2190 Dagenais W, Laval (Quebec) H7L 5X9

1.800.361.1820 www.burcam.com

Welcome to the Burcam Learning Centre.

With this information, you can now improve your water pump technical knowledge.

In pump sizing, there are three important calculations to consider:

1. **Pressure (psi) vs Head (lift)**
2. **Friction loss in pipes**
3. **Flow vs Pressure**

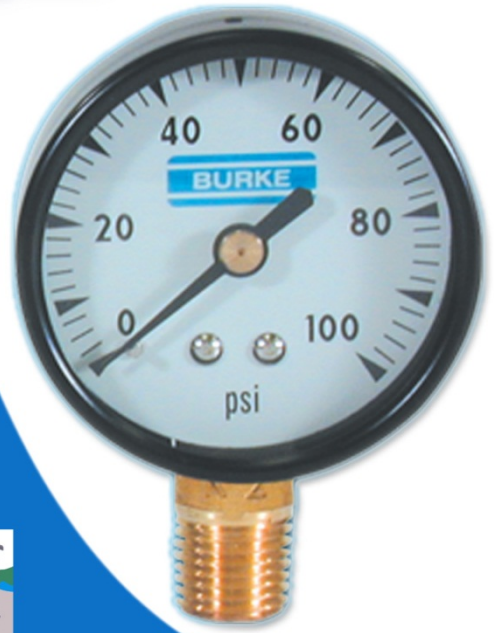
Once these are calculated, your pump selection is easy!

First Calculation

PSI vs Head

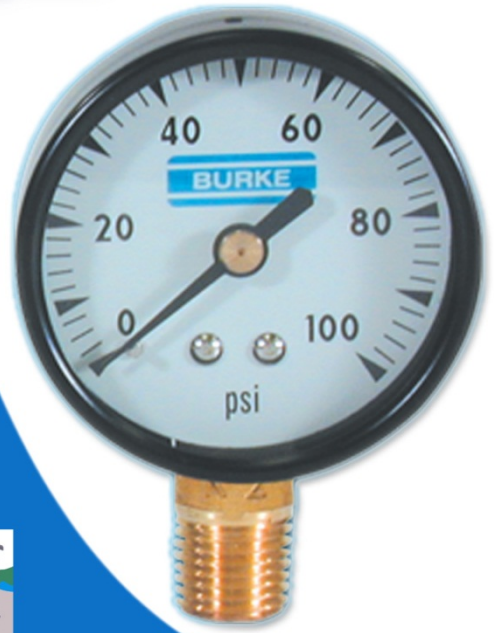
How high do you have to lift the water?

Head vs psi:



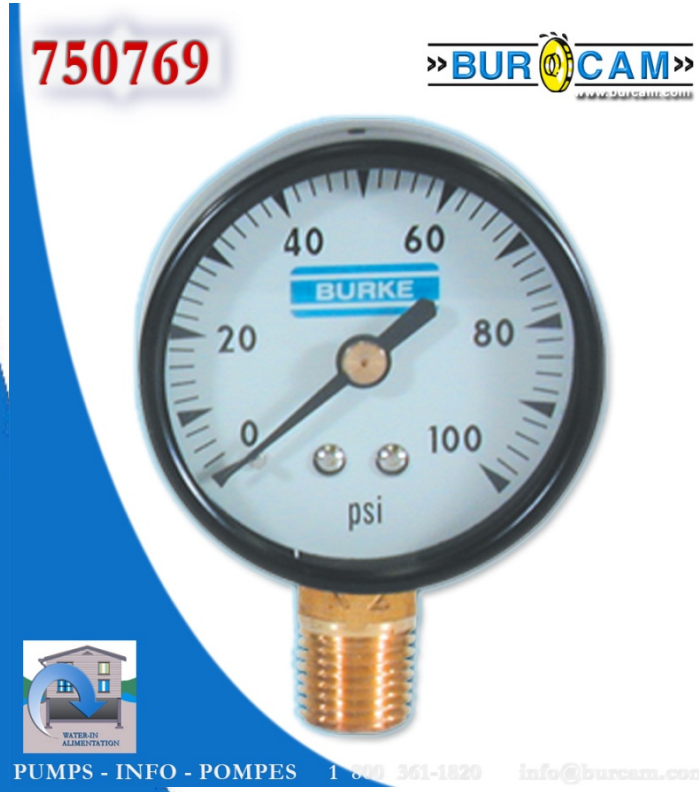
One of the most important accessory parts in a water system is the pressure gauge. It indicates the working pressure in the water system.

Head vs psi:



In any water system, it takes one pound per square inch (psi) of pressure to raise a column of water by 2.3 feet.

Head vs psi:

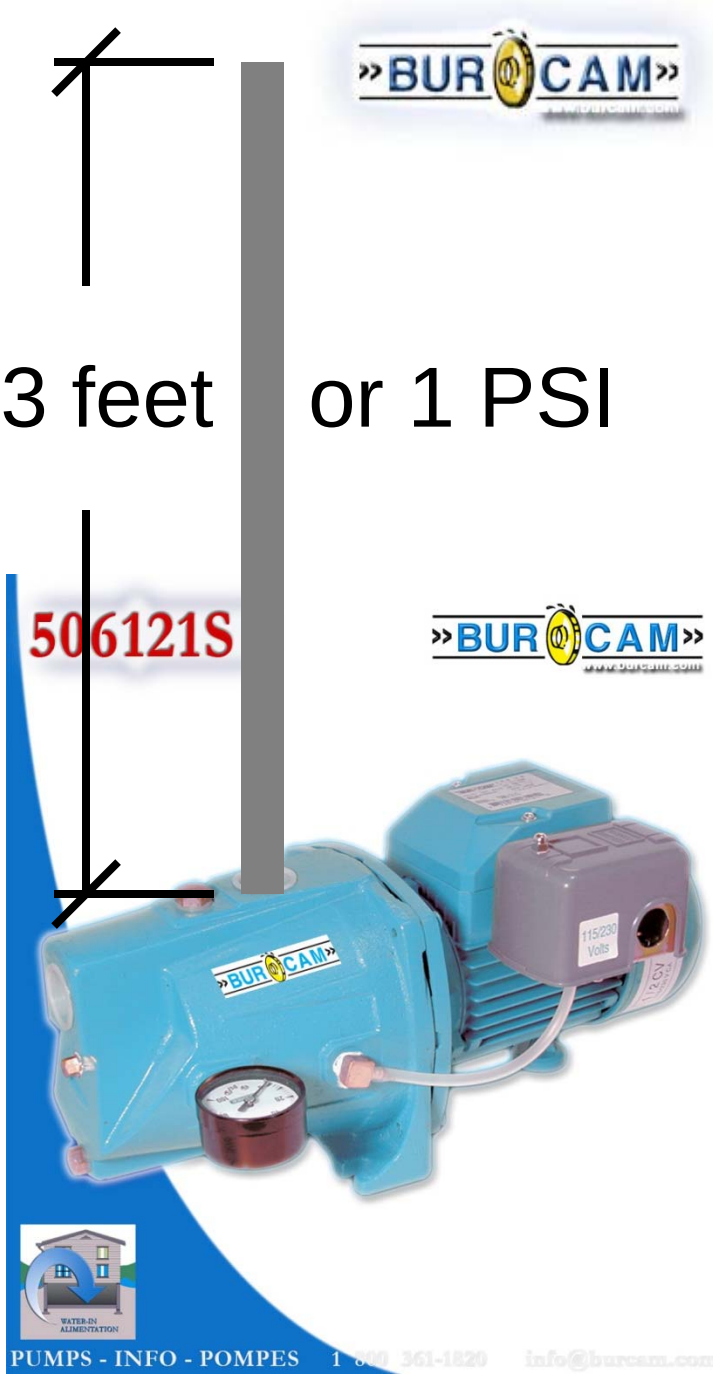


A pump that can generate 10 psi of pressure will raise/push the water up approximately 23 feet.

This is called the pump "Head".

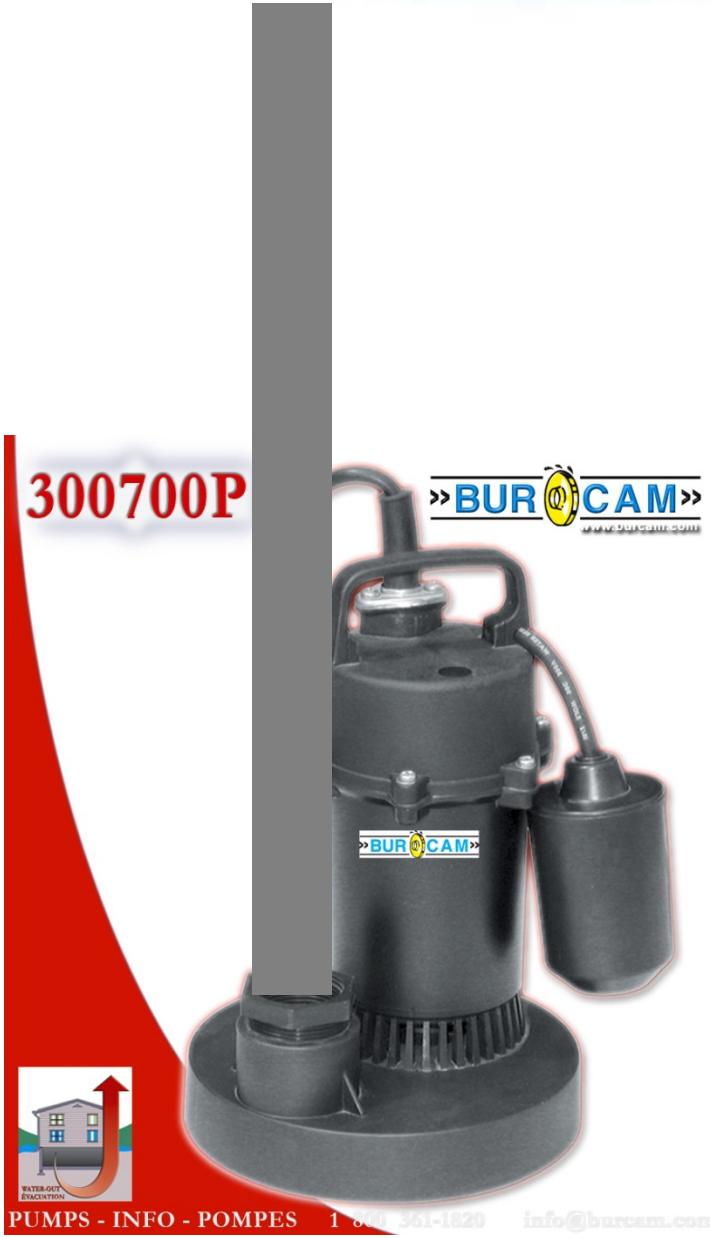
Head vs psi:

The pump head is calculated with a straight pipe, installed in a vertical position of the pump discharge, and is measured to the highest point the water must go.



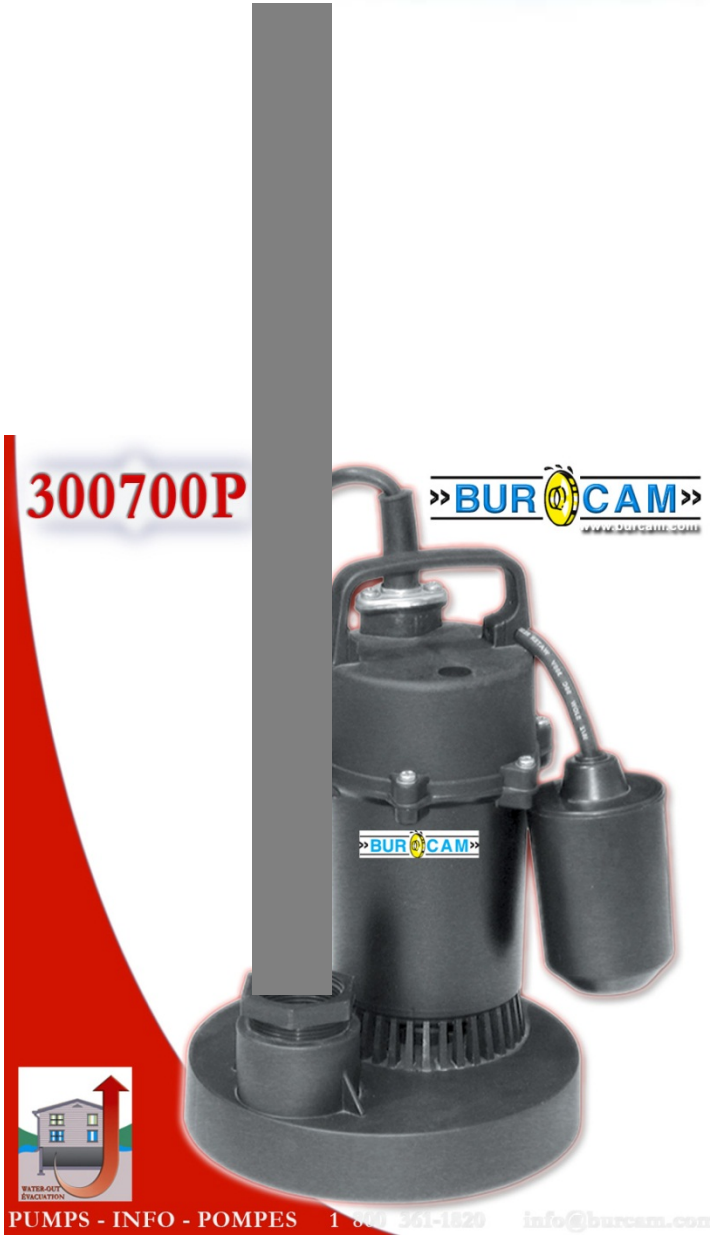
Head vs psi:

Calculating pump head is one of the most important technical details in sizing a sump or sewage pump application.



Head vs psi:

By measuring the vertical distance from the pump discharge to the highest point you want to push water will give you the calculation for head feet.



Second Calculation

Determining friction loss in piping

Friction Loss:

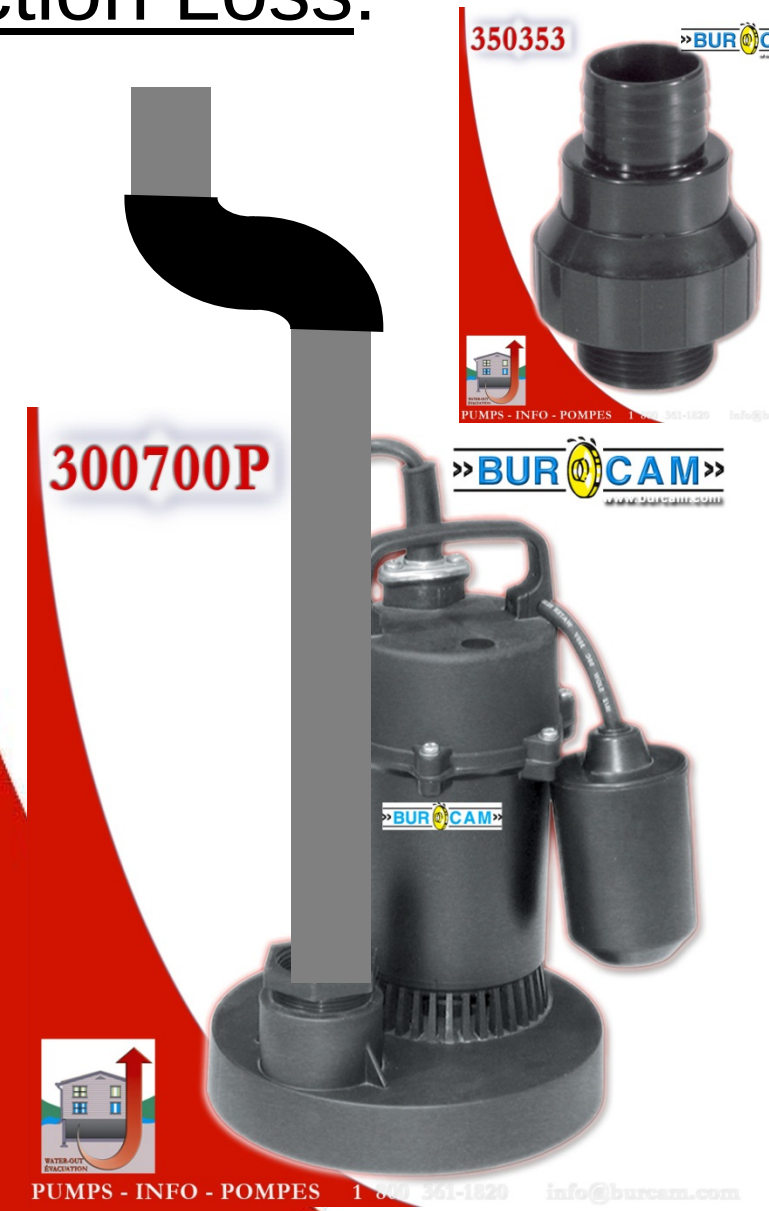
Calculating friction loss in piping is a combination of three factors:

- Friction of water on the pipe walls

- The flow volume

- The number of fittings in the pipe system

Friction Loss:



Restrictions are created by:

- check valves

- piping elbows

- any other type of fitting

- a length of horizontal pipe

Friction Loss:

In calculating friction loss, the following distances must be added to the pump head:

- each check valve - 1 foot

- each elbow - 1 foot

- any other type of fitting - 1 foot

- Horizontal pipe - 6 feet of head for every 20 feet of horizontal run

Friction Loss:

An important consideration in friction loss is the size of the suction and discharge pipe.

The smaller the pipe size, the greater the friction loss.

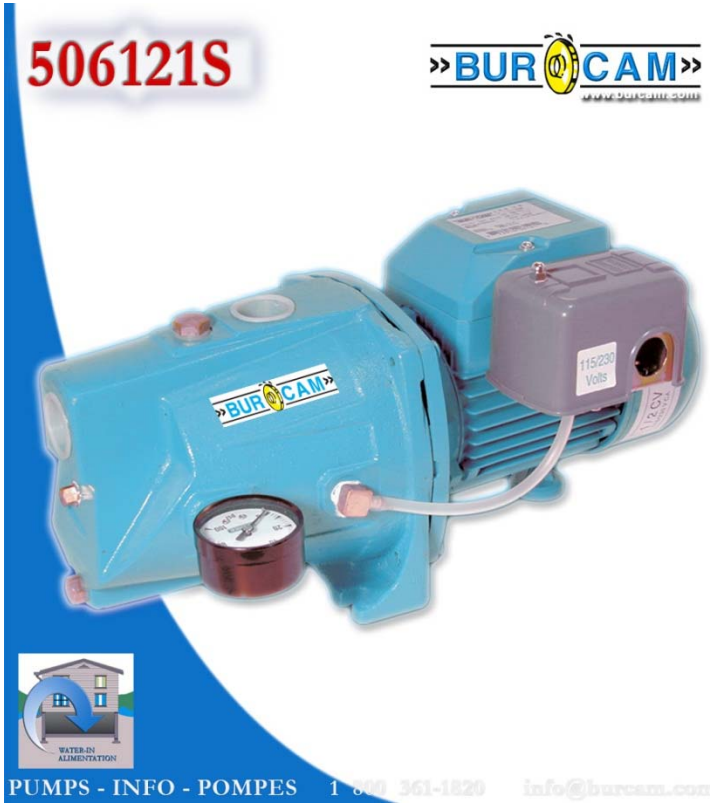
Friction Loss:

Increasing the pipe size reduces the friction loss and increases the pump's performance.

Friction Loss:

For this jet pump, a 1 inch pipe is required for both the suction and discharge.

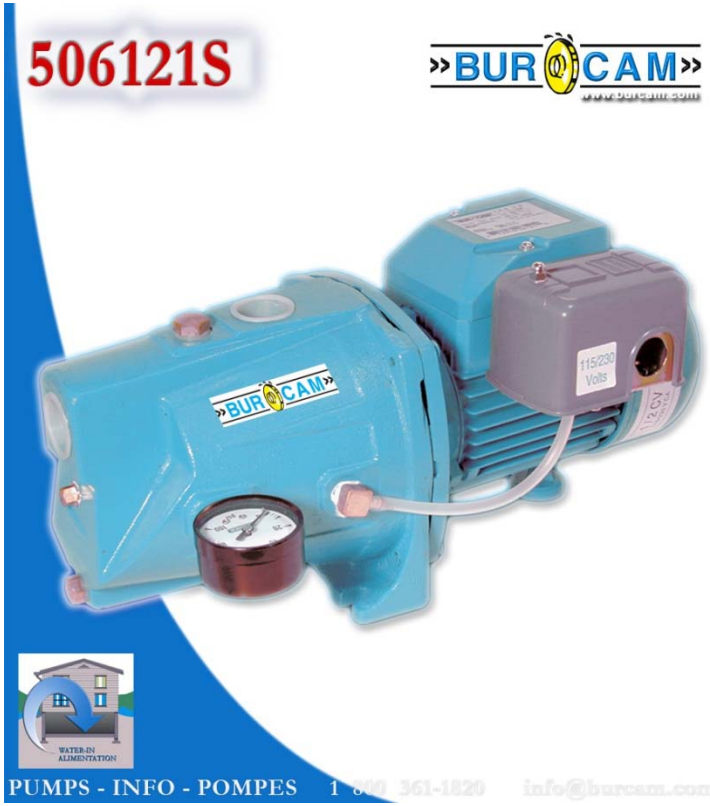
Installing a 3/4 inch pipe on the discharge side will reduce flow and pressure at the discharge point.



Friction Loss:

For this jet pump, the suction and discharge size is 1”.

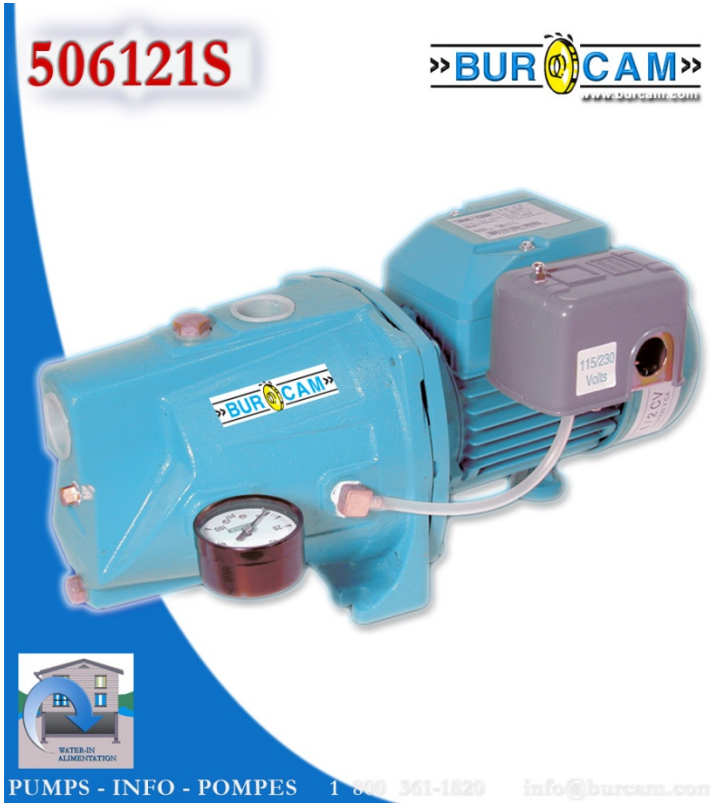
The best solution is to run a main distribution 1” pipe and reduce only at the tap.



Friction Loss:

The surface area of a pipe is equals to πr^2.

Lets review the relationship between the surface area and the pipe size.

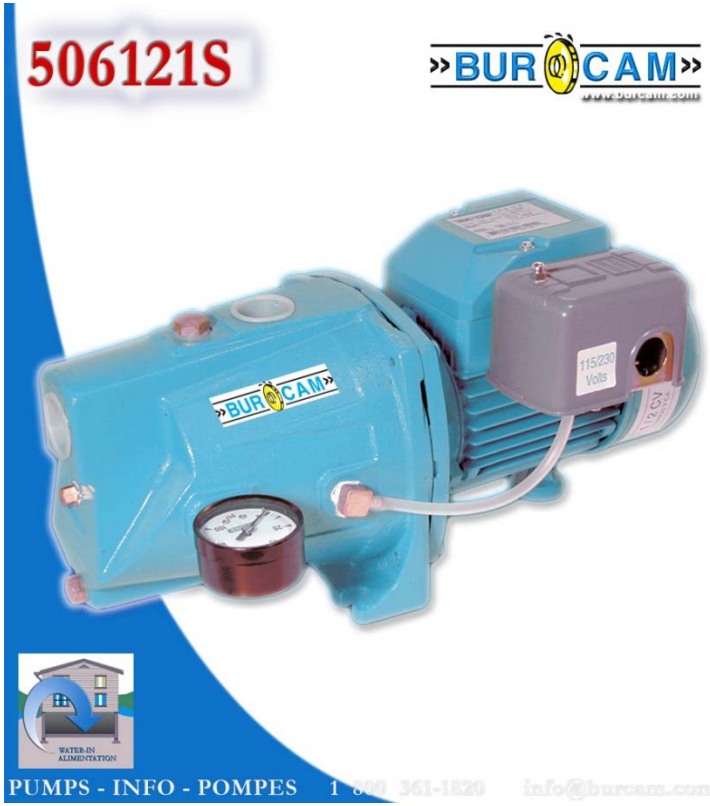


Friction Loss:

The surface area of a pipe is calculated using this formula: πr^2

Pipe size vs sq. inches.

1/2”	=	0.20	=	25%
3/4”	=	0.44	=	56%
1”	=	0.79	=	100%
1 1/4”	=	1.23	=	156%
1 1/2”	=	1.77	=	225%
2”	=	3.14	=	397%



Friction Loss:

For each application, using a smaller pipe size decreases the pump performance tremendously.

Conversely, increasing the pipe size reduces the friction loss.

Friction Loss:

The total head of the application is the addition of the vertical lift and the friction loss.

With this information, you can select the appropriate pump for your application.

Friction Loss:

Example

A consumer needs to lift water by 7 feet and has one check valve, two elbows and an 18 foot run of horizontal pipe.

Friction Loss:

Example

The calculation is:

7 foot for vertical lift, 1 foot for the check valve, 2 feet for the two elbows, 6 feet for the 18 foot run of horizontal pipe for a total real head of 16 feet.

Friction Loss:

Example

The pump performance chart at 16 feet will give you the performance to expect when using the proper sized pipe.

Friction Loss:

Most individuals don't understand the importance of proper pipe sizing and often buy a smaller pipe to save money.

By doing so, the investment in a particular pump, for specific performance, is partially lost in the pipe.

Third Calculation

Flow vs Pressure

Balancing your water needs

Flow vs Pressure:

The amount of pressure is in direct reversal to the amount of flow.

Increase the pressure and you reduce the flow.

Flow vs Pressure:

For example, using a garden hose, calculate the time to fill a bucket.

Then, install a nozzle to increase the pressure and calculate the time to fill the same bucket.

Flow vs Pressure:

By increasing the pressure with the nozzle, the flow will be reduced and it will take longer to fill the bucket.

You must calculate the required amount of flow in gallons/min and desired water pressure you need at the outlet.

Understanding the three basic concepts of pump performance will help you select the most suitable product to fit your application.

On behalf of the team who prepared this learning session, thank you for your attention.