

# Information Essential for Pump Sizing: "Flow Rate" and "Head"

## Flow Rate Is Easily Determined By One or All of the Following:

What is the width of the waterfall and how thick is the water going over the edge of the falls. (1/8", 1/4" etc... a 2' wide waterfall with a .5" thickness = 25.25 gpm)

The size of the pond and how often this water is circulated (3,000 gal pond re-circulated once per hour = a flow rate of 50 gpm.)

The gallons of a pond can be roughly estimated by:  $L \times W \times D \times 7.5 = \text{size in gallons.}$

**Next our goal is to determine the TDH (total dynamic head).** How much resistance does a flow of water need to overcome and still maintain a desired output.

**Static Head + Friction Head + Pressure Head = TOTAL DYNAMIC HEAD**

Static Head is the vertical height from the surface pond water to where it will discharge into the stream or waterfall.

Friction Head is the resistance to flow that is produced by the diameter of the pipe per 100' feet of pipe. It also increases by the number of fittings, valves, angles, and unions used in the run of pipe. (Flex hose is preferred by many; because, it helps to limit unnecessary friction loss.)

Pressure Head is the amount of resistance to flow as the water flows through an appliance like a bead filter or a UV light. This is an estimate based upon the system being built. Even the filter manufacturer does not offer this info so we are forced to guess from 10' – 15' for a large bead filter and 5' – 10' for the smaller types. (Remember, this is always increasing as the filter gets dirtier.) Usually going to the next larger pump solves this approximated value if the TDH is on or close to the limits of the pump curve.

## QUESTIONS TO ASK TO OBTAIN TDH

For Static Head ask for an estimation of this height in feet.

For Friction Head what is the pipe diameter being used and what is the total length of pipe in the combined supply and discharge pipe. It is also helpful to identify the number of 90' or 45' degree angles, check valves etc.

*Also, in most systems we never recommend pipe less than 2" in diameter. 2" is acceptable with flow rates of 100 gpm or less. For larger flow rates, 3" pipe is the recommended minimum. This will also help to eliminate increased friction loss due to particle build-up in the pipe over time.*

For Pressure Head what appliances and size are being used and how many. (Sand or bead filter, UV light etc.)