU OCC Control

Test Dates: 9-9-21, 9-30-21

Date Report Completed: 10/7/2021

### REPORT RESULTS: REPULPABILITY PROCESS (PART 1)

Chilltainers	Date Run:	7/2/2021		
Reflective Corrugated				
	Set #1:	Set #2:	Set #3: (if required)	
esentative of the material as a whole? (Y/N)	<u> </u>	<u>Y</u>		
MPLE tent	8.57_%	8.57 %	%	
ange er in Charge intained? (Y/N) rged to Flat Screen, as Instructed? (Y/N)	130 °F 25.49 g Y	130 °F 25.16 g Y	°! g 	
MPLE: Oven dry mass er Rejects er Accepts e (% Accepts)	2.763 g 18.1 g 86.8 %	2.604 g 17.91 g 87.3 %	g g %	
ote deposition on vessel walls, screens, etc. bserved? (Y/N) If yes, detail below.	N	N		
Operational Impact: (Pass/Fail) Yield: (Pass/Fail) To pass % accepts must be no less than 85%	Pass Pass	Pass Pass		
	Reflective Corrugated  Issentative of the material as a whole? (Y/N)  MPLE tent  ange r in Charge intained? (Y/N) ged to Flat Screen, as Instructed? (Y/N)  MPLE: Oven dry mass r Rejects r Accepts e (% Accepts)  ote deposition on vessel walls, screens, tc. oserved? (Y/N)  Operational Impact: (Pass/Fail) Yield: (Pass/Fail)	Reflective Corrugated  Set #1:  Sentative of the material as a whole? (Y/N)  MPLE tent  ange r in Charge intained? (Y/N) ged to Flat Screen, as Instructed? (Y/N)  MPLE: Oven dry mass r Rejects r Accepts e (% Accepts)  Ote deposition on vessel walls, screens, tc. Diserved? (Y/N)  Operational Impact: (Pass/Fail) Yield: (Pass/Fail)  Pass Pass	Set #1:   Set #2:	

Date Run:

9/9/2021

REPORT RESULTS: RECYCLABILITY PROCESS	(PART 2)	١

Reflective Corrugated

T-1

C-1

Trial:

Sample:

	Control	Test Sample
Is sample representative of the lot as a whole? (Y/N)	<u>Y</u>	<u>Y</u>
Moisture Content	8.3 %	8.35 %
Pulping At 6% Consistency? (Y/N) 20/80% Charged by weight? (Y/N) If greater than 20/80%, specify ratio here: Temp & pH maintained, per App. B, #3? (Y/N) Number of batches required?	Y Y 1	Y Y Y 1
0.0625 Screens 2% (note if different) Consistency, Temp & pH, per App.B, #5? (Y/N) 10% Volumetric Reject Rate? (Y/N)	<u>Y</u> <u>Y</u>	<u>Y</u> <u>Y</u>
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) Determine Volumentric Reject Rate	<u>Y</u>	<u>Y</u> 15.3gpm
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.	<u>N</u>	<u> N</u>
Were the required Temp & pH maintained throughout the entire protocol? (Y/N)	Y	Y
Note, details:		
C-1 is 100% OCC control supplied by WMU. T-1 is 80% control 20%	6 test material.	

### Western Michigan University



### TEST REPORT: HANDSHEET FORMATION AND PRODUCT PERFORMANCE

Trial:	Reflective Corrugated	Date Run: _	9/9/2021		
•	<u> </u>		_		

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)



#### **Product Performance**

Control	
Handsheet #	Test Data (°)
C-1-4, C-1-1	21
C-1-8, C-1-5	30
C-1-12, C-1-9	26
C-1-16, C-1-13	26
C-1-20, C-1-17	29

Average<sub>C</sub> = 
$$26.4$$
 ° Average<sub>R</sub> =  $29.4$  ° 85% Average<sub>C</sub> =  $22.44$  °

Recyclability Test Sample

Handsheet # T-1-5, T-1-2

T-1-9, T-1-6

T-1-13, T-1-10

T-1-17, T-1-14

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

	Υ	
Initials.	CW	

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

			Recycia
Control	Test Da	ata (sec)	Test Sa
Handsheet #	Wire	Blotter	Handsh
C-1-4	0.8	0.62	T-1-5
C-1-8	0.6	0.66	T-1-9
C-1-12	0.56	0.56	T-1-13
C-1-16	0.56	0.58	T-1-17
C-1-20	0.62	0.6	T-1-2

Recyclability		
Test Sample	Test Data	a (sec)
Handsheet #	Wire	Blotter
T-1-5	0.52	0.54
T-1-9	0.5	0.5
T-1-13	0.56	0.56
T-1-17	0.56	0.56
T-1-21	0.52	0.56

Test Data (°)

29

29

29

31

Average<sub>C</sub> of 10 drops = 
$$0.616$$
 sec  
 $200 + \text{Average}_{\text{C}} = 200.616$  sec

Average<sub>R</sub> of 10 drops = 
$$0.538$$
 sec

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

Y
CW

W	W	L 1	L J.		1	200	P	II.	M	A	W	8		1	A I	J 1	- 1	L Å
		MICH	* * *	V CEZ	A								/					
	B B	يُلِدُ ۾ *		$\cdot$	V E													
	1		903		7													

IEST REP	ORT: PROL	DUCT PERFC	RMANCE (C	CONTINUE	D)						
Trial:	Reflec	ctive Corrugat	ed			Date Ru	n: <u>9/</u> 9	9/2021	_		
Sample: _	C-1	T-1									
Product Pe	rformance										
3. Short Sp	an Compres	sion (STFI) T	-826								
	•	Control				Recyc	lability Test S	Sample			
Handsheet #	Handsheet Weight (g)	Basis Wt. (lbs/1000ft <sup>2</sup> )	STFI Value (lbf/inch)	Indexed Value	Handsheet #	Handsheet Weight (g)	Basis Wt. (lbs/1000ft <sup>2</sup> )	STFI Value (lbf/inch)	Indexed Value		
C-1-3 C-1-7 C-1-11	2.9 3 3.01	29.963 30.996 31.099	12.48 13.15 12.8	0.417 0.424 0.412	T-1-4 T-1-8 T-1-12	2.96 3.09 3.03	30.583 31.926 31.306	14.41 14.92 14.79	0.471 0.467 0.472		
C-1-15 C-1-19	2.93	30.273 30.686	12.84 12.75	0.424	T-1-16 T-1-20	2.99	30.893 31.099	14.66	0.475		
A											
Is Indexe	d Average <sub>R</sub> :	≥ Indexed Av	erage <sub>C</sub> - 10%	5? (Y/N)				Initials:	Y		
4. Burst Str	ength T-403										
	I	Control			<u> </u>		lability Test S				
Handsheet #	Handsheet Weight (g)	Basis Wt. (lbs/1000ft <sup>2</sup> )	Burst Value (psi)	Indexed Value	#	Handsheet Weight (g)	Basis Wt. (lbs/1000ft <sup>2</sup> )	Burst Value (psi)	Indexed Value		
C-1-1 C-1-5 C-1-9	2.95 2.89 2.96	30.479 29.859 30.583	69 68.25 66.75	2.264 2.286 2.183	T-1-2 T-1-6 T-1-10	2.96 3.09 3.03	30.583 31.926 31.306	77.25 78.25 74.75	2.526 2.451 2.388		
C-1-13 C-1-17	2.97 3.01	30.686 31.099	67.75 68	2.208	T-1-14 T-1-18	2.99 3.01	30.893 31.099	75.75 76.75	2.452 2.468		
A	verage <sub>c</sub> =	30.541	67.95	2.225	A.	verage <sub>R</sub> =	31.161	76.55	2.457		
	• •	exed Average		2.003		<b>5</b>					
Is Indexe	d Average <sub>R</sub>	≥ Indexed Av	erage <sub>C</sub> - 10%	6? (Y/N)					Υ		
Notes:								Initials:	CW		

TEST	RFPORT.	PRODUCT	PERFORM	IANCE (	CONTIN	UED,

Trial: \_\_\_\_\_Reflective Corrugated \_\_\_\_ Date Run: \_\_\_\_\_9/9/2021

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	4	6	3	4.3
Test Sample	24	25	25	24.7

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

Initials: N

REPORT RESULTS: RECYCLABILITY PROCESS	(PART 2)	١

Trial:	Reflective Corrugated	Date Run:	9/9/2021
Sample:	C-2 T-2		
•		Untreated	Recyclability
		Control	Test Sample
Is sample re	presentative of the lot as a whole? (Y/N)	<u> </u>	<u> </u>
Moisture Cor	ntent	8.3 %	8.35 %
Pulping			
	onsistency? (Y/N)	<u> </u>	<u> </u>
	Charged by weight? (Y/N)		<u> </u>
	than 20/80%, specify ratio here:		%
	pH maintained, per App. B, #3? (Y/N)	<u>Y</u>	<u>Y</u>
Number	of batches required?	1	1
0.0625 Scree			
,	if different) Consistency, Temp & pH, per		
App.B, #		<u>Y</u>	<u>Y</u>
10% Volu	umetric Reject Rate? (Y/N)	<u> </u>	<u> </u>
0.010 Baske			
Temp, pl	H, & Reject Rate, per App B, #6? (Y/N)	<u> </u>	<u> </u>
Reverse Cle	aners:		
	Pressure Differential, per App B, #7? (Y/N)	<u> </u>	<u> </u>
Determin	ne Volumentric Reject Rate	16.2gpm	<u>14.8</u> gpm
Was it neces	ssary to stop the test to clean any apparatus at any		
time during t	his procedure? (Y/N)	<u>N</u>	<u>N</u>
Deposition o	bserved? (Y/N) If yes, detail below.	<u>N</u>	<u>N</u>
Were the red	quired Temp & pH maintained throughout the entire		
protocol? (Y/	N)	Y	<u> </u>
Note, details	:		
C-2 is 100%	OCC control supplied by WMU. T-2 is 80% control 20%	% test material	
<u> </u>	200 Control Supplied by Willo. 1 2 is 00 / Control 20 /	toot material.	



### TEST REPORT: HANDSHEET FORMATION AND PRODUCT PERFORMANCE

26 25

26

Trial:	Reflective	Corrugated	Date Run:	9/9/2021	
Sample:	C-2	T-2			
		o form the handsheets, and were temp & ent under restrain at 250-275°F, per App	•	_	Υ
Product Pe	rformance				
	gle T-815 (Note ontrol	e: Test blotter side to blotter side.)	Recyclability Test Sample		
H	andsheet #	Test Data (°)	Handsheet #	Test Data (°)	
C-:	2-5, C-2-2	27	T-2-4, T-2-1	27	
C-:	2-9 C-2-6	28	T-2-8 T-2-5	32	

Average<sub>C</sub> = 
$$26.4$$
 ° Average<sub>R</sub> =  $30.2$  85% Average<sub>C</sub> =  $22.44$  °

-2-20, T-2-17

Is Average<sub>R</sub> ≥ 85% Average<sub>C</sub>? (Y/N)

2-21, C-2-18

Initials: Y

30

33

0.558

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

			Recyclability		
Control	Test Da	ata (sec)	Test Sample	Test Da	ata (sec)
Handsheet #	Wire	Blotter	Handsheet #	Wire	Blotter
C-2-5	0.56	0.5	T-2-4	0.54	0.56
C-2-9	0.52	0.48	T-2-8	0.58	0.56
C-2-13	0.5	0.54	T-2-12	0.56	0.56
C-2-17	0.5	0.54	T-2-16	0.56	0.56
C-2-21	0.54	0.52	T-2-20	0.54	0.56

Average<sub>C</sub> of 10 drops = 
$$0.52$$
 sec Average<sub>R</sub> of 10 drops =  $200 + \text{Average}_{\text{C}} = 200.52$  sec

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

Initials: Y

V	VLO		_   \	M	I V			N U I	VI
	* * * * * *	* 25.25			-	7			

IESI KEP	ORT: PROD	OUCT PERFO	ORMANCE (C	CONTINUE	D)				
Trial:	Reflec	tive Corrugat	ed			Date Ru	n: <u>9/</u> 9	9/2021	_
Sample: _	C-2	2 T-2							
Product Pe	Product Performance								
3 Short Sp	an Compres	sion (STFI) T	-826						
о. оо ор	<u></u>	Control				Recyc	lability Test S	Sample	
Handsheet	Handsheet		STFI Value	Indexed	Handsheet	Handsheet		STFI Value	Indexed
#		(lbs/1000ft <sup>2</sup> )	(lbf/inch)	Value	#	Weight (g)	(lbs/1000ft <sup>2</sup> )	(lbf/inch)	Value
C-2-3	2.87	29.653	12.52	0.422	T-2-3	3.02	31.203	14.56	0.467
C-2-7	2.97	30.686	13.2	0.43	T-2-7	3.01	31.099	14.65	0.471
C-2-11	2.92	30.169	12.29	0.407	T-2-11	2.94	30.376	14.38	0.473
C-2-15	3.02	31.203	13.33	0.427	T-2-15	3.06	31.616	14.04	0.444
<u>C-2-19</u>	2.88	29.756	12.13	0.408	<u>T-2-19</u>	2.94	30.376	14.54	0.479
A	verage <sub>c</sub> =	30.293	12.69	0.419	<u>I</u> А	L verage <sub>R</sub> =	30.934	14.43	0.467
		exed Average		0.377		J K			
		g-		0.011					
Is Indexed Average <sub>R</sub> ≥ Indexed Average <sub>C</sub> - 10%? (Y/N)									
le Indava	d Average :	> Indeved Av	erade - 10%	2 (V/NI)					V
Is Indexe	d Average <sub>R</sub>	≥ Indexed Ave	erage <sub>C</sub> - 10%	5? (Y/N)				Initials:	Y
Is Indexe Notes:	d Average <sub>R</sub> ?	≥ Indexed Ave	erage <sub>C</sub> - 10%	5? (Y/N)				Initials:	Y CW
Notes: _			erage <sub>C</sub> - 10%	5? (Y/N)				Initials:	
Notes: _	d Average <sub>R</sub> ?		erage <sub>C</sub> - 10%	5? (Y/N)		Daw	dala ilika Tana G	_	
Notes: 4. Burst Str	ength T-403	Control			Llandob at		clability Test S	Sample	CW
Notes: 4. Burst Str Handsheet	ength T-403	Control Basis Wt.	Burst	Indexed		Handsheet	Basis Wt.	Sample Burst	CW
Notes: 4. Burst Str Handsheet #	ength T-403 Handsheet Weight (g)	Control Basis Wt. (lbs/1000ft <sup>2</sup> )	Burst Value (psi)	Indexed Value	#	Handsheet Weight (g)	Basis Wt. (lbs/1000ft <sup>2</sup> )	Sample Burst Value (psi)	CW Indexed Value
Notes: 4. Burst Str  Handsheet # C-2-2	ength T-403  Handsheet Weight (g)  3	Control Basis Wt. (lbs/1000ft <sup>2</sup> ) 30.996	Burst Value (psi) 71.5	Indexed Value 2.307	# T-2-1	Handsheet Weight (g) 2.98	Basis Wt. (lbs/1000ft <sup>2</sup> ) 30.789	Sample Burst Value (psi) 71.5	Indexed Value 2.322
Notes: 4. Burst Str  Handsheet # C-2-2 C-2-6	ength T-403  Handsheet Weight (g)  3 2.9	Control Basis Wt. (lbs/1000ft²) 30.996 29.963	Burst Value (psi) 71.5 67.75	Indexed Value 2.307 2.261	# T-2-1 T-2-5	Handsheet Weight (g) 2.98 3.03	Basis Wt. (lbs/1000ft <sup>2</sup> ) 30.789 31.306	Sample Burst Value (psi) 71.5 76.5	Indexed Value 2.322 2.444
Notes: 4. Burst Str  Handsheet #  C-2-2 C-2-6 C-2-10	ength T-403  Handsheet Weight (g)  3  2.9  2.93	Control Basis Wt. (lbs/1000ft²) 30.996 29.963 30.273	Burst Value (psi) 71.5 67.75 68.75	Indexed Value 2.307 2.261 2.271	# T-2-1 T-2-5 T-2-9	Handsheet Weight (g) 2.98 3.03 2.99	Basis Wt. (lbs/1000ft²) 30.789 31.306 30.893	Sample  Burst  Value (psi)  71.5  76.5  73.5	Indexed Value 2.322 2.444 2.379
Notes:  4. Burst Str  Handsheet # C-2-2 C-2-6 C-2-10 C-2-14	ength T-403  Handsheet Weight (g)  3  2.9  2.93  2.94	Control Basis Wt. (lbs/1000ft²) 30.996 29.963 30.273 30.376	Burst Value (psi) 71.5 67.75 68.75 68.25	Indexed Value 2.307 2.261 2.271 2.247	# T-2-1 T-2-5 T-2-9 T-2-13	Handsheet Weight (g) 2.98 3.03 2.99 3.01	Basis Wt. (lbs/1000ft²) 30.789 31.306 30.893 31.099	Sample  Burst  Value (psi)  71.5  76.5  73.5  70.75	Indexed Value 2.322 2.444 2.379 2.275
Notes: 4. Burst Str  Handsheet # C-2-2 C-2-6 C-2-10	ength T-403  Handsheet Weight (g)  3  2.9  2.93	Control Basis Wt. (lbs/1000ft²) 30.996 29.963 30.273	Burst Value (psi) 71.5 67.75 68.75	Indexed Value 2.307 2.261 2.271	# T-2-1 T-2-5 T-2-9	Handsheet Weight (g) 2.98 3.03 2.99	Basis Wt. (lbs/1000ft²) 30.789 31.306 30.893	Sample  Burst  Value (psi)  71.5  76.5  73.5	Indexed Value 2.322 2.444 2.379
Notes:	ength T-403  Handsheet Weight (g)  3  2.9  2.93  2.94	Control Basis Wt. (lbs/1000ft²) 30.996 29.963 30.273 30.376	Burst Value (psi) 71.5 67.75 68.75 68.25	Indexed Value 2.307 2.261 2.271 2.247	# T-2-1 T-2-5 T-2-9 T-2-13 T-2-17	Handsheet Weight (g) 2.98 3.03 2.99 3.01	Basis Wt. (lbs/1000ft²) 30.789 31.306 30.893 31.099	Sample  Burst  Value (psi)  71.5  76.5  73.5  70.75	Indexed Value 2.322 2.444 2.379 2.275
Notes:	ength T-403  Handsheet Weight (g)  3 2.9 2.93 2.94 2.91  verage <sub>C</sub> =	Control Basis Wt. (lbs/1000ft²) 30.996 29.963 30.273 30.376 30.066	Burst Value (psi) 71.5 67.75 68.75 68.25 68.5	Indexed Value 2.307 2.261 2.271 2.247 2.278	# T-2-1 T-2-5 T-2-9 T-2-13 T-2-17	Handsheet Weight (g) 2.98 3.03 2.99 3.01 2.97	Basis Wt. (lbs/1000ft²) 30.789 31.306 30.893 31.099 30.686	Sample  Burst  Value (psi)  71.5  76.5  73.5  70.75  71.5	Indexed Value 2.322 2.444 2.379 2.275 2.33
Notes: 4. Burst Str  Handsheet #  C-2-2  C-2-6  C-2-10  C-2-14  C-2-18	ength T-403  Handsheet Weight (g)  3 2.9 2.93 2.94 2.91  verage <sub>C</sub> = Inde	Control Basis Wt. (lbs/1000ft²) 30.996 29.963 30.273 30.376 30.066  30.335 exed Average	Burst Value (psi) 71.5 67.75 68.75 68.25 68.95 68.95 c - 10% =	Indexed Value 2.307 2.261 2.271 2.247 2.278 2.273 2.046	# T-2-1 T-2-5 T-2-9 T-2-13 T-2-17	Handsheet Weight (g) 2.98 3.03 2.99 3.01 2.97	Basis Wt. (lbs/1000ft²) 30.789 31.306 30.893 31.099 30.686	Sample  Burst  Value (psi)  71.5  76.5  73.5  70.75  71.5	Indexed Value 2.322 2.444 2.379 2.275 2.33
Notes: 4. Burst Str  Handsheet #  C-2-2  C-2-6  C-2-10  C-2-14  C-2-18	ength T-403  Handsheet Weight (g)  3 2.9 2.93 2.94 2.91  verage <sub>C</sub> = Inde	Control Basis Wt. (lbs/1000ft²) 30.996 29.963 30.273 30.376 30.066	Burst Value (psi) 71.5 67.75 68.75 68.25 68.95 68.95 c - 10% =	Indexed Value 2.307 2.261 2.271 2.247 2.278 2.273 2.046	# T-2-1 T-2-5 T-2-9 T-2-13 T-2-17	Handsheet Weight (g) 2.98 3.03 2.99 3.01 2.97	Basis Wt. (lbs/1000ft²) 30.789 31.306 30.893 31.099 30.686	Sample  Burst  Value (psi)  71.5  76.5  73.5  70.75  71.5	Indexed Value 2.322 2.444 2.379 2.275 2.33  2.35
Notes: 4. Burst Str  Handsheet #  C-2-2  C-2-6  C-2-10  C-2-14  C-2-18	ength T-403  Handsheet Weight (g)  3 2.9 2.93 2.94 2.91  verage <sub>C</sub> = Inde	Control Basis Wt. (lbs/1000ft²) 30.996 29.963 30.273 30.376 30.066  30.335 exed Average	Burst Value (psi) 71.5 67.75 68.75 68.25 68.95 68.95 c - 10% =	Indexed Value 2.307 2.261 2.271 2.247 2.278 2.273 2.046	# T-2-1 T-2-5 T-2-9 T-2-13 T-2-17	Handsheet Weight (g) 2.98 3.03 2.99 3.01 2.97	Basis Wt. (lbs/1000ft²) 30.789 31.306 30.893 31.099 30.686	Sample  Burst  Value (psi)  71.5  76.5  73.5  70.75  71.5	Indexed Value 2.322 2.444 2.379 2.275 2.33

1903					
TEST REPORT: PRODU	CT PERFO	RMANCE	(CON	TINUED)	

Trial: Reflective Corrugated Date Run: 9/9/2021

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	4	9	3	5.3
Test Sample	1	4	7	4.0

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

Initials: Y

REPORT RESULTS: RECYCLABILITY PROCESS	(PART 2)	١

ı rıaı:	Reflective Corrugated	Date Run:	9/30/2021
Sample:	C-3 T-3		
· —		Untreated	Recyclability
		Control	Test Sample
Is sample repr	resentative of the lot as a whole? (Y/N)	<u>Y</u>	<u> </u>
Moisture Conte	ent	7.28 %	<u>7.01</u> %
Pulping			
	nsistency? (Y/N)	Υ	Υ
	narged by weight? (Y/N)		<u> </u>
	han 20/80%, specify ratio here:		<del></del> %
Temp & ph	H maintained, per App. B, #3? (Y/N)	Υ	<u> </u>
Number of	batches required?	1	1
0.0625 Screen	ns.		
	f different) Consistency, Temp & pH, per		
App.B, #5?		Υ	Υ
	netric Reject Rate? (Y/N)	<u> Y</u>	Y
0.010 Basket:			
Temp, pH,	& Reject Rate, per App B, #6? (Y/N)	<u>Y</u>	<u> </u>
Reverse Clear	ners:		
	ressure Differential, per App B, #7? (Y/N)	Υ	Υ
	Volumentric Reject Rate	14.2 gpm	14.1gpm
Was it necess	ary to stop the test to clean any apparatus at any		
	s procedure? (Y/N)	<u>N</u>	N
Deposition obs	served? (Y/N) If yes, detail below.	N	N
Deposition obs	il yes, detail below.		
	rired Temp & pH maintained throughout the entire		
protocol? (Y/N	.)	<u> </u>	<u> </u>
Note, details:			
C-3 is 100% O	OCC control supplied by WMU. T-3 is 80% control 209	% test material.	
	· · · · · · · · · · · · · · · · · · ·		

### Western Michigan University



### TEST REPORT: HANDSHEET FORMATION AND PRODUCT PERFORMANCE

Trial:	Reflective Corrugated	Date Run: _	9/30/2021

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)



#### **Product Performance**

Control	
Handsheet #	Test Data (°)
C-3-5, C-3-2	30
C-3-9, C-3-6	34
C-3-13, C-3-10	34
C-3-17, C-3-14	35
C-3-21, C-3-18	32

Average<sub>R</sub> =

Test Data (°)

33

34.4

Recyclability Test Sample

Handsheet # T-3-4, T-3-1

Average<sub>C</sub> = 
$$\frac{33}{28.05}$$
 °  $\frac{33}{28.05}$  °

Is  $Average_R \ge 85\% Average_C$ ? (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	Test Da	ata (sec)
Handsheet #	Wire	Blotter
C-3-5	0.54	0.52
C-3-9	0.52	0.54
C-3-13	0.52	0.52
C-3-17	0.54	0.54
C-3-21	0.56	0.52

Recyclability		
Test Sample	Test Da	ata (sec)
Handsheet #	Wire	Blotter
T-3-4	0.56	0.52
T-3-8	0.54	0.54
T-3-12	0.56	0.52
T-3-16	0.54	0.56
T-3-20	0.5	0.54

Average<sub>C</sub> of 10 drops = 
$$0.532$$
 sec  
 $200 + Average_C = 200.532$  sec

Average<sub>R</sub> of 10 drops = 
$$0.538$$
 sec

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

Y
CW

4000	9007	(Selection of the Control of the Con	3615	Editorouseedil	 40. 40	-05	86	w	A000 A00	Name of Street,	300.	400 400	The second of the second	98. 8	400	A CONTRACTOR OF THE PARTY OF TH	an .
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	16	1903	3	7													

TEST REPORT: PRODUCT PERFORMANCE (CONTINUED)

Trial:	Reflective Corrugated					Date Rur	n: <u>9/3</u>	0/2021	_
Sample:	C-3	3 T-3							
			_						
Product Per	rformance								
3. Short Sp.	an Compres	sion (STFI) T	-826						
•	•	Control				Recyc	lability Test S	Sample	
Handsheet	Handsheet	Basis Wt.	STFI Value	Indexed	Handsheet	Handsheet	Basis Wt.	STFI Value	Indexed
#		(lbs/1000ft <sup>2</sup> )	(lbf/inch)	Value	#		(lbs/1000ft <sup>2</sup> )	(lbf/inch)	Value
C-3-4	2.98	30.789	11.77	0.382	T-3-2	2.87	29.653	14.66	0.494
C-3-8	3.01	31.099	12.75	0.41	T-3-6	2.77	28.62	15.49	0.541
C-3-12	3	30.996	13.09	0.422	T-3-10	2.75	28.413	14.51	0.511
C-3-16	3.01	31.099	13.13	0.422	T-3-14	2.74	28.31	14.77	0.522
C-3-20	3.11	32.133	13.59	0.423	T-3-18	2.77	28.62	15.71	0.549
A	verage <sub>C</sub> =	31.223	12.87	0.412	A	verage <sub>R</sub> =	28.723	15.03	0.523
	Inde	exed Average	<sub>C</sub> - 10% =	0.371					
Is Indexe	d Average <sub>⊳</sub> :	≥ Indexed Av	erage <sub>c</sub> - 10%	5? (Y/N)					Υ
	a / II o la go k		<b>g</b> = 0	( . , ,				Initials:	CW
Notes:								a.o.	
- Notes.									
4. Burst Str	ength T-403								
		Control				Recyc	lability Test S	Sample	
Handsheet	Handsheet	Basis Wt.	Burst	Indexed	Handsheet	Handsheet	Basis Wt.	Burst	Indexed
#	Weight (g)	(lbs/1000ft <sup>2</sup> )	Value (psi)	Value	#	Weight (g)	(lbs/1000ft <sup>2</sup> )	Value (psi)	Value
C-3-2	3.06	31.616	70.25	2.222		2.81	29.033	72.75	2.506
C-3-6	2.98	30.789	65.5	2.127	T-3-5	2.79	28.826	76.25	2.645
C-3-10	3.04	31.409	71.5	2.276	T-3-9	2.76	28.516	72.25	2.534
C-3-14	3.07	31.719	71	2.238	T-3-13	2.79	28.826	74.25	2.576
C-3-18	3.07	31.719	68	2.144	T-3-17	2.81	29.033	74	2.549
A	verage <sub>C</sub> =	31.451	69.25	2.202	A	verage <sub>R</sub> =	28.847	73.9	2.562
Indexed Average <sub>C</sub> - 10% = 1.981									
Is Indexed Average <sub>R</sub> ≥ Indexed Average <sub>C</sub> - 10%? (Y/N) Y Y								Υ	
								Initials:	CW
Notes:									

1903			
TECT DEDODT: DDODUG	T DEDE	E (CONT	

TEST REPORT: PRODUCT PERFORMANCE (CONTINUED)

Trial: Reflective Corrugated Date Run: 9/30/2021

Sample: C-3 T-3

**Product Appearance** 

### STICKIES/SPOT COUNT TEST VALUES AVERAGE COUNT FOR THREE SHEETS

Material	Trial #1	Trial #2	Trial #3	Average
Control	4	9	2	5.0
Test Sample	4	2	3	3.0

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

Y Initials: CW



### PASS/FAIL SUMMARY

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

### MATERIAL AS SUBMITTED "PASSES" VOLUNTARY STANDARD.

Pass or Fail:	Pass	
Signed:		SLM
Print name:	Shawn Mo	timore



### **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:

Shawn Mortimore Print Name

Director Pilot Plants Title

269-276-3532 Phone

10/7/2021 Date

WMU Pilot Plants 4651 Campus Dr. Kalamazoo, MI 49008