



GEOMEMBRANE TEST RESULTS

TRI Client: Gecat Plastic Factory

Project: MQA

Material: 2mm Single Sided Textured Geomembrane

TRI Log No.: A16-281

Sample Date(s): 23/11/2016

Test Date(s): 24-11-2016 - 30-01-2017

Sample conditioning for tests that require specific conditions

Thickness (ASTM D 5199)

Thickness (ASTM D 5994)

Asperity Height (ASTM D 7466)

Tensile (ASTM D 6693)

Puncture Strength (ASTM D 4833)

Tear Resistance (ASTM D 1004)

Standard		Laboratory	
t (°C)	RH (%)	t (°C)	RH (%)
21 ± 2	60 ± 10	22	46
21 ± 2	60 ± 10	22	46
21 ± 2	60 ± 10	22	46
21 ± 2	n/a	22	46
21 ± 2	65 ± 5	22	46
23 ± 2	50 ± 10	22	46

The laboratory temperature and relative humidity measurement is an average over the period during which the conditioning and testing was carried out.

All samples have been conditioned for a minimum of 24 hours unless otherwise stated.

Note

ASTM D6693-2010, Page 2 Note 5 states — *A humidity requirement has intentionally been left out of the test conditions due to the fact that polyolefins are not significantly affected by large fluctuations in humidity thereby making such a restriction unnecessary.*

Tests were performed as directed in each individual standard, unless otherwise stated.



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Sample Identification: 3766 SS 3/3

PARAMETER	TEST REPLICATE NUMBER										MEAN	GRI GM13
	1	2	3	4	5	6	7	8	9	10		
Thickness (ASTM D 5994)												
Thickness (mm)	1.975	1.850	1.900	1.950	1.975	1.875	1.900	1.850	1.875	1.925	1.900	≥1.9
											1.850	<< min ≥1.7
Equipment used: AEI TG3.											STD. DEV.	0.05
Sample dimensions: 125mm circle.											CV.	2.6%
Asperity Height (ASTM D 7466)												
Asperity Height (mm) - Side A	0.500	0.625	0.750	0.675	0.875	0.800	0.800	0.625	0.800	0.750	0.725	≥0.4
											STD. DEV.	0.11
Equipment used: AEI TG3.											CV.	15.5%
Density (ASTM D 1505 @ 23°C)												
Density (g/cm ³)	0.949	0.949	0.949								0.949	≥0.94
Carbon Black Content (ASTM D 4218)												
% Carbon Black	2.11	2.06									2.09	2 - 3
Carbon Black Dispersion (ASTM D 5596, Method: Microtome)												
Rating* - 1st field view	1	1	1	1	1							≥ 90%
Rating* - 2nd field view	1	1	1	1	1							1 - 2
												≤ 10%
* PCN: 12-0455960-38 - Carbon dispersion classification chart for geosynthetics was used to rate agglomerate size range.												3



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											GRI	
PARAMETER	TEST REPLICATE NUMBER										MEAN	GM13
	1	2	3	4	5	6	7	8	9	10		
Tensile Properties (ASTM D 6693)											Test speed: 50 mm/min	
MD Yield Strength (N/mm)	36.9	37.5	35.7	36.9	37.5						36.9	≥29
											STD. DEV.	0.73
TD Yield Strength (N/mm)	37.4	37.4	37.1	38.1	37.6						37.5	≥29
											STD. DEV.	0.37
MD Break Strength (N/mm)	56.4	59.0	57.1	44.9	54.7						54.4	≥21
											STD. DEV.	5.54
TD Break Strength (N/mm)	50.1	50.0	54.0	52.0	57.9						52.8	≥21
											STD. DEV.	3.29
MD Yield Elongation (%)	15	15	15	15	16						15	≥12
TD Yield Elongation (%)	15	14	15	17	17						16	≥12
MD Break Elongation (%)	644	667	663	533	622						626	≥100
TD Break Elongation (%)	588	585	634	596	659						612	≥100
Puncture Resistance (ASTM D 4833)												
Puncture Strength (N)	812	787	768	797	808	824	827	813	805	763	800	≥534
											STD. DEV.	21.80
											CV.	2.7%
Tear Resistance (ASTM D 1004)											Machine Used: AEI TM2-TRI 5-Station	
MD Tear Strength (N)	303	302	308	303	293	306	306	297	307	295	302	≥249
											STD. DEV.	5.19
TD Tear Strength (N)	291	305	295	310	289	307	297	300	296	292	298	≥249
											STD. DEV.	7.12
Oxidative Induction Time (ASTM D 3895)												
OIT (minutes)	181	185									183	≥100
High Pressure Oxidative Induction Time (ASTM D 5885)												
HPOIT (minutes)	1185										1185	≥400
MD Machine Direction	TD Transverse Direction											



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Oven Aging (ASTM D 5721)

The geomembrane was exposed to 90 days of elevated temperature exposure in an air oven maintained at $85^{\circ}\text{C} \pm 0.5^{\circ}\text{C}$ in accordance with ASTM D 5721, Standard Practice for Air-Oven Aging of Polyolefin Geomembranes. Oxidative Induction Time (OIT) was tested after exposure and compared to values generated for unexposed material. The results are provided below.

				PERCENT RETAINED
OIT (minutes) - Baseline	157	172	164.5	
OIT (minutes) - After Oven Aging	90	92	91	55
HPOIT (minutes) - Baseline	953		953	
HPOIT (minutes) - After Oven Aging	919		919	96

Note: No surface cracking was observed.

UV Resistance (ASTM D 7238)

The resistance to degradation due to exposure to ultraviolet light and moisture was determined in accordance with GRI-GM11, Accelerated Weathering of Geomembranes Using a Fluorescent UVA Device. This standard covers the basic principles for using the QUV apparatus to accelerate the weathering of geomembranes using UVA bulbs and condensation. To comply with specification GRI GM13, the sample was exposed to 1600 hours of UV exposure composed of 80 cycles of UVA at 75°C for 20 hours followed by condensation at 60°C for 4 hours. The High Pressure Oxidative Induction Time (HPOIT) was evaluated before and after the exposure and results were as follows.

			PERCENT RETAINED
HPOIT (minutes) - Baseline	953	953	
HPOIT (minutes) - After QUV Aging	950	950	100

Note: No surface cracking was observed.

MD Machine Direction TD Transverse Direction

End of Report