

GEOMEMBRANE TEST RESULTS
 TRI Client: Al Takmol Company - Plastic Factory

Material: Al Takamol 2.5 mm Textured HDPE Geomembrane
Sample Identification: NL - 2.5 mm
TRI Log #: E2402-44-10

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5994)													
Thickness (mm)	2.421	2.332	2.352	2.332	2.431	2.428	2.316	2.383	2.383	2.385	2.376 2.316	0.042 << min	2.375 mm 8 of 10 2.25 min Lowest 2.125
Asperity Height (ASTM D 7466)													
Asperity Height (mm) - Side A	0.48	0.46	0.48	0.36	0.28	0.48	0.36	0.48	0.48	0.41	0.43	0.07	0.40 min
Asperity Height (mm) - Side B	0.56	0.56	0.56	0.43	0.66	0.64	0.53	0.51	0.46	0.48	0.54	0.07	0.40 min
Density (ASTM D 1505)													
Density (g/cm3)	0.949	0.949	0.949								0.949	0.000	0.940 min
Carbon Black Content (ASTM D 4218)													
% Carbon Black	2.43	2.43									2.43	0.00	2.0 - 3.0
Carbon Black Dispersion (ASTM D 5596)													
Rating - 1st field view	1	1	1	1	1								9 in cat 1 or 2
Rating - 2nd field view	1	1	1	1	1								1 in cat 3
Tensile Properties (ASTM D 6693, 2 lpm strain rate)													
MD Yield Strength (N/mm)	43.8	43.3	42.6	43.6	42.7						43.2	0.5	37 min
TD Yield Strength (N/mm)	44.7	46.3	43.8	43.3	44.0						44.4	1.2	37 min
MD Break Strength (N/mm)	69.2	64.3	66.8	65.5	60.1						65.2	3.4	26 min
TD Break Strength (N/mm)	50.1	61.5	60.1	64.1	61.0						59.4	5.4	26 min
MD Yield Elongation (%)	17	17	18	18	16						17	1	12 min
TD Yield Elongation (%)	17	18	18	18	17						18	1	12 min
MD Break Elongation (%)	628	596	616	604	548						598	31	100 min
TD Break Elongation (%)	452	556	574	622	575						556	63	100 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (N)	921	921	899	903	886						906	15	667 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (N)	374	364	342	360	350	356	359	357	353	343	356	10	311 min
TD Tear Strength (N)	343	355	348	362	357	347	352	355	355	359	353	6	311 min
Oxidative Induction Time (ASTM D 3895)													
OIT (minutes)	160	159									160	1	100 min
MD Machine Direction	TD Transverse Direction												



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	1	2	3	4	5	6	7	8	9	10					
High Pressure Oxidative Induction Time (ASTM D 5885)															
HPOIT (minutes)	1870										1870		400 min		
SP-NCTL Stress Crack Resistance (ASTM D 5397, App)															
SURFACTANT:	CO-630														
EXPOSURE PERIOD:	500 hrs														
DATE TEST STARTED:	17-Nov-15														
TEST TEMPERATURE:	50C														
Machine direction yield stress:	2596 (psi)														
Yield stress:	17.9 (MPa)														
x 30%	779 (x 0.30)														
x hinge thickness (in)	0.0800 (80% of thickness)														
x hinge thickness (mm)	2.0320 (80% of thickness)														
x specimen width	0.124 (0.124")														
x specimen width	3.15 (3.18 mm)														
Load	7.73 (lbs)														
Load	34.38 (N)														
Mechanical Advantage 5															
Lever Weight 0.33 (lbs)															
Lever Weight 1.4685 (N)															
Grip Weight 0.09 (lbs)															
Grip Weight 0.4005 (N)															
Applied load = (Load - Lever Weight + Grip Weight)/Mechanical Advantage =											1.50	lbs	=	680	grams
Replicate No.:	1	2	3	4	5										
No. Hours to Failure:	>500	>500	>500	>500	>500						>500				
UV Resistance (ASTM D 7238 / GRI GM 11)															
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 GM17, the sample was exposed to 1600 hours of UV exposure composed of 80 cycles of UA 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.															
HPOIT (minutes) - Baseline	1870										1870		PERCENT RETAINED		
HPOIT (minutes) - After QUV Aging	1521										1521	81			
Note: No surface cracking was observed.															
Oven Aging (ASTM D5721)															
The geomembrane was exposed to 90 days of elevated temperature exposure in an air oven maintained at 85°C ± 0.5°C in accordance with ASTM D 5721-95, Standard Practice for Air-Oven Aging of Polyolefin Geomembranes. Oxidation Induction Time (OIT) was tested for after exposure and compared to values generated for unexposed material. The results are provided below.															
OIT (minutes) - Baseline	160										160		PERCENT		
OIT (minutes) - After Oven Aging	30										32	20			
55 min															
HPOIT (minutes) - Baseline	1870										1870		PERCENT		
HPOIT (minutes) - After QUV Aging	1759										1759	94			
50 min															