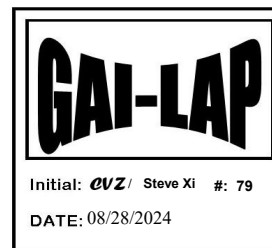


Aug 28th, 2024

Mr. Qiu
JINSEED GEOSYNTHETICS SOLUTION PTE. LTD
181 Tanjong Rhu Road
Singapore

Re: FINAL LABORATORY TEST REPORT



Dear Mr. Qiu:

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

Enclosed is the **final** laboratory report for the **Conformance** testing of **one (1) Smooth HDPE Geomembrane sample**.

PROJECT NAME: GM 13 Conformance Testing

DATE REPORTED: Aug 28th, 2024

REFERENCE TRI JOB NO.: SCH24132

DATE RECEIVED: Apr 25th, 2024

SAMPLE(S) SENT BY: JINSEED GEOSYNTHETICS SOLUTION PTE.LTD

SAMPLE IDENTIFICATIONS:

SAMPLE ID

2.0 mm Smooth HDPE Geomembrane

TRI CONTROL NUMBER

11379

TESTS REQUIRED / PERFORMED:

TEST METHOD

1. ASTM D5199
2. ASTM D1505
3. ASTM D6693
4. ASTM D1004
5. ASTM D4833
6. ASTM D4218
7. ASTM D5596
8. ASTM D8117
9. ASTM D5885
10. ASTM D5721
11. ASTM D7238
12. ASTM D5397

DESCRIPTION

Thickness
Density
Tensile Property
Tear Resistance
Puncture Resistance
Carbon Black Content
Carbon Black Dispersion
Standard OIT
HPOIT
Oven Aging
QUV
SP-NCTL

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.

5 Pages Total (including this sheet)



TESTING, RESEARCH, CONSULTING AND FIELD SERVICES

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TABLE 1.
MATERIAL PROPERTIES
CLIENT: JINSEED GEOSYNTHETICS Solution PTE.LTD
PROJECT: HDPE Testing

Date Received: **2024.04.25**
Date Reported: **2024.08.28**
Client Sample ID: **2.0 mm Smooth HDPE Geomembrane**
Material Description: **2.0 mm Smooth HDPE Geomembrane**

QC'd By: 
TRI Job No.: **SCH24132**
TRI Control No.: **11379**

SPECIMENS															Proj. Specs. (See Note1)	
	1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max		
METHOD	DESCRIPTION															
ASTM D5199	Thickness (mm) <i>Apparatus:Dead weight dial micrometer with 6.35mm (0.250in) dia presser foot and a pressure of 43.10 kPa (6.25psi) provided by a 65.8gm - 658gm weight. Loading time: 5 sec Specimen Size: 4" x 4"</i>															
	1.84	2.04	1.87	2.07	1.82	2.06	2.12	2.11	2.07	2.09	2.01	0.12	1.82	2.12	2.00	
ASTM D1505	Density (grams/ cm. ³)															
	0.9466	0.9458	0.9458								0.9460	0.0005	0.9458	0.9466	0.940	
ASTM D6693 Type IV	<u>Tensile Properties:</u> <i>Test Specimens: Type IV, Width of narrow section: 0.25"(6.4mm), Length of narrow section: 1.3"(33 mm), Width Overall: 0.75"(19.1 mm), Length Overall: 4.5"(114mm) Conditioning: Conducted test in standard laboratory atmosphere of 21 +/-2 °C (70 +/-3.6⁰ F) , and 60+/-10 % relative humidity. CRE Type Tensile Testing Machine (YT010P) is set for rate of Separation : 2"/min (HDPE) Initial gauge length: 2.5" (63mm). Load full scal: 100lbs(500 N)</i>															
	Tensile Strength at Yield (kN/m)															
MD	35	36	32	33	34						34	2	32	36	29	
TD	33	34	35	32	36						34	2	32	36		
	Elongation at Yield (percent)															
MD	20	20	20	20	20						20	0	20	20	12	
TD	18	18	18	17	17						17	1	17	18		
	Tensile Strength at Break (kN/m)															
MD	61	60	54	55	61						58	3	54	61	53	
TD	57	56	56	55	58						56	1	55	58		
	Elongation at Break (percent)															
MD	784	682	740	738	726	Gauge Length =2.0 in. (GRI-GM13 Mod)					734	36	682	784	700	
TD	806	772	704	776	778						767	38	704	806		

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TESTING, RESEARCH, CONSULTING AND FIELD SERVICES

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TABLE 1.
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PROJECT: HDPE Testing

Date Received: **2024.04.25**
Date Reported: **2024.08.28**
Client Sample ID: **2.0 mm Smooth HDPE Geomembrane**
Material Description: **2.0 mm Smooth HDPE Geomembrane**

QC'd By: Steve/张一凡
TRI Job No.: **SCH24132**
TRI Control No.: **11379**

SPECIMENS															Proj. Specs. (See Note1)	
	1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max		
METHOD	DESCRIPTION															
ASTM D1004	Tear Resistance (N)															
Die C	Set CRE Type tensile testing machine(YT010 P) constant rate of separation 2" (50mm)/min, initial gauge length: 1 " (25.4mm). Load full scale: 100lbs(500 N). Specimen was cut by butterfly die.															
	MD	327	341	326	322	338	395	332	345	346	372	344	23	322	395	249
	TD	313	349	332	320	340	311	353	321	363	347	335	18	311	363	
ASTM D4833	Puncture Resistance (N)															
	Specimens were treated as directed in Test Method D4833. They were clamped without tension between circular plates of a ring clamp attachment secured in the tensile machine. Test specimens extended to or beyond the outer edges of the clamping plates.															
		798	778	714	721	733	785	761	764	782	739	744	35	687	798	640
		704	760	694	744	687										
ASTM D4218	Carbon Black Content															
	Apparatus : Muffle Furnace															
		2.28	2.24									2.26	0.03	2.24	2.28	2.0-3.0
ASTM D5596	Carbon Black Dispersion (category rating per reference chart PCN: 12-455960-38)															
		1	1	1	1	1	1	1	1	1	1	1	N/A	N/A	N/A	1 or 2
ASTM D5397**	Notched Constant Tensile Load (hours)															
Single Point	Yield Stress at Room Temperature per ASTM D6693: 2464 psi 30% of the Yield Stress obtained was used in the NCTL test: 739 psi															
		>500	>500	>500	>500	>500						>500	N/A	N/A	N/A	500
ASTM D8117*	Oxidative Induction Time (min)															
	Before Exposure Two (2) identical specimens were prepare in accordance with this standard. The specimens were obtained in the middle section of the sample, weighed and placed in a Tzero aluminum pan then heated from 35°C to 200°C with a heat rate of 20°C/min in flowing Atmosphere was switched to oxygen while holding isothermal temperature of 200 °C until exothermic peak is detected.															
		225	225	226								225	1	225	226	100

(Continued on next page)

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TESTING, RESEARCH, CONSULTING AND FIELD SERVICES

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TABLE 1.
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PROJECT: HDPE Testing

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Date Reported: **2024.08.28**
Client Sample ID: **2.0 mm Smooth HDPE Geomembrane**
Material Description: **2.0 mm Smooth HDPE Geomembrane**

QC'd By: Steve/李. 邱.
TRI Job No.: **SCH24132**
TRI Control No.: **11379**

SPECIMENS															Proj. Specs. (See Note1)
1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max		
METHOD	DESCRIPTION														
ASTM D5885*	High Pressure Oxidative Induction Time (min) <i>Two (2) specimens were homogenized, weight and placed in a Tzero aluminum pan then heated from 40°C to 150°C with a heat rate of 20°C/min in oxygen atmosphere(500 psi (3.4MPa)) and held for 5 min. Atmosphere is held isothermally at 150 °C until exothermic peak is detected. Mass of the Test specimen (mg): <u>5.7</u> and <u>5.9</u></i>														
	567.7	553.8								560.8	9.8	553.8	567.7	400	
ASTM D5721*	Air- Oven Aging <i>Specimens were conditioned for 1 hr in the laboratory at 22 °C+/-2 °C(71.6 °F+/-3.6 °F) and at 60% +/-10 Relative Humidity before conducting initial tests, and after exposure in the oven. Type of oven used: Gravity convection oven. Exposure temperature: <u>85 °C</u> Exposure time: <u>90</u> days</i>														
ASTM D8117*	Oxidative Induction Time (min) <i>Two (2) identical specimens were prepared, weighed and placed in a Tzero aluminum pan then heated from 35 °C to 200 °C with a heat rate of 20°C/min in flowing nitrogen atmosphere and held for 5 min. Atmosphere was switched to oxygen while holding isothermal temperature of 200°C until exothermic peak is detected.</i>														
	155	157	154							155	2	154	157		
% Retained	69									69				55	
ASTM D5885*	High Pressure Oxidative Induction Time (min) <i>Two (2) specimens were homogenized, weight and placed in a Tzero aluminum pan then heated from 40°C to 150°C with a heat rate of 20°C/min in oxygen atmosphere(500 psi (3.4MPa)) and held for 5 min. Atmosphere is held isothermally at 150 °C until exothermic peak is detected. Mass of the Test specimen (mg): <u>5.8</u></i>														
	501.2	487.8								494.5	9.5	487.8	501.2		
% Retained	88														

(Continued on next page)

(Sheet 3 of 4)



TESTING, RESEARCH, CONSULTING AND FIELD SERVICES

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Material Description: **2.0 mm Smooth HDPE Geomembrane**

QC'd By: Steve/张. 邱.
TRI Job No.: **SCH24132**
TRI Control No.: **11379**

SPECIMENS														Proj. Specs. (See Note1)	
1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max		
METHOD	DESCRIPTION														
ASTM D7238*	Accelerated Weathering using FluorescentUVA- Condensation Exposure Device 1600 hrs														
ASTM D5885*	High Pressure Oxidative Induction Time (min) After QUV Exposure														
	One (1) specimen was prepared in accordance with this standard. The specimen was obtained in the middle section of the sample, weighed and placed in a Tzero aluminum pan then heated from 40 °C to 150 °C with a heat rate of 20 °C/min in oxygen atmosphere (300 psi (2MPa)) and held for 5 min. Atmosphere is held isothermally at 150 °C until exothermic peak is detected.														
	382.53	376.35								379.44	4.37	376.35	382.53		
% Retained	68									68				50	

* - Tested in TRI CA

** - Tested in TRI Texas

End of Table 1

(Sheet 4 of 4)

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 harmless TRI SUZHOU from and against all liabilities in excess of the aforementioned limits.