

WHITE PAPER**Pipe Sizing Part 3: The Suction Side**Introduction

Above Ground Pumps (AGP) have a suction side as well as a discharge side. Pipe sizing will affect how much lift the pump is seeing. All pumps have an NPSHR, Net Positive Suction Head Required, it is a little more apparent with an above ground pump.

Defining the Problem

NPSHR is the amount of head required by the pump to keep the fluid in a fluid state. In other words: Prevent cavitation. It is believed that most centrifugal AGP can lift water about 25 feet. But because of inherent losses there are other factors which affect the pump's ability to lift water. In another White Paper we stated that when water moves through a pipe there is friction that is caused by that movement. It is measured in feet of head which in pump language is energy.

To get water up the suction pipe takes a lower pressure at the eye of the impeller than over the surface of the water we are trying to move. Water always moves from areas of high pressure to areas of low pressure. That means that the higher pressure over the water will move the water from where it is to where we want it - at the pump. Like any other piece of pipe the suction pipe has friction loss as the water moves through it.

When you turn a pump on, get the water flowing through it, and then cut the flow of water at some point in the discharge, the pump will hit the maximum amount of pressure it can produce. We call that Shut Off Head. It is made up of two things: The pressure the pump produces, and the suction pressure.

Vertical lift makes up part of the suction side's "suction pressure." The other part is friction loss through the pipe. This means that the smaller the pipe, the more friction loss we will see, and the less vertical lift we can get from the pump without cavitation.

Solution

If we increase the size of our suction pipe there is less friction loss. That means it gives us more lift. The smaller the pipe, and the greater the flow, the more our pump is affected by friction loss.

A rule of thumb is: With fractional size (4" or smaller) pipe using a suction pipe that is two sizes larger than the pipe diameter at 5 FPS provides the most efficient use with the least friction loss. On the suction side this means more vertical lift. Overall, this makes the pump work easier and better. It is simply more efficient.