

Your reference: APP-20171612
21 December 2017

The General Manager
Environment Southland
Private Bag 90116
INVERCARGILL

Attention: Ms A King

Dear Alex

RE: Further Information – Kerr Inverurie Trust

I will respond to each point in order.

The pH range for the raw material is between 4.0 and 8.0 from the E3 and other earlier tests information provided. The HDPE has the ability to be stable in the pH range of 1.5 to 14. Following is the detail from a HDPE product manufacturer.

- Resists the corrosive effects of soils and effluents with a pH range from a very acidic 1.5 to a very caustic 14
- Is often specified in acidic or alkaline native soil conditions
- Is expected to significantly exceed 100 year design service life
- Allows for long-term deflection of 5% to 7.5% without failure or damage

I have also discussed this with a locally based liner installer and many acid and alkaline storage tanks have been manufactured in New Zealand from HDPE at more extreme levels than this material. HDPE is a very stable and versatile liner material. It is used at the AB Lime site. The attached Data Sheet for the HDPE liner from the New Zealand supplier does not include pH.

The pond has not been constructed.

The turning and watering will depend on the evapotranspiration rate. The exact point at which the material is turned will be a subjective decision and this does not need to be an exact science as it will just slow the process down. The moisture is partly to stop any dust and moisture is required to promote material breakdown. The final timing will need to be confirmed on site. I consider that watering maybe applied weekly but a system may be put in place to replace moisture loss every couple of days. This is still to be confirmed but any dust is the most important item that we have to control.

The composting will be with clean wood waste and straw. Any change to that would need to be discussed and consented prior to using it. There was originally a thought that used calf pen bedding or calving pad residue could be used rather than being spread on farms but this will not be done now.

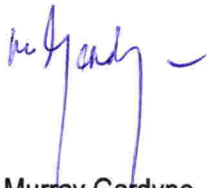
The removal of ear tags will take place by use of the screen after composting when the material is broken down. The larger material would be skin that had not broken down and this would be re-composted until it is.

This application is only for use of this material on the applicant farm and there will be none moved to or used on other farms.

The farm currently carries out yearly soil tests and carried out wide ranging chemical analysis when the farm was purchased. These paddocks will have been tested in the past 2 years. E3 Scientific did not carry out soil tests but tests on the skin material. If there are not test results available for any paddock to be used then it would be tested prior to any application of compost. These paddocks would be then tested yearly from then on.

Please contact me if you have any questions.

Yours faithfully
Civil Tech Ltd

A handwritten signature in blue ink, appearing to read 'Murray Gardyne', with a horizontal flourish at the end.

Murray Gardyne
Director

MACLINE Geomembranes MACLINE® ATARFIL HD

Raw Material

High Density Polyethylene

DESCRIPTION

MACLINE® ATARFIL HD is a geomembrane manufactured from maximum quality high density polyethylene HDPE resins, duly contrasted, that comply with the most rigorous requirements established for their use.

MACLINE® ATARFIL HD contains 97,5% of pure polymer, and approximately 2,5% of Carbon Black, antioxidants and thermal stabilizers. The product does not contain plasticizers or fillers that can migrate over time.

The geomembrane MACLINE® ATARFIL HD is manufactured under permanent quality controls.

SURFACE	SMOOTH	COLOUR	BLACK
		RAL Code	

	Tested Property			
	Unit	Test Method	Value	
Raw Material Identification	Density of Raw Material	g/cm ³	ASTM D 792	>0,932
	Density of Geomembrane	g/cm ³	ASTM D 792	0,946 ± 0,004
	Melt Flow Index	g/10 min	ASTM D 1238 (190°C/5 Kg)	<1,30
	Carbon Black Content	%	ASTM D 4218	2,0 - 2,5
	Carbon Black Dispersion	-	ASTM D 5596	10/10 views in cat. 1 or 2
Durability	Oxidative Induction Time (OIT)	min	ASTM D 3885 (200°C)	> 100
	Stress Crack Resistance/NCTI	h	ASTM D 5397	> 600
	Oven aging at 85°C (min. avg.)	%	ASTM D 3895	> 55
	UV Resistance: High Pressure OIT - % retained after 1600 hrs	%	GM 11 / ASTM D 5865	> 70
	Oxidation	%	UNE EN 14575	> 15

	Tested Property			
	Unit	Test Method	Value	
Functional Properties	Low Temperature Brittleness (T _b -40°C)	-	UNE EN 485-5	No cracks
	Water Permeability	m ³ /m ² day	UNE EN 14150	< 1·10 ⁻⁴
	Coefficient of Linear Thermal Expansion	1/K	ASTM D 896	2,15·10 ⁻⁴
	Water Absorption	%	ASTM D 570 (24h)	0,1
			ASTM D 570 (8 days)	0,1
	Thickness of Co-extruded Layer	%	ASTM D 5199	-
Asperity Height	mm	ASTM D 7466	-	

	Tested Property		Test Method	Value						
	Unit			0,75	1,00	1,50	2,00	2,50	3,00	
Strength Characteristics Quality of Final Product	Thickness	mm	ASTM D 5199	0,75	1,00	1,50	2,00	2,50	3,00	
	Medium thickness tolerance			+ 5						
	Punctual (minimum) thickness tolerance	%		+ 10						
	Tensile Properties ⁽¹⁾									
	Tensile strength at Yield	N/mm	ASTM D 638 (Type IV)	13 (11)	18 (16)	26 (24)	35 (32)	44 (40)	53 (48)	
	Elongation at Yield	%		12						
	Tensile strength at Break	N/mm		22 (19)	31 (26)	47 (39)	62 (52)	78 (65)	94 (78)	
	Elongation at Break	%		800 (700)						
	Tear Resistance	N	ASTM D 1004	100	135	202	270	337	405	
	Puncture Resistance	N	ASTM D 4833	>240	> 320	>480	>640	>800	>960	
	Expanding Resistance	%	pr EN 14151	> 15						
Dimensional Stability	%	ASTM D 1234 (100°C, 1h)	± 1,5							

190713 PRESENTATION (Standard Sizes)	Parameter		Units					
			0,75	1,00	1,50	2,00	2,50	3,00
	Roll width	m	7,5	7,5	7,5	7,5	7,5	7,5
	Roll Length	m	280	210	140	105	84	70
Surface	m ²	2100	1575	050	787	630	525	

(1) Values indicated are MEDIUM. In brackets values with 95% confidence level.

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Quality System ASNZS ISO 9001:2008

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