The ITL Aqualiner Design Life and Maintenance

The **ITL Aqualiner** has a product design life well in excess of 15 years, noting that design and anticipated use are the key determinants of the functional life of the product.[1]

The end of life of the **ITL Aqualiner** cannot be calculated (no mechanism of degradation of the **ITL Aqualiner** has been identified) and the repair schedule does not suggest replacement except under catastrophic and insurable events.

This is in stark contrast to common plastic liners, such as HDPE, as it will degrade when exposed to UV light. The degradation is retarded by stabilising additives (to ensure resistance to heat and UV weathering effects), but these additives are lost over time by mechanisms such as leaching, consumption, migration and diffusion. Experience would suggest that failure and subsequent replacement of HDPE is most common between 15 and 20 years.

The **ITL Aqualiner** is not dependent on the retention of additives or antioxidants for its long-term stability.

Low maintenance needs of the **ITL Aqualiner** are derived from (a) product test results demonstrate a very robust and damage resistant product, and (b) the ease of the repair.

The Ease of Repair

All surfaces are to be cleaned, dry, and free of containments and loose material prior to application.

Visual account	Action suggested	Future Planning Considerations
Small puncture	Reapply coating	If damage caused is from Non-Intended Use, isolate to minimise future damage
Puncture or tear substantially involving the geotextile.	Reapply geotextile and coating on top of damaged surface.	Monitor and investigate design suitability.
Dark ceramicised surface from fire	Reapply geotextile and coating on top of damaged surface.	
Light discolouration from fire	Reapply coating	
Silt	Remove using non-destructive equipment	Consider light rubber tracked vehicles with silt vacuum systems for distribution into adjacent fields
Objects in channel	Remove using non-destructive equipment	
Geotextile exposed	Reapply coating	Investigate installation QA/QC.
Abrasion	Reapply coating	Monitor and investigate design

A Robust and Damage Resistant Product

The **ITL Aqualiner** is a two component construction; a geotextile and a polymer modified cementitous coating. The geotextile material will last indefinitely when not exposed UV light. The coating has been utilised for many years in the building and construction industry for mortars and exposed renders and it has a track record of proven durability.

1. This document is a guide only. This guide is subject to contract, warranty, product and application specification for the **ITL Aqualiner** use in earthern channels.

ITL Aqualiner — Table of Critical Performance [2]

	Test Method	Value
Taber Abrasion	ASTM D3389	1000gram, mass loss 0.05mg per
CBR Burst Strength	AS 3706.4	Mean 3646.0 NM
Thickness Measure	AS 2001.2.15A	Mean Thickness 2.28mm
Grab Tensile	AS2001.2.3.2	Mean Max Force NM D :1290 TD 1935
		Max Force Std Dev MD: 93 TD :455
Mass Per Unit Area	AS2001.2.13	1055g/sq m
Peel Adhesion	ASTM D751	Mean 57.5 N/25mm Std Dev 11.0N/25mm
Rod Puncture	ASTM D4833	Mean 747.0 Newton Std Dev: 72.0 Newton
Strip Tensile	ASTM D 751	Mean 516.9N/25mm Std Dev : 56.0N/25mm
Trapezoidal Tear	AS3706.3	Mean: 475.5 Newton Std Dev: 92 Newton

Cost Considerations

The following cost implications should be considered when undertaking a management program incorporating the **ITL Aqualiner**.

- Monitoring and inspection
- Nominated water-tight tolerances that trigger repair schedules
- Availability of the specified coating and geotextile material for maintenance and repairs
- Safe Work Method Statements for maintenance, repairs and replacement of liner

[2] Test results supplied by Exceplas Geomembrane Testing Services

Technical Aspects & Material Analysis of the ITL Aqualiner[3]

The individual components of the **ITL Aqualiner** are mainly inorganic (55% by weight) such as sand, clay, chalk, cement and silicas that have be used since antiquity and are well known for their durability and outdoor stability.

The polymeric binder of the **ITL Aqualiner** coating is based on a dispersible EVA powder which has been used in exposed architectural applications such as mortar, render, top-coat and adhesive compounds since the 1960's.

No reports on the degradation of dispersible EVA powders have appeared in the scientific literature and the EVA powder manufacturer Wacker[4] has published reports demonstrating their long-term outdoor stability towards weathering and environmental agents. They found there was no change in flexural strength of the binder polymer over 10 years of weathering[5].

Laboratory UV ageing has failed to identify any degradation mechanism other than apparent 'chalking', however that was attributed to leaching of calcium hydroxide (efflorescence typically of curing concrete) and was not due to any loss of binder or filler.

The chemical structure of the dispersible EVA powders lacks any molecular chain backbones groups or linkages that are hydrolyzable or chemically degradable by long-term contact with water. Hence these coatings exhibit good stability against hydrolysis or chemical breakdown involving containment and contact with water. In contrast, polyester, polyurethanes and polyamides all contain hydrolyzable backbone linkages such as ester, urethane and amide bridges.

The polypropylene geotextile support exhibits good outdoor stability provided fibres are screened from the damaging effects of sunlight. An important function of the **ITL Aqualiner** coating is to protect the PP fibres of the geotextile from heat and UV degradation.

The **ITL Aqualiner** coating has a high inorganic content which gives it good abrasion resistance to high sediment loads. There will however be an inevitable, gradual loss of inorganic particles and erosion of the binder leading to a slow loss of coating thickness. The advantage of the **ITL Aqualiner** coating over that of competing liner materials is that it is readily maintainable and repairable by respraying.

The EVA dispersible powders are not re-emulsifiable and once dried and desiccated by the reaction with cement form a water-proof stable network that is not affected by repeated wetting/drying cycles. As indicated earlier, the dispersible EVA powders lack any chemical structures that are hydrolyzable or chemical degradable by long-term contact with water

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[3] Dr. John Scheirs – a polymer technologist with ExcelPlas Geomembrane Testing Services

[4] Wacker Chemie AG (Germany), Wacker Chemicals Australia Pty Ltd

[5] Long-Term Performance of Redispersible Powders in Mortars, Joachim Schulze, Otmar Killerman the, Wacker Polymer Systems, Burghausen, Germany, 13th June, 1999, published and accepted by Cement and Concrete Research, 29 November 2000