



BluSeal PVC Tunnel Liner

PVC FLEXIBLE SHEET MEMBRANE



BluSeal PVC is supplied and installed as a fully sealed and welded robust membrane system.

BluSeal PVC Tunnel Liner is a synthetic membrane of plasticised PVC sheet which forms a flexible and durable tunnel membrane. BluSeal PVC Tunnel Liner is used for lining bored and driven tunnels, cut and cover tunnels, cross passages, shafts and underground structures. BluSeal PVC Tunnel Liner comes in a range of thicknesses for various performance applications. The membrane is applied to structures to prevent water inflow and provide asset protection.

Application Advantages

- Flexibility to conform to various surface profiles
- High tear strength and elongation
- Exceptional waterproofing performance
- Good weldability

Lifecycle Advantages

- 100 year design life
- International Standards testing
- Fire rated

About the Product

BluSeal PVC is supplied and installed as a fully sealed and welded robust membrane system. The installed system includes proprietary system provisions for service penetrations, through fixings and terminations. The liner is suitable for a range of underground structures providing the most robust and reliable solution available for concrete protection and water infiltration management. Under the supervision of Bluey Engineers and trained installers, BluSeal PVC can be applied to tunnels, basements and other structures as either a tanked or drained lining system. PVC allows easy hand welding in complex areas providing cost savings on installation around structures with complex geometry. BluSeal PVC is designed and installed in accordance with International standards. BluSeal PVC is the most reliable choice for all civil engineering underground structures.

Application Solutions

- Lining bored and driven tunnels
- Cut and cover tunnels
- Green roofs
- Cross passages
- Underground structures
- Flat and insulated roof structures

Project Specification Clause

PVC FLEXIBLE SHEET MEMBRANE- The PVC Sheet membrane used for this project shall be supplied and installed as a fully sealed and welded robust membrane system. It shall be a pre-fabricated product that has independent testing to validate the performance outlined in the technical data table on the following pages. BluSeal PVC Tunnel Liner manufactured by Bluey Technologies or equivalent shall be accepted.

Project Examples

Tunnel waterproofing, basements, green roofs, rail bridges, land bridges



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Application Specification

PREPARATION

- 1.1 Substrate surfaces onto which a waterproof membrane is to be applied shall be prepared by the addition of a shotcrete smoothing layer to remove local peaks and infill hollows, or a suitably smooth concrete or rock surface.
- 1.2 Surfaces on which waterproofing systems shall be installed shall be clean, free from loose aggregate, sharp protrusions, projecting tying wire, release agents and other substances which are likely to damage or affect the waterproofing system.
- 1.3 Large circumferential irregularities shall not exceed 200mm when measured from a 1.0m curved edge held against the tunnel circumference.
- 1.4 Any curvature or irregularity shall have a radius greater than 200mm. In areas where curvature is in excess of this value the Waterproofing Supervisor shall be required to inspect and deem if acceptable with the use of double geotextile fleecing, etc.
- 1.5 The shotcrete (including smoothing layer) shall be cured for at least 24 hours prior to membrane placement.
- 1.6 Steel elements, such as reinforcement bars, steel girders and the heads of rock bolts (as far as not used to hold inner lining structures) shall be covered with at least 20mm of shotcrete (or other approved method).
- 1.7 Depth pins shall be cut flush with the surface and patched with mortar.
- 1.8 Running water ingress shall be plugged prior to the initial lining of the tunnel with geotextile. Where heavy water ingress is encountered it shall be collected into half-pipes (e.g. flexi-drain or strip-drains, etc.), mounted by nailing and led into the permanent drainage system as appropriate.
- 1.9 If water is later found excessively penetrating through the shotcrete lining, which can adversely affect the installation of membrane, the water shall be collected by means of hoses and temporarily drained to the tunnel invert (i.e. during concrete lining pour, etc.).
- 1.10 The drainage shall be maintained during the membrane installation process so that no water pressure can develop behind the membrane.
- 1.11 BluSeal PVC Tunnel Liner is to be installed over non woven geotextile of not less than 700gsm.

APPLICATION

- 2.1 BluSeal PVC Tunnel Liner must be installed by an approved, specialised applicator. Experienced in installation techniques and testing is essential.
- 2.2 Following installation of geotextile, the compatible roundels are nailed to the surface using a suitable nail gun. Roundels shall be set in a pattern to adequately support the membrane. This will vary between the tunnel crown, walls and invert.
- 2.3 BluSeal PVC Tunnel Liner shall be attached to the roundels by hot air 'spot' welding.
- 2.4 The membrane shall be laid with sufficient slack (quilting) to avoid potential overstressing of the membrane sheet and possible tearing during concreting. However, it should not be installed too loose, that the membrane folds over itself during concrete placement (the membrane should be pressed against the surface during concreting).
- 2.5 Adjacent sections (rolls) of BluSeal PVC Tunnel Liner shall be overlapped by approximately 100mm and joined by double seam welding.
- 2.6 Double seam welds are to be tested by applying pressure to the gap between the welds.
- 2.7 Areas where a double seam weld is not possible, a hand weld is to be employed. These welds are to be tested by nail test, or if profile permits a vacuum test.



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Product Data

Please refer to Important Notice on following page

Storage	The membrane must not be exposed to UV light for more than 3 months Storage and transport of the membrane must be done with consideration for eliminating potential damage
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TESTED CHARACTERISTIC	STANDARD	RESULT
Appearance	EN 1850-2	No tears, blisters, bubbles, pores or any other type of visual imperfection.
Straightness and Flatness	EN 1848-2	$g \leq 50\text{mm}$ $g \leq 10\text{mm}$
Density	EN ISO 1183-1	$1.28\text{g/cm}^3 \pm 0.03$
Nominal Thickness including Signal Layer	EN 1849-2	$2.0\text{mm} \pm 10\%$
Thickness of the Signal Layer	EN 1849-2	$\leq 0.2\text{mm}$
Tensile Strength	EN ISO 527-3	$L \geq 16\text{N/mm}^2$ $T \geq 16\text{N/mm}^2$
Elongation at Failure	EN ISO 527-3	$L \geq 300\% -10\%+20\%$ $T \geq 300\% -10\%+20\%$
Resistance Under Water Pressure	EN 1928 (Method B)	5 bars @ 1 hour No leakage
Root Resistance	EN 14416	No penetration
Tear Resistance	EN 12310-2	$\geq 80\text{N/mm}$
Tensile Strength of Welded Seam - Shear Test - Peel Test	EN 12317-2 EN 12316-2	Break outside the seam $\geq 6\text{N/mm}$
Water Absorption	EN ISO 62	$\leq 4\%$
Fire Resistance and Combustibility	EN ISO 11925-2	Class E
Impact Resistance: Height of Fall Without Perforation	EN 12691 (A)	$\geq 750\text{mm}$
Dimensional Stability after Accelerated Ageing	EN ISO 1107-2	$\leq 2\%$
Condition after Accelerated Ageing	EN 1850-2	No visible defect
Resistance to Artificial Weathering	EN 1850-2	No visible defect
Chemical Resistance: Behaviour After Storage in Aqueous Solutions	EN 1850-2	TBC as part of durability assessment
Thermal Ageing	EN 1296	70 days storage @ 80°C Change in tensile strength < 10% Change in elongation < 10%



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Contact Bluey

BRISBANE (HEAD OFFICE)

Bluey Technologies Pty Ltd
Unit 8, 53 Metroplex Avenue, Murarrie Qld 4172 Australia
Ph +61 7 3399 3635 Fax +61 7 3899 9822 brisbane@bluey.com.au

SYDNEY

Bluey Technologies Pty Ltd
Unit 3, 35 Higginbotham Road, Gladesville NSW 2111 Australia
Ph +61 2 9807 2207 sydney@bluey.com.au

MELBOURNE

Bluey Technologies Pty Ltd
PO Box 170, Tullamarine VIC 3043 Australia
Ph +61 3 9826 5570 melbourne@bluey.com.au

PERTH

Bluey Technologies Pty Ltd
Ph +61 402 372 308 perth@bluey.com.au

AUCKLAND

Bluey Technologies
Ph +64 21 102 4797 nz@bluey.com.au

www.bluey.com.au

BLUEY ASIA PACIFIC DISTRIBUTOR

QUICSEAL CONSTRUCTION CHEMICALS PTE LTD

No.7 Eunos Avenue 8A, Eunos Industrial Estate, (S)409460 Singapore
Ph +65 6742 4466 Fax +65 6741 4666

www.quicseal.com

IMPORTANT NOTICE

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