

ESTIMATING WATER VOLUME IN GALLONS

Knowing the amount of water in your water feature helps in determining the correct pond pump, pond filter, fish quantities and water treatments you will need for your koi pond or water garden.

Formula for determining water volume for a rectangular pond.

$$\text{Width} \times \text{Length} \times \text{Depth} = \text{Cubic Feet}$$
$$\text{Cubic Feet} \times 7.5 = \text{Gallons}$$

Formula for determining water volume for a circular pond.

$$\text{Radius} \times \text{Radius} \times 3.14 \times \text{Depth} = \text{Cubic Feet}$$
$$\text{Cubic Feet} \times 7.5 = \text{Gallons}$$

EXAMPLE: Your pond is 10' wide, 12' long and 2' deep at the deepest point. Lets place these numbers into the formula.

$$10 \times 12 \times 2 = 240 \text{ cubic feet} \quad 240 \times 7.5 = 1800 \text{ Gallons}$$

Your pond holds roughly 1800 gallons of water.

You can also use this formula when determining the size of the reservoir for a pondless waterfall.

HOW MUCH LINER DO YOU NEED?

Sometimes figuring out how much liner you need can be pretty complicated. Use this formula to determine the amount of liner you will need for your water feature. Always allow an extra 1.5' of overlap around the pond's perimeter. Include 3' in length & width.

Formula for determining the liner length

$$\text{Max Length} + \text{Twice the Depth} + 3 = \text{Liner Length}$$

Formula for determining the liner width

$$\text{Max Width} + \text{Twice the Depth} + 3 = \text{Liner Width}$$

EXAMPLE: Your pond is 12' long, 10' wide and 2' deep at the deepest point. Lets place these numbers into the formula.

$$12' + 2'(2) + 3' = 19' \quad 10' + 2'(2) + 3' = 17'$$

Your liner needs to be 19' long x 17' wide.

You can also use this formula when determining the size liner for the reservoir of a pondless waterfall.

DECIDING THE WATERFALL FLOW RATE

The waterfall flow rate is how much water is flowing over a waterfall or stream to achieve the desired affect. The more water that flows over the waterfall the louder the sound of running water will be.

- Light Flow = 100 gallons per hour (gph) per inch of spillway
- Medium Flow = 150 gph per inch of spillway
- High Flow = 200 gph per inch of spillway

Width of Spillway x Desired Flow Rate = Total GPH

EXAMPLE: You want your waterfall to have a 24" spillway

Light Flow24" Spillway x 100 gph = 2,400 gph

Medium Flow24" Spillway x 150 gph = 3,600 gph

Heavy Flow24" Spillway x 200 gph = 4,800 gph

You will need a pump that will be able to pump this much water at the height of the waterfall after it overcomes the head pressure.

SIZING A PUMP FOR YOUR WATERFALL

To determine the size pump you will need for your waterfall, you will need to know the waterfall flow rate, the length of tubing, the height of the waterfall, and the number of elbow & T fittings used.

Add 1' of head for every 10' of tubing and 1' of head for every elbow or T fitting used.

$$\frac{\text{Waterfall Height} + 1' \text{ of head per } 10' \text{ of hose} + \text{fittings}}{\text{Total Head Pressure}}$$

EXAMPLE: Your waterfall is 24" wide and requires 3,600 gph and is 4' above ground level and has 10' of tubing and 2 elbow fittings.

$$4' \text{ high} + 1' \text{ for tubing} + 2' \text{ for fittings} = 7' \text{ of head}$$

You will need a pump that provides 3,600 gph at 7' of head to achieve the desired effect of the waterfall or stream.

GET THE RIGHT SIZE TUBING

Only a certain amount of water can physically fit through any diameter of tubing. Despite the dimensions of the pumps discharge, tubing must be sized based on the amount of water required

Tubing Size	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"
Max Flow	300	720	1,200	2,000	3,000	4,800	6,000	9,000	12,000

SIZING YOUR STREAM OR WATERFALL RESERVOIR

A good rule of thumb for waterfall reservoirs is to make the reservoir 3 times the volume of the total water in the stream or waterfall.

EXAMPLE: Your stream is 3' wide and 20' long and has an average depth of 3". Use the water volume formula to get the total water volume of the stream and waterfall.

$$3' \text{ wide} \times 20' \text{ long} \times .25' \text{ depth} \times 7.5 = 112.5 \text{ gal. } 112.5 \times 3 = 337.5$$

Your stream or waterfall basin will need to hold 337.5 gal. of water.