



*This 100' x 80' pond is 12' deep. The 300 lb. piece of liner holds 90,000 gallons of water.*

Photo courtesy of Mystic Water Gardens

# the pond liner & underlayment

the pond

the foundation of

tales from the  
**FIELD**

Several years ago, we installed a pond for a customer who lived a good 90 minutes away from our office. She loved it so much, that two years later she called us back to see if we could enlarge her pond.

### More Than We Bargained for ...

On the scheduled day, we enlarged the pond according to her wishes ... or so we thought. The next day she called us back and said, "I really need the pond to be bigger." We scheduled another visit.

With enough liner to cover the pond enlargement that we'd discussed, we arrived on the scheduled day. After we got started, she came out to see how we were doing and stood there with her hand on her chin ... thinking. Sure enough, she said, "You know guys, I think I still want it to be bigger." We didn't have a large enough piece of liner with us, so I walked out to the truck hoping to find something that might work.

### A Quilting Bee?

I pulled a bunch of liner scraps out of the truck - leftovers from other jobs that I hadn't had time to throw in the dumpster yet. I walked back to her yard, and began seaming them all together into a liner quilt. I really didn't know whether or not it would work.

A couple of hours later the customer came out and looked at my work and said, "My, that's interesting. Do you do that often?" Without cracking a smile, I assured her that it was an everyday occurrence, and she would be happy with the outcome. In the end, she was happy with it, and she's turned out to be one of our best customers. In other words, there were no leaks and my seams worked!

*Ed Beaulieu*

*Vice President of Field Research*







A solid foundation on a house is extremely important. You would not build your home's foundation out of sand just because it is the least expensive material available. The same logic holds true when choosing a liner for a pond. The liner is the pond's foundation. Choosing an inferior liner can lead to a leaky pond, multiple service calls, and possibly an extensive amount of labor. Start with a good foundation and you will be able to sleep at night knowing that the pond you installed will hold water for years to come.

## Choosing the Right Liner

The first step in choosing the proper liner is to educate yourself on the selection of liners that are available. Over the years, The Pond Guys™, Aquascape's elite construction crew, have tested many different types of liners in the field. We have also been called out to many job sites where a pond had been installed using inferior products, allowing us the opportunity to see how these products hold up to the test of time and the forces of nature.

### Warranty

Don't even consider using a liner if it doesn't come with a long-term warranty. All of the liners described in this chapter come with a 20-year warranty. It states that the liner will not prematurely deteriorate because of weathering within the 20-year period. The sun's ultraviolet rays are the primary culprit in the deterioration of most liners. A properly built pond, with boulders and gravel covering the liner, will protect the liner from ultraviolet rays, further extending its lifespan well beyond 20 years.

### What Is Fish Safe?

It is important to also determine whether the liner you choose is safe for any fish that may inhabit the pond. A fish-safe liner is given a stamp of approval by the manufacturer that guarantees the membrane is chemically com-



*Don't be fooled by inexpensive lightweight pond liners. Here we put a competitor's liner to the test.*

pounded to be fish-safe, and that this is verified by testing to ensure that it is not toxic to fish.

### It's Not Worth the Risk

Yes, it's true, some people have used liner that is not stamped as fish-safe without a problem. But there also have been reports of pond owners with dead fish in their new ponds, built without fish-safe liner. The reason? Liner manufacturers use a wide variety of raw materials to produce their liners and quite often the cost of one raw material might increase, causing the manufacturer to choose a less expensive substitute raw material. These substitutes may not be safe for aquatic life. This would help explain why people sometimes get away without using fish-safe liner, while others have dead fish. In our opinion it's just not worth the risk!

## Which Type of Liner Should You Choose?

### 45 mil EPDM Rubber

There is a definite pecking order used at Aquascape to determine what liner should be used for a specific job. Our liner of choice is 45 mil EPDM fish safe liner. We love this liner because of a few important properties.

#### Advantages:

- EPDM is extremely flexible. This comes in very handy when working with the irregular twists, turns, and shelves commonly found in a pond or stream. EPDM liner easily drapes into the excavated area and conforms to all of the nooks and crannies in the application.
- EPDM is very durable and puncture resistant. This is especially important when it comes to placing large boulders on the liner. The Aquascape construction



crew commonly sets boulders weighing more than five tons each, right on the liner, and seldom experience any problems because of it.

#### Limitations:

- Size is a limitation when specifying EPDM for a job. The largest roll size manufactured is 50' × 100'.
- Seaming EPDM can be difficult. You may have noticed that Aquascape offers seaming supplies for EPDM rubber. Why not just seam two large sections together?





**Perfect Weather Conditions**

- Weather conditions have to be perfect in order to properly complete a seam. Moisture, such as rain or cold damp conditions, can affect seam quality.

**A Flat Surface**

- You need to have a good, flat foundation to seal the seam. This can be difficult when you're working with the irregular contours of a pond.

**Messy**

- The seam tape can be a real mess. It wants to stick to everything, including you! Not to mention that seaming is tedious and time consuming.
- We do seam EPDM liner in the field, but we don't seam large sections of liner together. We usually only seam short sections of liner together, such as where a deep stream liner meets the pond liner.

**40 mil Polypropylene**

There are a couple of other liner alternatives to choose from if your pond requires a liner larger than 50'×100'. One of them is 40 mil polypropylene.

**Advantages:****Durable**

- 40 mil polypropylene is actually more durable and puncture resistant than 45 mil EPDM.

**Custom Sizing**

- If the job requires a liner larger than 50' × 100', the factory will customize the liner for your project. This custom sizing takes about two weeks, so you need to allow for that in the scheduling of the project. The liner can be made in sizes over four times as large as EPDM.

**Seaming**

- The other great attribute of polypropylene liner is its ability to be seamed or "welded" together very easily. This comes in very handy in the field.

The process is as simple as using a standard heat gun that can be purchased at any hardware store. The liners are overlapped and welded, or melted, together. This technique takes a little practice, but once learned can easily be applied in the field.

**Limitations:****Flexibility**

- Polypropylene, unfortunately, is not nearly as flexible as EPDM. This limits its use to larger projects. Trying to use polypropylene on the typical small residential backyard pond would be difficult and the bends and curves could be aggravating.

**Cost**

- Polypropylene is a few cents per square foot more expensive than EPDM. This can add up quickly on large projects. Its performance and durability, however, are well worth the extra dollars.

*Nothing compares to polyethylene for big jobs. Its lack of flexibility would make it awful to use on a small job. However, for large projects, this is not an issue.*





*Big ponds are built the same way small ones are – just more liner and rock, a bigger filter, and increased backache.*

### 30 mil Polyethylene

For large projects that are under budget constraints, we turn to our third choice for liners, 30 mil polyethylene.

#### Advantages:

##### Cost

- The only real advantage of polyethylene is its cost. It's about half the price of polypropylene and EPDM. As with the polypropylene liner, it too can be manufactured to custom fit your application.

#### Limitations:

##### Difficult to Work With

- Cheaper isn't always better, and in this case, you get what you pay for. Polyethylene is not nearly as flexible as EPDM or polypropylene. It is a "plastic" type liner and can be stiff to work with.

##### Durability

- Polyethylene does not hold up as well to the beating that it takes from the placement of large stones in the pond. Basically, you have to be a little more careful!

##### No Seaming

- Polyethylene cannot be seamed without expensive welding equipment. Typically, seaming of polyethylene is subcontracted to a specialist who has the proper equipment and training.
- We have used polyethylene with success on a number of large-scale installations, but it was not until the 40 mil polypropylene liner was introduced to us that we switched away from polyethylene. If you can't fit the higher cost of polypropylene into a large-scale pond budget, you can choose polyethylene as a less expensive alternative.





### **Pound for Pound... Something to Consider!**

When it comes to building large ponds that require 40 mil polypropylene or 30 mil polyethylene, one needs to factor in the weight of the liner. Liners for large  $\frac{1}{2}$  acre ponds can easily weigh a couple of tons. This is an obstacle that is often overlooked, but with a dozen or so laborers and a little sweat, the liner can be pulled into an excavated pond.

### **Size Limitations**

There is a size limit to consider when it comes to using 40 mil polypropylene or 30 mil polyethylene. The manufacturer is capable of making liner in lengths and/or widths up to 200' or weights up to 5,000 lbs., whichever comes first. The liner is not manufac-

tured in one large sheet. Instead, 10' wide strips of liner are factory welded together.

Many customers assume that having one large sheet would be better than having a number of factory seams, but keep in mind that the location of the seam is actually twice as thick as

a single sheet. Strength and elongation tests demonstrate that the non-seamed areas actually fail before the factory seamed area. So, don't worry about the factory seams, they are actually the strongest point on the liner.

### **Choose the Liner Carefully**

There are many types of liners out there to choose from. Advertisements claiming "lighter weight" or "more tear-resistant" are frequently seen in publications. We enjoy putting them to the test in the field and, to this day, we have not found any liners that can touch the quality, flexibility, strength, durability, and cost-effectiveness of EPDM, polypropylene, or polyethylene. The proper selection of one of these three liners will help guarantee a successful installation.

## **Underlayment**

Underlayment is installed before the liner in order to prevent any punctures that may occur from rough or rocky ground. Many different types of materials have been used for ponds in the past. The best material is the one that is easy to use, cost effective, and readily available. The only underlayment that Aquascape's construction crew uses is a non-woven geotextile fabric. It's lightweight and very effective, giving you the biggest bang for your buck.

This underlayment actually serves a couple of purposes. It not only provides protection for the liner against rocky soils and roots, but it also allows the ground to breathe from underneath. The earth releases gases and the fabric allows the gases to escape from underneath the liner rather than becoming trapped, causing gas bubbles to push the liner up into the pond. In the past, we have tried everything available—newspapers, carpet, and sand, and we will not revert back to them.

### **What Is the Best Foundation for the Liner?**

Aquascape has tested just about every known form of underlayment out there. There are many different types of soil and terrains across the country and not every form of under-

layment will provide a suitable foundation. However, after years of testing, geotextile underlayment has become the clear definitive product of choice for our everyday routine. This product has far too many positive qualities that work in our favor during and after the installation of a water garden to use anything else.

There are disadvantages to every other underlayment material that you can use. For instance, when we first started, Aquascape's construction crew used newspaper as an underlayment because it was inexpensive. Although it was cheap, we quickly tired of pilgaging the towns' recycling bins or going to the local recycling facility and getting a truckload of newspaper for the next couple of ponds. We are often asked why we don't use newspaper. Our response, "Have you ever tried to paper mache the bottom of a pond ... or worse, on a windy day?"

Some people might choose to use their grandmother's 1970 old avocado green shag carpeting that they've just inherited. The carpet can be very heavy, difficult to work with and it is usually very hard to come by.

The most common liner protection people ask about is sand. Yes, sand will be effective for the horizontal flooring, but that's it. There is no way for sand to protect the vertical edges inside the pond where roots may penetrate or a sharp rock or object is imbedded in the side

of the shelf. Heavy-duty underlayment and rock pads are used in extreme conditions to protect the liner. They're also used under large boulders as an insurance policy.

### Our Recommendations

#### *Non-woven, geotextile fabric*

- Professional looking
- Its light weight makes it very efficient
- Cost-effective

### What We Don't Recommend

#### *Newspaper*

- Too much trouble to collect enough of it
- Hard to apply in windy conditions
- Time consuming

#### *Old Carpet*

- Non-professional
- Hard to come by
- Difficult to cut and form to the shape of the pond
- Labor intensive

#### *Sand*

- Labor intensive
- Does not protect vertical walls inside the pond
- Shifts and settles

*On large jobs with polyethylene liner, putting sand down and then underlayment adds extra protection.*



**TIP** from **TEAM AQUASCAPE**

Thinking about not installing underlayment? ... Think again! The liner is one of the largest investments in the pond kit, the product that should last the longest, and one of the most difficult to replace. For this reason, we feel the underlayment is worth its cost and provides a sense of security to the pond owner for years to come. Often, the underlayment is the first thing to get cut from the bid, because there needs to be a cost reduction. There may be a less expensive alternative, but the time that it takes to find and use it often adds up to more than what the underlayment would have cost in the first place!







*The stream in this commercial site was filled with rocks and debris, so we decided it would be worth it to put in underlayment.*

**esp** *¿Underlayment Para La Corriente?*

## Underlayment for the Stream?

This is probably the most common question we get when a customer is ordering a kit. The answer is that it is completely up to you, however, we very rarely install underlayment in a stream. Most streams are very shallow, so the stream itself does not put a lot of pressure on top of the liner like thousands of gallons of water or tons of stone would. By not having this pressure

on the liner, we eliminate the chance of preventing gases to escape from the earth or having rough soil puncturing our stream liner. Of the hundreds of ponds we've installed in our area, 98% were installed without underlayment underneath the stream liner.

**esp** *Probablemente esto es la pregunta más común que recibimos cuando un cliente ordena un kit. La respuesta es toda suya—pero es muy raro que instalamos un underlayment debajo de un arroyo. La mayoría de los arroyos son de poca profundidad, así que el arroyo no*

*pone mucha presión encima de la capa protectora como harían miles de galones de agua ni toneladas de piedra. Por no tener está presión encima de la capa protectora, eliminamos la oportunidad de prevenir que se escapen gases de la tierra o que tierra áspera rompe la capa protectora del arroyo. De los centenares de estanques que hemos instalado en nuestra área, 98% fueron instalados sin underlayment debajo de la capa protectora del arroyo.*

## How Is the Underlayment Used?

The underlayment should always be installed before the liner goes down. It doesn't matter if you have a puddle in your backyard or a one-acre pond.

When installing the underlayment, it doesn't matter which side is up or down—just make sure that all parts of the pond will be protected with the fabric.

The fabric comes in widths of 7½' and 15' and is available in lengths of up to 300'. When a project requires underlayment wider than 15', simply cut the underlayment along the length and overlap this piece next to the existing 15' wide increment. There is no seaming or connecting of the underlayment. Just make sure there is no soil showing wherever the liner is going to be placed.

## esp ¿Cómo Se Usa El Underlayment?

*Siempre se debe instalar el underlayment antes de la capa protectora. No importa si Ud. tiene un estanque grande o chico.*

*Con la instalación del underlayment, no importa cuál lado esté arriba o hacia abajo—no más asegúrese que todas partes del estanque esten protegidos con la tela.*

*La tela sólo viene en anchuras de 15 pies y se ofrece de larguras hasta 300 pies. Simplemente corte el underlayment por la largura y ponga un lado encima del otro. No hay que juntar o conectar el underlayment. Solamente asegúrese que no se ve tierra donde se va a poner la capa protectora.*



## TIP from TEAM AQUASCAPE

For additional liner protection when placing huge boulders, cut off a scrap piece of the underlayment and place it under the rock just before setting it.

esp *Para protección adicional en colocando piedras muy grandes encima de la capa protectora, corte un pedacito del underlayment y colóquelo debajo de la piedra antes de que esté situada.*



*Rock pads can also be used since they're four times as thick as standard underlayment.*