



CLEARPOND™

PROLINER EPDM POND LINER

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1. INTRODUCTION

The objective of this document is to provide the installer information of how to install Clearpond Proliner. It includes general instructions for correct design and installation.

This manual serves to explain some design and installation techniques.

These simple projects can be performed by non-experienced installers.

Annex: Description of all products required for lining process

Necessary tools for installing Clearpond lining systems

2. GARDEN POND DESIGN

2.1 USES OF LINING MATERIALS

This document's content can be applied principally for:

- ornamental lakes
- decorative small ponds

The Clearpond EPDM rubber membrane Proliner is also suitable for bigger projects like:

- agricultural / fishing ponds
- fire fighting reservoirs
- sediment ponds / settlement basins
- hazardous material containment / disposal
- irrigation channels
- enlargement of natural ponds



2.2 GARDEN POND LOCATION

The correct location for a garden pond will ensure a result that lasts for decades. Some factors to consider when selecting the site include:

2.2.1 NATURE OF SOIL

It is important to consider the stability of the soil.

This table allows the installer to evaluate the risks regarding soil characteristics:

TYPE OF SOIL	RISKS	SOLUTIONS
COMPRESSIBLE SOILS (peat, fine sand...)	<ul style="list-style-type: none"> • gas emanation • contra-pressures • settlement • excessive compaction after filling pond 	<ul style="list-style-type: none"> • gas drainage • pond base sloped to ensure gas drainage • satisfactory compaction
SOILS CONTAINING ORGANIC MATERIALS (Old ponds from sugar and paper industries)	<ul style="list-style-type: none"> • fermentation • contra-pressures by pockets of gas under the geomembrane 	<ul style="list-style-type: none"> • gas drainage
SOILS WHERE POSSIBLE INTERNAL ROTTING CAN OCCUR (Embankments with waste demolition, calcareous soils, chinks, plaster...)	<ul style="list-style-type: none"> • reduction in base level caused by decomposition of soil content • fail caused by an eroding watercourse 	<ul style="list-style-type: none"> • thorough geological cavity study • special compaction or double waterproofing
VOLCANIC SOILS (porous clay, compressible slimes...)	<ul style="list-style-type: none"> • absorbent capacity • different base structure causing inconsistent conditions - risk of tearing 	<ul style="list-style-type: none"> • intermediate layer • specific drainage • special compaction around base features



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2.2.2 WATER TABLE

The level of the ground water within the excavated hole is critical. If it becomes too high it may cause the installed liner to be forced upward in response to underlying pressure increases and cause displacement of the pond water content.

Constructing a pond with raised sides (part of pond above existing ground level) can alleviate problems caused by rising water table as increased atmospheric pressure (effective weight of water) forces uprising groundwater to “bleed” from under the constructed pond, therefore reducing liner displacement within the pond.

Accordingly it is necessary to know the level of the water table (medium and high values).

2.3 BASE LEVEL

2.3.1 GARDEN-POND BOTTOM

We recommend a 2% slope for:

- Good working of the drainage system
- Better settling of liner
- Easier garden-pond maintenance (emptying, cleaning)

This slope is even more necessary if the garden-pond has a large surface area and has different levels after filling.

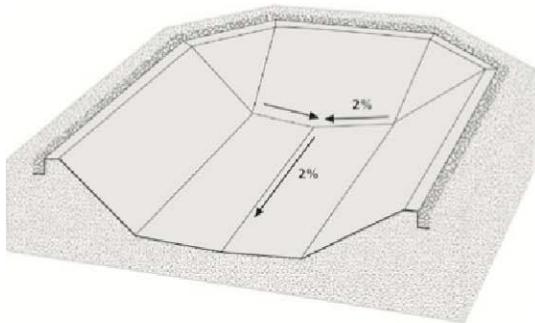


Fig. 1: slopes of the garden-pond bottom

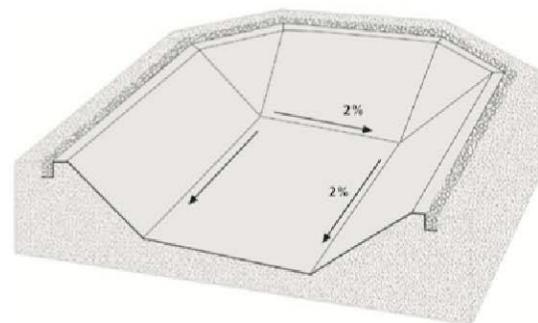


Fig 2: slopes of the garden-pond bottom



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2.3.2 LATERAL SLOPES

When constructing garden ponds lateral slopes do not tend to be a problem, however the ground water level and/or the soil type must however be considered.

SOIL TYPE	SLOPE			
clayey soil	2,5 H / 1 V	(1/2.5)	40%	23°
sandy - clayey soil	2 - 3 H / 1 V	(1/2 - 1/3)	50% - 33.3%	28° - 20°
sandy - clayey soil	2 H / 1 V	(1/2)	50%	28°
new rock (tender)	1,5 H / 1 V	(1/1.5)	66.6%	35°

* illustration:

1 H / 1 V 1/1 100% 45°

The slope ridge must be sufficient for the anchoring and other needs of the project (e.g. fixing edging stones).

2.3.3 MAXIMUM HEIGHT OF WATER FROM GROUND LEVEL

The greater the water height in the pond, the greater the pressure on the bottom and slopes will be. Despite the high tensile strength capacity of the membrane, it's possible that cavities in the ground can provoke a burst. Therefore we recommend a layer of liner with sufficient thickness and/or Clearpond Liner Underlay, laid under the lining material.



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2.4 PREPARATION OF THE BASE

2.4.1 NATURAL GROUND

The surface in contact with the waterproofing membrane must be smooth and clean, free of aggressive roughness and small cavities.

The preparation of the ground can be made in different ways:

- Remove the stones, plants etc., and then smooth the ground and compact it.
- Add a regulation layer, normally sand with controlled a granule size, and then compact it. Clearpond liner underlay is also suitable for this purpose and will provide greater protection to vertical walls.

Plants:

In order to avoid possible gas pressure produced by decomposition of vegetation, which may create contra-pressure on the lining, all plant material must be removed from the bottom of the garden pond excavation before compacting the soil. We recommend using an environmentally friendly herbicide with long-term effect in zones where the vegetation may grow again, especially near the anchoring.

Compacting:

The base must be well compacted, be especially careful when compacting the top of slope.

Clearpond Pond Liner Underlay:

We recommend using Clearpond Pond Liner Underlay between the ground and the membrane. It is absolutely necessary on slopes and tops where addition of a regularization layer (e.g. sand) is difficult.

2.4.2 NATURAL GROUND

Clearpond Pond Liner Underlay is absolutely necessary between the membrane and a hard base like concrete, except when the waterproofing membrane is fully adhered to the base.

Over bituminous supports (bituminous mortar, floors stabilized with asphalt emulsions, etc.) it is also necessary to use Clearpond Pond Liner Underlay as a minimum.



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2.4.3 SURFACES AROUND CONCRETE SUPPORT

Be especially thorough when compacting the soil around this kind of support in order to avoid all possible strain that could tear the membrane.

The geomembrane fixed on the concrete support must be able to absorb all possible settling movements around it. The ground added around the support must be compacted.

Filling the pond with water before permanent attachment is recommended as this will allow the liner to settle correctly to its surrounds.

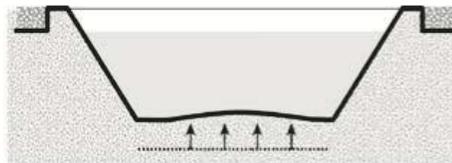
Inspection of the support: Before placing the geomembrane, always check the stability of the soil and evaluate any preventive measures, which may be required.

Figure 3 illustrates the main reasons of possible contra-pressure below the geomembrane, which can be avoided with water or gas drainage system.

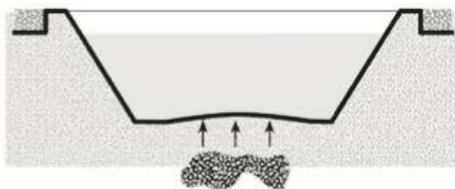
Fig. 3: Factors that cause contra-pressure



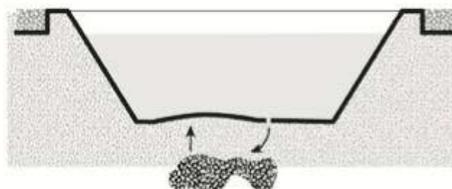
3.1 Existence of a waterproof layer which causes the slope's weakening



3.2 Elevation of the water table



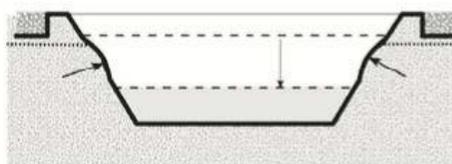
3.3 Decomposition of organic materials



3.4 Leaks in the membrane and existence of organic materials



3.5 Water table higher than pond level



3.6 Fast emptying of the garden pond



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3. EXECUTION

3.1 DIGGING THE HOLE

3.1.1 SOIL PREPARATION

Using: - only an excavated hole

- earth to form the pond's embankments
- a mixed solution consisting of excavating the pond hole and using the material to form the embankments.

The following table explains the advantages and disadvantages of these three systems:

SYSTEM	ADVANTAGES	DISAVANTAGES
• only excavation	• prevents the soil movement (natural consolidation)	• possible problems with ground water levels
• adding earth	• the drainage is more easy, no problems with the water table	• cost • needs to be compacted
• mix solution	• average of two systems	

All the soils to receive Proliner must be **CORRECTLY** compacted.
The soil may not contain cutting materials with a size bigger than 5mm.
After the stones and roots have been recollected check that the soil is in a correct state.

On soft surfaces like sand or clay it is possible to install the membrane directly over the soil but in most occasions it is necessary to install Clearpond Pond Liner Underlay. Clearpond Pond Liner Underlay is recommended over gradient slopes (or sidewalls) of all surfaces including where sand has been used as sand provides no protection of sidewalls. All hard surfaces such as concrete, brick or wood should be protected by Clearpond Pond Liner Underlay.



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Anchorage trench

Open an anchorage trench all the way around the outer pond edges. The extracted material should be deposited at the exterior side of the trench.

This trench must be opened away from the ridge to prevent a possible collapse of created ridge

The transition from the ridge to the slope is realized by a dull bevel with a 30 to 50 cm radius, to prevent the membrane from being drawn into the excavated pond when filling is complete.

Consolidate around structures in pond base

In order to avoid different degrees of setting, it is necessary to give special attention to solid structures in the base that may have a puncturing effect on the liner. Use extra Clearpond Pond Liner Underlay around such structures to dull exposed edges and add extra cushioning to the liner.



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3.2 INSTALLING THE LINER

3.2.1 CLEARPOND'S GEOMEMBRANE – INFORMATION

Clearpond's geomembrane "Proliner" is a synthetic EPDM (Ethylene-Propylene-Diene-Monomer) rubber. All components necessary for laying and joining the geomembrane are supplied by Clearpond and Technical Data Sheets are available by request.

The Clearpond Proliner EPDM rubber membrane is sold in many sizes and thickness.

Standard width	3m, 4.5m, 6m, 9m & 15m
Standard Length	30 metres
Standard Thickness	0.70 & 0.90 mm

Each roll is labelled with the brand name, the thickness and the size.

3.2.2 TRANSPORT & STORAGE

Take necessary care not to damage the liner during transport and whilst loading /unloading. The rolls must be stored over an area that is smooth, clean and has no risk of puncturing occurring. The EPDM rubber does not require any special protection from the weather as it is waterproof, frost proof and UV stabilised.

Any accessories necessary for installation (e.g. joining tape) must be stored away from weathering effects, ideally between 10°C - 15°C.

3.2.3 PLANNING THE INSTALLATION

An installation plan or drawing is recommended to be kept for identification of seam and pipe locations should future repairs be required.



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3.2.4 MEMBRANE INSTALLATION

Clearpond Pond Liner Underlay placement

The Pond Liner Underlay is placed with a 30cm (12") overlap, minimum.

To prevent any wind rise it is necessary to temporarily ballast the membrane, with sandbags, old tyres...etc., or permanently fix to ground with plastic flat headed pegs. Smaller areas of Pond Liner Underlay can be sprayed with water to make the material heavy.

Membrane placement

Unroll and unfold the rolls according to the installation plan, having in mind possible seaming and anchoring.

After verifying the correct situation of the Proliner EPDM rubber sheeting it is necessary to let it settle for 30-45 minutes, before finally closing the joints and/or all lining details.

3.2.5 ANCHORING THE GEOMEMBRANE

Normally the anchoring is made by burying the membrane in a trench or by ballasting (e.g. edging stone).

Trench dimensions depend upon the specification required by the project. For most installations it is advisable to install a temporary ballast in the trench, or around the perimeter once liner is laid out.

When all joints, seams and other lining details are finished, it is necessary to fully fill the pond to determinate the final settlement level of the water. Only when the liner has fully settled can permanent fixing be applied around edges.

Immediate Anchoring

Not advisable, but sometimes necessary and suitable for only small projects, i.e. cascade and waterfall construction or small tank linings. Ensure that full consideration is given to the settlement of the liner before applying permanent fixing. (E.g. cement, rock edges and capping)



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3.2.6 JOINT FIXING

If several sheets of liner are required, joints will have to be made. The sheets must be installed with no tension and with minimum overlap of 15cm (6").

For small garden-ponds it's possible to make the joint seam at the side of the garden-pond, on a flat support.

In bigger ponds we suggest to put a stratified wood panel, or an insulating panel, under the membrane along the joint. The panel can be moved along, as the joint moves forward.

DO NOT make a joint when:

- Snowing
- Raining
- Under water
- In the sludge
- When there is condensation over the membrane

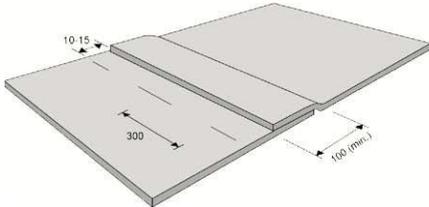
The joint between two adjacent sheets can be made with:

Clearpond Quick Primer and Quick Seam Splice Tape 3"

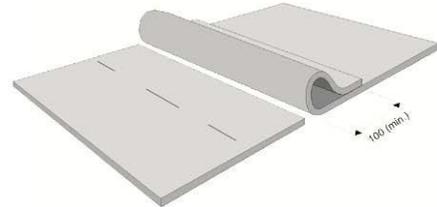


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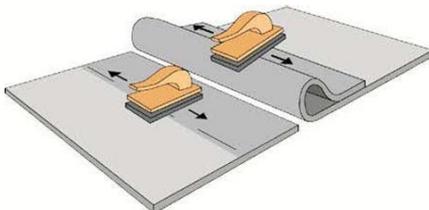
Joining Clearpond Proliner



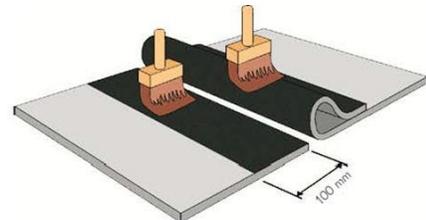
Step 1: Position the membrane



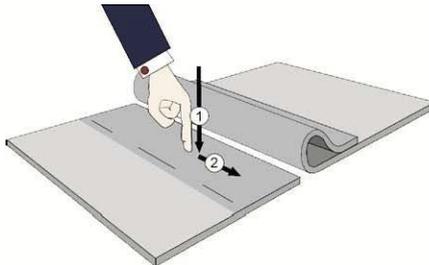
Step 2: Turn the overlap



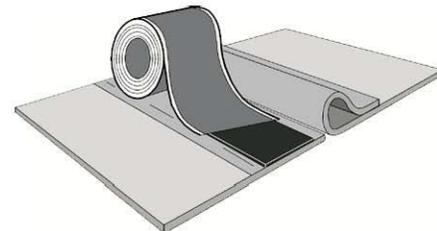
Step 3: Cleaning if necessary



Step 4: Apply Clearpond Quick Primer



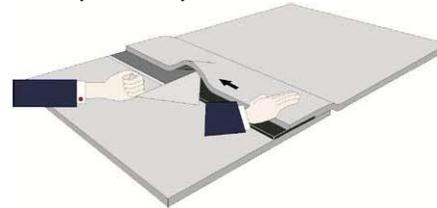
Step 5: Check surface is dry



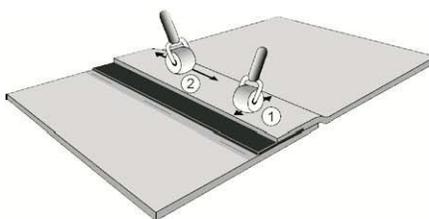
Step 6: Install 3" Quick Seam Splice tape



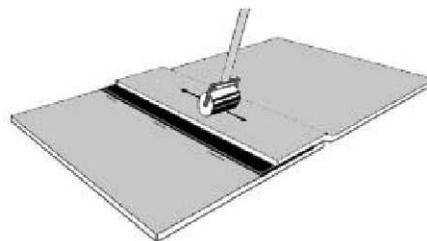
Step 7: Check tape alignment



Step 8: Remove paper backing



Step 9: Roll or hand press the seam.





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3.2.7 MEMBRANE PROTECTION

Depending on the future use of the garden-pond, membrane protection may be required. This protection can be realised with: sand, Pond Liner Underlay, stone, earth or prefabricated decoration.

3.3 LINING DETAILS

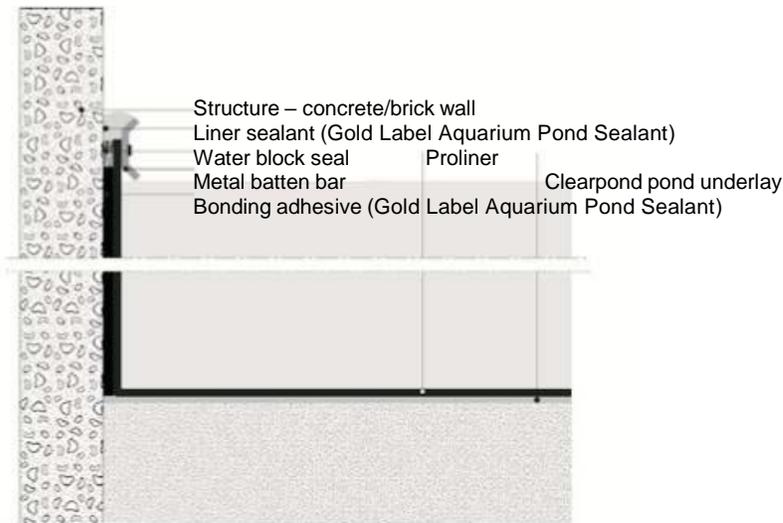
3.3.1 GENERAL:

Where possible, it is recommended NOT TO CUT the Proliner membrane, but re-fold the remaining liner around the edges of the pond.

When the membrane is cut, Quick Seam Form Flash 9" will have to be used to waterproof around the detail. (E.g. around bottom drains or side outlet/inlet)

3.3.2 FIXING TO: Concrete, Brick-wall...

- The fixing walls must be clean, smooth, and without roughness.
- The wall joint must not permit the water to leak out between the membrane and the wall.

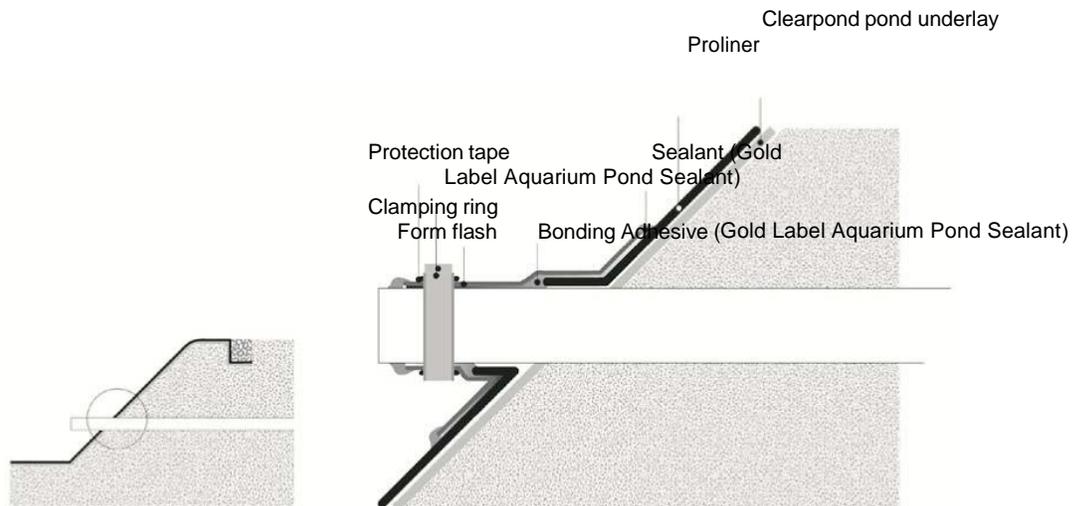




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3.3.3 FIXING TO CANALISATIONS:

It is necessary to verify if the ground compaction around the canalisation are sufficient to prevent all possible later settlement.



3.3.4 FIXING TO DRAINS:

The fixation between the Proliner membrane and drain outlet tube can be done by use of a mechanical system, e.g. Oase or Clearpond bottom drain.

Between the membrane and the clamping ring seat flanges, it is imperative to include a water block seal cordon.

3.4 LINER REPAIR NOTES

The repair method varies if the membrane is new or if it has been in service for many years.

If new, the best method is:

- Each membrane damaged will be repaired with a piece of Quick Seam Form Flash. If it is necessary to clean before the adhesive application, use a cloth with Clearpond Quick Primer and gloves.

If it has been in service for many years, the method is different:

- Firstly clean the damaged zone to remove the accumulated waste, initially, scrubbing with a mop with soap (use carefully so as not to get soap near pond water) and warm water, rinse with clear water and wait to dry. Repair as per method above.



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4. Annex

4.1 Product Description

The Clearpond Proliner waterproofing system for garden pond lining uses a complete range of products including the Proliner membrane, adhesives, tapes, sealants and cleaning products. Only use accessories recommended by Clearpond.

Geomembrane

Proliner – a geomembrane produced by calendaring and vulcanisation. Sheets 0.70mm and 0.9mm thickness are mostly used for pond construction.

Adhesives and tapes

Clearpond Quick Seam Splice tape – butyl tape, self-adhesive double-faced for joining between Proliner sheets. To be used with Clearpond Quick Primer.

Clearpond Quick Primer – to prepare the EPDM membrane and activate the surface before applying joining tape.

Clearpond Form Flash – self-vulcanising tape, can be moulded and adjusted to irregular forms like corners, pipes etc.

Sealants

Gold Label Aquarium Pond Sealant – allows fixing of Proliner to different substrates like stone, metal, plastic etc. Liner pre-treatment with Quick Primer is recommended.

Accessories

Oase liner transitions – these components are used for penetration of pipes and hoses.

Oase Tradux – safe liner transition for electric cables or hoses without the need to cut electric plugs.

Oase Grindex set – holder and sanding sponges for preparation of liner surface prior to joining

4.2 Necessary Installation Tools

- tape measures
- scissors
- chalk
- cotton cloths for cleaning
- cleaning agent
- painters brush
- silicon rubber roller 5cm wide
- caulking gun