



Apr 15th, 2023

Parker Chen
 Jilin Liufangzi Bentonite Science & Technology Co, Ltd
 Jilin Province, Southwest 4 kilometers, Liufangzi Town
 Gongzhuling City, Jilin Province, China



Re: FINAL LABORATORY TEST REPORT

Dear Mr. Parker Chen:

Thank you for consulting TRI Suzhou for your material testing needs.

Enclosed is the final laboratory report for the Conformance testing of one (1) GCL sample.

PROJECT NAME: GCL Testing DATE REPORTED: Apr 15th, 2023
REFERENCE TRI JOB NO.: SCH21180
DATE RECEIVED: Mar 15th, 2023
SAMPLE(S) SENT BY: Liufangzi China
SAMPLE IDENTIFICATIONS:

GCL NP5500

10354

TESTS REQUIRED / PERFORMED:

- TEST METHOD
1. ASTM D4643
 2. ASTM D5261
 3. ASTM D5890
 4. ASTM D5891
 5. ASTM D5993
 6. ASTM D5887
 7. ASTM D4632
 8. ASTM D6496
 9. ASTM D6241

- DESCRIPTION
- Water Content
 - Mass per Unit area
 - Swell Index
 - Fluid Loss
 - Mass per Unit Area
 - Index Flux
 - Tensile Strength
 - Peel Strength
 - CBR Puncture

TEST RESULTS: The test results are summarized in the attached Table(s) 1.

Respectfully,

TRI Geosynthetic Testing and Services (Suzhou) Co., Ltd.

Steve Xi
 Quality Assurance

Chad Blackwell
 General Manager

Signatures are on file

It shall be noted that the sample/s tested is/are believed to be true representatives of the material produced under the designation herein stated. In addition, the attached laboratory tests results are considered indicative only of the quality of samples/specimens that were actually tested. The appropriate test methods hereby employed are based on the current and accepted industry practices. TRI neither accepts responsibility for nor makes claims to the intended final use and purpose of the material. The test data and all associated project information shall be held confidential and not to be reproduced and/or disclosed to other parties except in full and with prior written approval from the client or any pertinent entity duly authorized by the respective client. It is our policy to keep physical records of each job for five (5) years commencing from the date of receipt of the samples and keep its corresponding electronic file for seven (7) years. Retained conformance samples are disposed of after one (1) month. On the other hand, should you need us to keep them at a longer period, please advise us in writing.



TABLE 1.
MATERIAL PROPERTIES
 CLIENT: Liufangzi China
 PROJECT: GCL Testing

Date Received: 2023.03.15
 Date Reported: 2023.04.15
 Client Sample ID: NP5500
 Material Description: NP5500

QC'd By: *Steve*
 TRI Job No.: SCH21180
 TRI Control No.: 10384

SPECIMENS

METHOD DESCRIPTION	1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. (See Note1)
ASTM D5261 Mass per Unit Area of the Nonwoven component(g/ m ²)															
Test specimen size: 4"x 8"															
ASTM D5261 Mass per Unit Area of the woven component (g / m ²)		245.9	253.2	248.8	252.7	249.8					250.1	3.0	245.9	253.2	
Test specimen size: 4"x 8"															
ASTM D4643 Water (Moisture) Content (percent)		100.3	108.8	107.8	108.8	107.4					106.6	0.2	100.3	180.8	
ASTM D5887 Index Flux (m. ³ / m. ² /sec.)		8.8	9.3	8.2							8.8	0.5	8.24	9.31	
Confining Pressure: 5 psi															
3.4E-09											3.4E-09	N/A	N/A	N/A	
Permeability(m/s)															
1.8E-11											1.8E-11	N/A	N/A	N/A	
ASTM D5890 Swell Index (mL/ 2 g.)															
Temperature of the slurry after mixing 22°C															
24											24.0	N/A	N/A	N/A	
Temperature after aging 22°C															

(Continued on next page)

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TABLE 1.

MATERIAL PROPERTIES

CLIENT: Liufangzi China

PROJECT: GCL Testing

Date Received: 2023.03.15
 Date Reported: 2023.04.15
 Client Sample ID: NP5500
 Material Description: NP5500

QC'd By: *Steve*
 TRI Job No.: SCH21180
 TRI Control No.: 10384

SPECIMENS

METHOD	DESCRIPTION	1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. (See Note 1)
ASTM D5993	Mass per Unit Area of the dried Clay component of the GCL (gms/ m ²) Drying Time/ Temp: 110%/- 5°C for 16 hrs using thermostatically controlled oven.	5616	5628	5856	5834	5855						5758	124	5616	5856	
	Mass per Unit area of the GCL @ 0% MC (gm/ m ²)	5952	5970	6206	6184	6205						6103	124	5952	6206	
	Moisture Content of the Clay as received (percent)	9.8%	9.8%	9.9%	9.8%	9.7%						9.8%	0	0.10	0.10	
ASTM D5891	Fluid Loss (mL) Temperature of the slurry at the start of test: 22 °C After test: 23 °C	13.6										13.6	N/A	N/A	N/A	
ASTM D6496	Bonding Peel Strength (N/10cm) Specimens were die cut using 4" x 8" (100mmX 200mm) die parallel to the machine direction. Tensile Testing Machine: YT010 P (CRE Type) set for 12" (300 mm/min) constant rate of extension, with initial gauge length (distance between grips) of 2" (50mm).	64	69	68	61	68						66	5	61	69	

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TABLE 1.
 MATERIAL PROPERTIES
 CLIENT: Lufangzi China
 PROJECT: GCL Testing

Date Received: 2023.03.15
 Date Reported: 2023.04.15
 Client Sample ID: NP5500
 Material Description: NP5500

QC'd By: *Steve*
 TRI Job No.: SCH21180
 TRI Control No.: 10384

SPECIMENS

METHOD DESCRIPTION	SPECIMENS										Proj. Specs. (See Note1)				
	1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	
ASTM D4632 Tensile Strength (N)															
Specimens were die cut using 4" x 8" (100mmX 200mm) die parallel to the machine direction. Tensile Testing Machine (T010) (CR-Type) set for 12" (300 mm/min) constant rate of extension, with initial gauge length (distance between grips) of 4" (100mm).															
Load Full scale: 1000lbs(5000N)															
MD	857	755	728	705	790						767	0.7	705	857	
TD	772	806	808	894	801						816	0.5	772	894	
Elongation (percent)															
MD	14	13	13	14	14						14	0.3	13	14	
TD	16	15	16	15	16						16	0.6	15	16	
ASTM D6241 Static Puncture Strength (N)															
Specimens were tested in accordance with ASTM D6241. Specimens were conditioned for 1hr in the laboratory at 21 +/- 5 °C (75 +/- 3.60F) and at 60% +/- 10 Relative Humidity. Specimens were secured between the clamping plates ensuring that they extended to or beyond the outer edges of the clamping plates.															
MD	2953	2846	2543	2543	2543						2934	129	2674	3131	
TD	3131	2674	3082	2903	2903						2934	129	2674	3131	

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End of Table 1

Note 1 : The Project Specification values reflected herein were provided by the Client.

By accepting the data and results presented on this report, the Client agrees to limit the liability of TRI SUZHOU from Client and all other related parties for any claims on issues, due to the use of this data, to the cost respective of the tests presented in this report; and the Client agrees to indemnify and hold TRI SUZHOU from and against all liabilities in excess of the aforementioned limits. 通过接受了这篇报告中数据和结果, 客户同意限定 TRI 苏州来自客户和其他相关方的责任. 所有其因使用这些数据索赔问题, 报告中提出的各项检测的成本, 客户同意赔偿并承担后果, TRI 苏州不承担超过上述限额的所有责任.