



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

Material: Al Takamol 0.75 mm Smooth HDPE Geomembrane
 Sample Identification: Sample # NL , 0.75 mm
 TRI Log #: E2402-45-02

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5199)													
Thickness (mm)	0.83	0.83	0.77	0.82	0.81	0.86	0.92	0.88	0.81	0.83	0.84 0.77	0.04 << min	0.75 mm Lowest 0.675 mm
Density (ASTM D 1505)													
Density (g/cm3)	0.948	0.948	0.948								0.948	0.000	0.940 min
Carbon Black Content (ASTM D 4218)													
% Carbon Black	2.45	2.45									2.45	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 1 in cat 3
Rating - 2nd field view	1	1	1	1	1								
Tensile Properties (ASTM D 6693, 2 lpm strain rate)													
MD Yield Strength (N/mm)	14.4	14.7	15.1	15.1	15.1						14.9	0.3	11 min
TD Yield Strength (N/mm)	17.5	18.0	17.7	17.3	17.0						17.5	0.4	11 min
MD Break Strength (N/mm)	31.5	31.7	30.5	30.8	31.7						31.3	0.6	20 min
TD Break Strength (N/mm)	32.1	31.5	32.1	29.1	30.8						31.1	1.2	20 min
MD Yield Elongation (%)	17	17	17	17	17						17	0	12 min
TD Yield Elongation (%)	14	13	13	14	13						13	1	12 min
MD Break Elongation (%)	763	735	724	760	760						748	18	700 min
TD Break Elongation (%)	820	789	814	767	809						800	22	700 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (N)	399	413	403	408	397						404	7	240 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (N)	138	135	135	135	135	126	130	138	128	140	134	4	93 min
TD Tear Strength (N)	138	132	126	133	131	135	137	142	133	135	134	4	93 min
Oxidative Induction Time (ASTM D 3895)													
OIT (minutes)	164.85	166.25									165.55	0.9899495	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)	1686										1686		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:	2707 (psi)															
Yield stress:	18.7 (MPa)															
x 30%	812 (x 0.30)															
x hinge thickness (in)	0.0588 (80% of thickness)															
x hinge thickness (mm)	1.4935 (80% of thickness)															
x specimen width	0.124 (0.124")															
x specimen width	3.15 (3.18 mm)															
Load	5.92 (lbs)															
Load	26.35 (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 =											1.14 lbs =	516 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	1686										1686					
HPOIT (minutes) - After QUV Aging	1484										1484		PERCENT RETAINED			
													88			
													50 min			
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) and HPOIT were tested after exposure and compared to values generated for unexposed material. The results are provided below.																
OIT (minutes) - Baseline	165	166												165		
OIT (minutes) - After Oven Aging	49	51												49		PERCENT
													30			
													55 min			
HPOIT (minutes) - Baseline	1686										1686					
HPOIT (minutes) - After Oven Aging	1579										1579		PERCENT			
													94			
													80 min			