

TEST REPORT

CLIENT:

Company:	Flex Fiber, LLC	Report Number:	72206
Address:	1606 4 th Avenue, Ste B	Lab Test Number:	2967-4549
	Fargo, ND 58078	Test Completion Date:	10/26/2017
		Report Date:	10/27/2017
Requested By:	Zach Fluto	Page:	1 of 2

TEST MATERIAL:

Material Type:	Loose Fill Wood Material			Date Received:	10/26/2017
Material Condition:	EXCELLENT:	XXX	GOOD:	POOR:	REJECTED:
Material Identification:	Flex Fiber				
Test Depth:	12" Compacted				

TESTING METHODS REQUESTED:

Testing Services, Inc was instructed by the client to perform the following testing..			
Standard:	ASTM F1951	Test Method:	Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment

SAMPLING PLAN:

Sampling Date:	10/26/2017
<ul style="list-style-type: none"> Flex Fiber, LLC delivered in excess of 100 cubic feet of loose fill wood material identified as "Flex Fiber" to our facility. Random sampling of the loose fill wood material lot submitted was used to fill the appropriate test area per the ASTM F1951 requirements. 	

DEVIATION FROM TEST METHOD:

State reason for any Deviation from, Additions to, or Exclusions From Test Method.	
None	

REQUIREMENT:

A surface in place shall have average work per foot (work per meter) values for straight propulsion and for turning *less* than the average work per foot (work per meter) values for straight propulsion and for turning, respectively, on a hard, smooth, surface with a grade of 1:14 (7.1 %).

PROCEDURE:

Test Surface Preparation: Tests were conducted on 10/26/2017 outdoors at TSi Laboratories in an environment of 62°F and 53% R.H. The loose fill wood material was installed in a wooden frame (44"W x 117"L). Approximately 6 inches of the material was installed, thoroughly saturated with water for 4 minutes, and compacted to approximately 4 inches using a vibrating plate compactor. Additional material, saturating and compacting was repeated in this manner until a final compacted depth of 12" was achieved.

Wheelchair/Operator: The wheelchair used in these tests was manufactured by *Invcare*, Model Action Xtra, Serial Number 98J84142. This wheelchair is totally adjustable, a necessity for these tests. The pneumatic tires were inflated to 60 psi on the rear and 32 psi on the front. The weight of the wheelchair was 24.25 pounds and the operator's weight was 165 pounds for a total of 189 pounds. The operator's distribution was adjusted to 60% on the rear wheels and 40 % on the front.

Torque Measuring System: A certified *Mecmesin Advanced Force Gauge*, Model 500N, was used as an interface between a *Dell* Laptop and a calibrated *Smart Torque Wrench*, S/N 97-0085-01. Emperor Lite Software, from *Mecmesin*, logged the load vs. time and integrated the area under the resulting curves. The adapters and accessories needed to attach the instrumentation were fabricated locally. This total package added 10 pounds to the total weight bringing the total to 199 pounds.

TEST SUMMARY:

TEST METHOD	Propulsion	Maximum Requirements – Baseline (No Material)		TEST RESULTS – With Test Material	
		Average Work/ft-Force	Average Work/ft-Force (lbf-in)	Average Work/ft-Force	Average Work/ft-Force (lbf-in)
ASTM F1951-14	Straight	14.81 lbs	177.72 lbf-in	11.56 lbs	138.72 lbf-in
	Turning	10.68 lbs	128.16 lbf-in	9.59 lbs	115.08 lbf-in

Individual data for all straight and turning propulsion tests are show on page 2 of this report.

CONCLUSION:

The above listed material **meets/exceeds** both the straight line and turning propulsion requirements set forth in this test, where the surface tested average work per foot value was less than the average work per foot value verses a hard, smooth surface with a grade of 7.1%

Uncertainty:

We undertake all assignments for our clients on a best effort basis. Our findings and judgments are based on the information to us using the latest test methods available.

TSI can only ensure the test results for the specific items tested.

Unless otherwise noted in the deviations sections of this report, all tests are performed in compliance with stated test method.

Test Report Approval:

Erie Miles, III, Lab Director Testing Services Inc.

TSI Accreditation: Our laboratory is ISO 9001:2008 Technical Testing of Textiles. TSi is a certified independent testing laboratory by the Synthetic Turf Council



OUR LETTERS AND REPORTS APPLY ONLY TO THE SAMPLE TESTED AND ARE NOT NECESSARILY INDICATIVE OF THE QUALITIES OF APPARENTLY IDENTICAL OR SIMILAR PRODUCTS. THESE LETTERS AND REPORTS ARE FOR THE USE ONLY OF THE CLIENT TO WHOM THEY ARE ADDRESSED AND THEIR COMMUNICATION TO ANY OTHERS OR THE USE OF THE NAME TESTING SERVICES, INC. MUST RECEIVE OUR PRIOR WRITTEN APPROVAL. OUR REPORTS, LETTERS, NAME, SEALS, OR INSIGNIA ARE NOT UNDER ANY CIRCUMSTANCES TO BE USED IN ADVERTISING TO THE GENERAL PUBLIC.

PO Box 2041
Dalton, GA 30722-2041
(706) 226-1400
tsioffice@optilink.us



TEST REPORT

CLIENT:

Company:	Flex Fiber, LLC	Report Number:	72206
Address:	1606 4 th Avenue, Ste B	Lab Test Number:	2967-4549
	Fargo, ND 58078	Test Completion Date:	10/26/2017
		Report Date:	10/27/2017
Requested By:	Zach Fluto	Page:	2 of 2

TEST MATERIAL:

Material Type:	Loose Fill Wood Material				Date Received:	10/26/2017
Material Condition:	EXCELLENT:	XXX	GOOD:		POOR:	REJECTED:
Material Identification:	Flex Fiber					
Test Depth:	12" Compacted					

TEST DATA:

Straight Propulsion	1	2	3	4	5
Circumference of Rear Wheel	75.375"	75.375"	75.375"	75.375"	75.375"
Area	43.5027 ft ² lbs*s	46.2826 ft ² lbs*s	40.8192 ft ² lbs*s	41.3495 ft ² lbs*s	37.7283 ft ² lbs*s
Time	6.75 seconds	7.22 seconds	7.70 seconds	7.37 seconds	7.59 seconds
Distance	86.0 inches	86.0 inches	86.0 inches	86.0 inches	86.0 inches
Distance	7.17 ft	7.17 ft	7.17 ft	7.17 ft	7.17 ft
Angular Displacement	7.17 radians	7.17 radians	7.17 radians	7.17 radians	7.17 radians
Average Torque (energy)	6.45 ft lbs	6.41 ft lbs	5.30 ft lbs	5.61 ft lbs	4.97 ft lbs
Total Work (energy)	92.46 ft lbs	91.96 ft lbs	76.04 ft lbs	80.47 ft lbs	71.27 ft lbs
Work/ft (force)	12.90 lbs	12.83 lbs	10.61 lbs	11.23 lbs	9.94 lbs
Drop Hi/Low Work/ft (force)		12.83 lbs	10.61 lbs	11.23 lbs	
Average Work/ft (force)	11.56 lbs (138.72 lbf-in)				

Turning Propulsion	1	2	3	4	5
Circumference of Rear Wheel	75.375"	75.375"	75.375"	75.375"	75.375"
Distance from Pivot Point to Outer Wheel	35.75 inches	35.75 inches	35.75 inches	35.75 inches	35.75 inches
Area	75.4087 ft ² lbs*s	73.5961 ft ² lbs*s	76.4867 ft ² lbs*s	73.2534 ft ² lbs*s	69.6854 ft ² lbs*s
Time	7.10 seconds	7.36 seconds	7.19 seconds	7.75 seconds	7.63 seconds
Angle Traveled (degrees)	92.0°	91.0°	92.0°	91.0°	92.0°
Angle Traveled (radians)	1.61 rad	1.59 rad	1.61 rad	1.59 rad	1.61 rad
Arc Length Traveled by Outer Wheel	57.40 inches	56.78 inches	57.40 inches	56.78 inches	57.40 inches
Arc Length Traveled by Outer Wheel	4.78 ft	4.73 ft	4.78 ft	4.73 ft	4.78 ft
Angular Displacement of Outer Wheel	4.79 radians	4.73 radians	4.79 radians	4.73 radians	4.79 radians
Average Torque (energy)	10.62 ft lbs	9.40 ft lbs	9.91 ft lbs	9.45 ft lbs	9.14 ft lbs
Total Work (energy)	50.80 ft lbs	44.48 ft lbs	47.42 ft lbs	44.72 ft lbs	43.71 ft lbs
Work/ft (force)	10.62 lbs	9.40 lbs	9.91 lbs	9.45 lbs	9.14 lbs
Drop Hi/Low Work/ft (force)		9.40 lbs	9.91 lbs	9.45 lbs	
Average Work/ft (force)	9.59 lbs (115.08 lbf-in)				

OUR LETTERS AND REPORTS APPLY ONLY TO THE SAMPLE TESTED AND ARE NOT NECESSARILY INDICATIVE OF THE QUALITIES OF APPARENTLY IDENTICAL OR SIMILAR PRODUCTS. THESE LETTERS AND REPORTS ARE FOR THE USE ONLY OF THE CLIENT TO WHOM THEY ARE ADDRESSED AND THEIR COMMUNICATION TO ANY OTHERS OR THE USE OF THE NAME TESTING SERVICES, INC. MUST RECEIVE OUR PRIOR WRITTEN APPROVAL. OUR REPORTS, LETTERS, NAME, SEALS, OR INSIGNIA ARE NOT UNDER ANY CIRCUMSTANCES TO BE USED IN ADVERTISING TO THE GENERAL PUBLIC.

PO Box 2041
Dalton, GA 30722-2041
(706) 226-1400
tsioffice@optilink.us