

## ► building a pond, step by step

Once you have planned all the details of your water garden, you can begin building it.

The basic construction consists of six simple steps.





## Layout

Use a heavy garden hose or rope to outline the edges of the pond. Place short stakes at one-foot intervals to retain the shape.



## Excavation

Excavate the pond area. You may choose to create 2 or 3 tiers in your pond, the top one for rock edging and the others for plant shelves. Deep areas should be between 18 and 40 inches deep, depending on the climate, and shallow areas between 4 and 12 inches. In most parts of the U.S., 18 to 24 inches is generally a good depth. To keep the surface of your pond level, stake out strings lengthwise and widthwise and use a line level.



## Padding and underlayment

Carefully remove all sharp rocks and protruding roots from the surface. Line the entire pond with 1 to 2 1/2 inches of sand, then positioning your TetraPond Underliner to protect the main liner from root and rock punctures. Carpet padding and newspaper are also underlayment options, but they will not provide the same degree of protection.

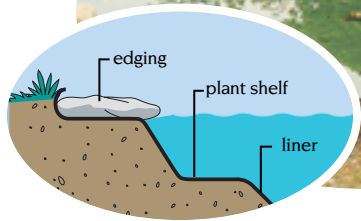
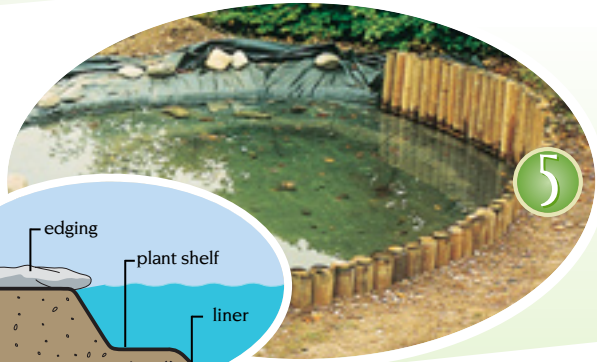


## Liner installation

Unfold the liner on your lawn or other flat surface nearby. With at least two people on either side of the liner, pick it up and walk to slide it over the pond. Let the liner drop into the pond, making sure it extends evenly, well beyond the perimeter. Minimize the number of small folds by pulling or tucking them into large folds. Hold the liner in place with bricks or rocks and fill the pond with water. This will cause the liner to conform to the shape of the pond.

## Rock borders

If you choose, build a rock border around the edges, allowing rocks to overlap the water by one to two inches. To achieve a natural look without the liner showing, make sure the water meets the rock edging. To do this, extend the liner up behind the edging (see illustration) and backfill with soil or rocks to create a barrier that holds the liner upright and prevents both pond drainage and garden runoff. Only after the pond is completely filled and rock edging is in place, trim excess liner.



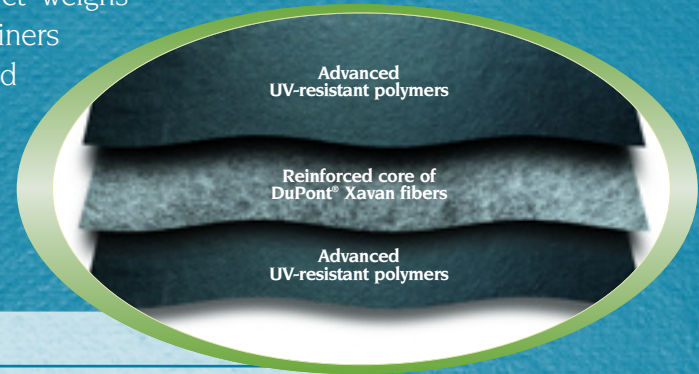
## Equipment installation and finishing touches

Install a TetraPond filtration system, water garden pump and waterfall. Treat pond water with Tetra AquaSafe® Pond Formula (see page 26). Add plants, then wait several days and add fish a few at a time over the course of 30 days to ensure that your pond and filter are biologically ready to support aquatic life. Landscape to suite your taste and environment.



# flexible pond liners ◀

The latest development in flexible pond liners is a technologically advanced TetraPond liner reinforced with Xavan® non-woven fibers by DuPont®. This superior liner is tear-resistant and much stronger than conventional liners, yet weighs about one-third as much. TetraPond liners carry a 25-year limited guarantee and are available in a variety of popular pre-cut sizes or in bulk for custom sizing. EPDM liner made from butyl rubber is also an option.



## ▶ Calculating liner size

**Liner length** = Pond length + 2 x Depth + 2 ft. overlap

**Liner width** = Pond width + 2 x Depth + 2 ft. overlap

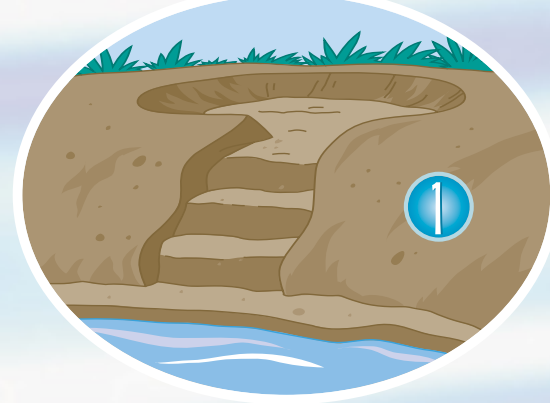
Example ▶

	For finished pond size			Use liner size
<b>3' x 7'</b>	18" deep	350 gal. (approx)		8' x 12'
<b>5' x 7'</b>	18" deep	550 gal. (approx)		10' x 12'
<b>15' x 19'</b>	18" deep	3500 gal. (approx)		20' x 24'



## ▶ adding a waterfall

The sight and sound of moving water add an extra dimension to your garden and enhance the appeal of your pond. Moving water helps oxygenate the pond, and waterfalls also provide a biofiltration benefit as helpful bacteria become embedded in the stones. Building a waterfall isn't difficult if you follow these simple steps.



### Excavating header pool and tiers

Begin by laying out the site for the waterfall. The header pool can be located at the top of a natural slope, or you can use the soil excavated from the main pond as the foundation of the waterfall. Mark the path and the tiers with a pair of stakes at each step. Starting at the base of the mound, excavate the waterfall using the stakes as guides. Make each step roughly horizontal and the sides roughly vertical. If the soil is not holding its shape, allow it to settle or use a tamper. At the top of the waterfall, create a header pool to house the inlet pipe and form the top tier.



## Installing the liner

Cut a piece of liner large enough to cover the whole waterfall with a 12-inch overlap on all sides. Be sure the waterfall liner overlaps the pond liner. With the liner in place, run water over the fall and make sure there are no leaks.



## Laying flat rocks and edging

Place the first flat rock on the bottom tier, overlapping the pond edge by 2 to 3 inches. Next, set a stone flat against the back of that tier. The backing stones should be slightly higher than the rise of the tier. Lay the next rock horizontally on the next tier so it overhangs the first by 2 to 3 inches. Continue until you have reached the top, laying the final rock flat in the bottom of the header pool. Edge stones should be placed at each tier along the sides of the falls. Make sure the edge stones are taller than the surrounding earth.



## Routing plumbing and testing flow

Secure flexible tubing to the pump outlet with a stainless steel hose clamp. Submerge at the furthest point from the waterfall. Route the tubing over the side of the pond, hiding it under perimeter stones without pinching it. Avoid sharp bends so the tubing does not kink and reduce flow. You may want to route and bury the tubing in inexpensive flexible corrugated drainage pipe to protect it. To achieve the desired pattern and sounds for your waterfall, select and position stones while the water is flowing over them. Small pebbles will create a trickling effect while large rocks mimic the rush of rapids. Make sure all flowing water is confined within the waterfall liner. Landscape to suit your tastes.

## ▶ installing an efficient system

In order to keep your pond clear and healthy, you will need to install a system incorporating a pump, filter and a UV clarifier. Depending on the size of your pond and the type of water features you want to incorporate, there a number of different combinations that will fit your needs. The following section makes it easy to build your own backyard oasis with examples of complete systems, information on getting started and handy reference charts.

▶ here are some examples:

### 1200 gallon pond system

**DynaMag 750 Pump** – flow @ 2 ft. high approx. 650 gph

**UV1 Clarifier** – Max. flow 900 gph

**PF1 Gravity Flow BioFilter** – Max. flow 500 gph  
Use 1" inside diameter tubing to connect all components.

Flow control valve



About 150 gallons are diverted to fountain or waterfall

Restrict flow to UV clarifier and filter to about 500 gph

**DynaMag 750**

### 1800 gallon pond system

**DynaTec 2250 Pump** – flow @ 2 ft. high approx. 2000 gph

**UV1 Clarifier** – Max. flow 900 gph

**PF2 Gravity Flow BioFilter** – Max. flow 750 gph  
1 1/4" and 1' inside diameter tubing to connect these components.

Use 1 1/4" inside diameter tubing to connect these components



**T-Fitting**

**DynaTec 2250**

### 2500 gallon pond system

**OFX4000 Pump** – flow @ 2 ft. high approx. 3500 gph

**PUV2500 Pressure Filter With Built-In UV Clarifier** – Max. flow 1250 gph  
1 1/2" inside diameter tubing to connect these components.

Use 1 1/2" ID tubing



**T-Fitting**

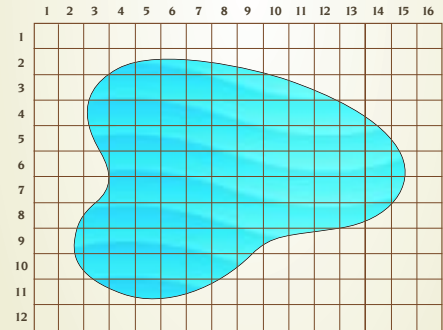
**OFX4000**



## ► to figure area and volume

This grid may be used to determine the surface square footage and the volume which you will need to determine the size of your pump.

1. Measure the length and width of your pond, and sketch the approximate shape on the grid. Each square represents 1 square foot.
2. Total the squares for your square footage.
3. Multiply square footage by the average depth (ft.) This is your cubic footage.
4. Multiply cubic footage by 7.5. The result is your liquid volume in gallons.



The pond sketched into the grid is approximately 105 sq. ft with an average depth of 1 1/2'. It will contain 1182 gallons of water.



**UVI Clarifier**

**PF1 Biofilter**



Back to pond

Use 1" inside diameter tubing to connect all components

Extra flow is diverted directly to waterfall or stream



**Flow Control Valve**

Adjust flow control valve so that flow to UV clarifier and filter is about 750 gph

**UVI Clarifier**



Use 1" ID tubing to connect clarifier to filter

**PF2 Biofilter**



Back to pond

**Reducer**



Reduce 1 1/4" tubing to 1" ID tubing

Extra flow is diverted directly to waterfall or stream



Adjust flow control valve so that 1,250 gph is discharged from filter

**PUV2500 Pressure Filter**



Back to pond

During backflush mode, dirty water can be discharged to garden

# ▶ guide to building your own system



- 1. How many gallons your pond holds** (see “to figure area and volume” on page 13).
- 2. Choose the proper size pump – three considerations:**
  - a. The 50% circulation rule – choose a pump that circulates a minimum of 50% of the pond volume per hour.
  - b. Determine the height and width of desired waterfall spillover (see page 17).
  - c. Choose a pump large enough to power your filter and UV clarifier (see page 17).
- 3. Measuring flow** - An easy way to check flow volume: simply time how long it takes (total seconds) to fill a 5-gallon bucket. Divide 3,600 by the total seconds, then multiply result by 5.  
Example:  $3600 \text{ (seconds in an hour)} \div 15 \text{ seconds (fill time)} \times 5 \text{ gallons (bucket size)} = 1200 \text{ gph (flow rate)}$
- 4. Choose biofilter type and size** - Gravity Flow or Pressure Filter (see “keeping your pond clean” on page 22 for more information on filter types).
- 5. Choose the proper size UV clarifier** (see chart on page 15).
- 6. Choose the proper hose diameter** - Use the largest inside diameter that equipment can accommodate to connect equipment. Equipment inlet/outlet sizes are listed right on the packaging. If you are in the pre-planning stages, visit our Web site at [www.tetra-fish.com](http://www.tetra-fish.com) for a complete listing of all TetraPond equipment specifications and capacities.
- 7. Determine hose length** - An easy way to determine length of tubing is to use a string to consecutively link the equipment (pump, filter, clarifier, etc.), follow the terrain and make the most direct path. Measure string for length. Always purchase an extra foot or two.
- 8. Determine if flow control valve, T-fittings and/or reducers will be needed** (see “tying it all together” at right).

## ▶ tying it all together

These essential items are readily available at your local hardware store or water garden center.

### Tubing

Flexible, kink-resistant tubing available in a variety of diameters to connect pump, biofilters, UV clarifiers, waterfalls and other water features.



### Hose clamps

to secure your hose connections.

### Teflon tape

To ensure a good seal on threaded connections.



### T-fitting

To divert water flow to a waterfall or piece of equipment.

### Reducer fitting

To connect hoses of different inside diameters.
































### Flow control valve

Adjustable valve used to increase or reduce water flow volume.

## ► matching the right equipment


Use this handy reference chart to help you match the proper pump to the proper filter/UV clarifier for your pond. Although your pond application may vary, this will give you the guidelines and ranges to help you make the combination that's right for you. If you are matching a pump with a flow greater than the flow of the other components, a control valve is recommended to reduce flow, or use in conjunction with a T-fitting to divert excess flow to a water feature.

		RECOMMENDED PUMPS							
									
<b>GRAVITY FILTER &amp; UV CLARIFIER COMBINATIONS</b>	<b>Recommended Pond Range</b>	<b>DynaMag 500</b> 500 gph max	<b>DynaMag 750</b> 750 gph max	<b>DynaTec 1100</b> 1100 gph max	<b>DynaTec 1500</b> 1500 gph max	<b>DynaTec 2250</b> 2250 gph max	<b>OFX2000</b> 2000 gph max	<b>OFX3000</b> 3000 gph max	<b>OFX4000</b> 3870 gph max
<b>PF1 Filter &amp; UV mini Clarifier</b> Filter: max flow 500 gph UV Max. flow 330 gph	100-660								
<b>PF1 Filter &amp; UV1 Clarifier</b> Filter: max flow 500 gph UV Max flow 900 gph	660-1200								
<b>PF2 Filter &amp; UV1 Clarifier</b> Filter: max flow 750 gph UV Max. flow 900 gph	1200-1800								
<b>PF3 Filter &amp; UV2 Clarifier</b> Filter: max flow 1000 gph UV Max. flow 2200 gph	1800-2400								
<b>PRESSURE FILTER COMBINATIONS</b>									
<b>PRF1500 Filter or PUV1500</b> *Filter: Max flow 750 gph	300-1500								
<b>PRF2500 Filter or PUV2500</b> *Filter: Max flow 1250 gph	1500-2500								
<b>PRF4000 Filter or PUV4000</b> *Filter: Max flow 2000 gph	2500-4000								

\*Expect approximately 40% flow loss through the pressure filter.

 No flow control valve needed

 Use the DynaMag flow control valve with these combinations

 Use an auxiliary flow control with these combinations