

Monday, May 13, 2019

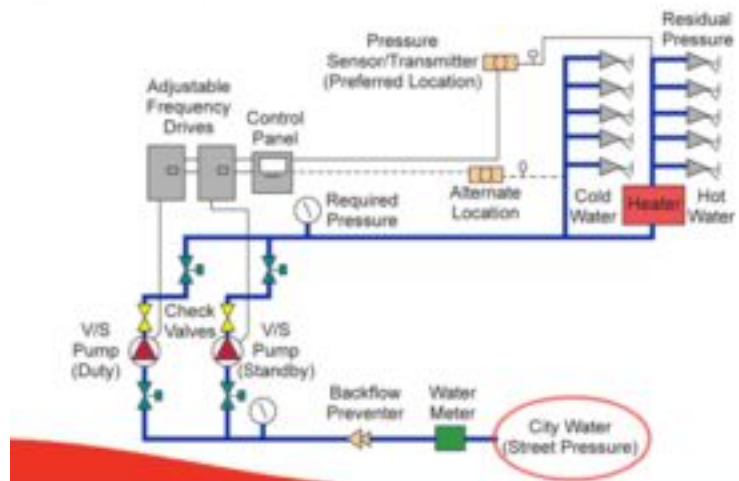
Domestic Water “Pressure Booster Pumping System” – Discharge Pressure

Monday Morning Minutes | by Norm Hall, May 13, 2019

A high rise building will require a pressure booster pumping system. This system includes the pumps and controls for proper operation and smooth pressure control. When sizing the system, it is normal to start by determining the flow rate just as you would in any plumbing design. The next calculation is the pressure required for the plumbing system to properly function. Today, let’s look at that discharge pressure.

Here is an example system to help illustrate the steps required. We believe we need a pressure booster system so let’s look at the pressure required. Once we have all the numbers we will use the R. L. Deppmann Plumbing Website to do the calculations.

Typical Water System Variable Speed Booster

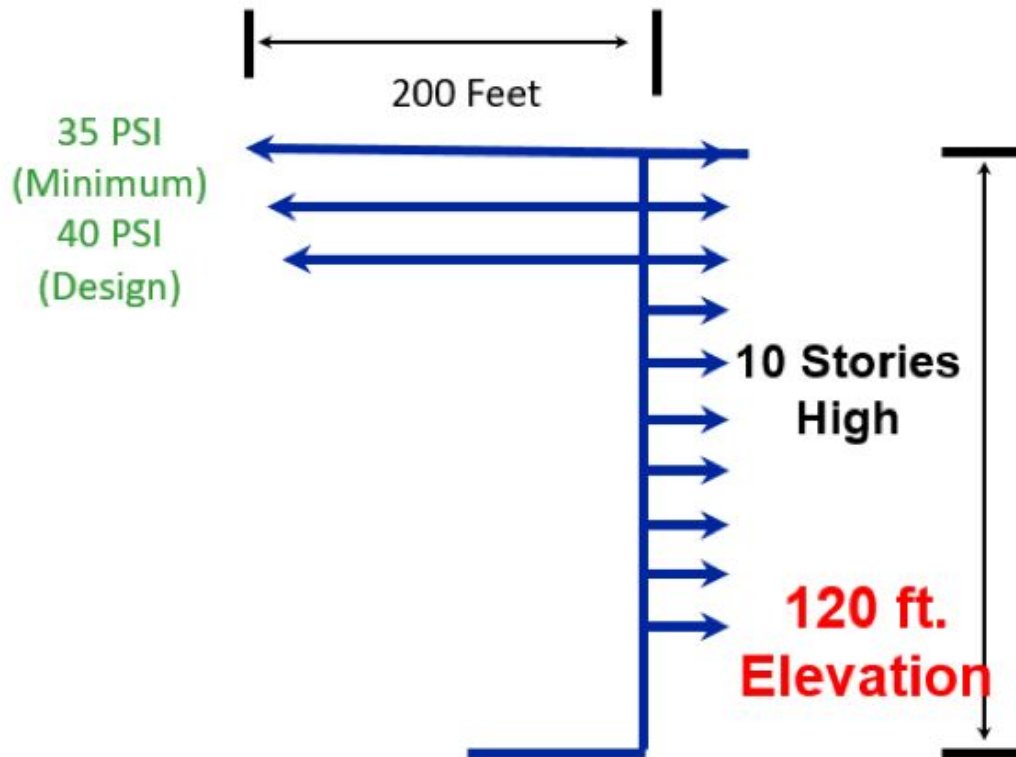


Fixture Pressure

The pressure required at the farthest plumbing fixture is a larger number today than it was 20 years ago. Today it is not unusual to require 30, 35, or even 40 PSIG for a proper flush. If there are multiple fixture brands allowed in your specification, you may want to define a minimum and maximum fixture pressure required so you have enough. Take a look at the products you specify and the pressure required. I tend to default to 35 PSIG minimum and 40 PSIG maximum required as a rule of thumb. The booster systems are variable speed so a few extra pounds will not cause too much of an energy loss.

Elevation and Friction Loss

Obviously, the pumping system has to have enough discharge pressure to lift the water to the top of the system. Along the way to the farthest fixture there will be friction loss in both the vertical and horizontal piping.



Look at the simple sketch above as our example. The elevation is 120 feet and the horizontal distance on each floor to the farthest fixture is 200 feet. Let's assume for this example that the 120 and 200 feet include fitting losses. You should include any fittings in the total developed length of the pipe. You will also need the friction loss per 100 feet used as the official standard for plumbing systems. We will use 3 PSIG per 100 feet in this example.

Additional Pressure Drop Devices

Once in a while, there is an additional pressure drop item in the discharge piping at the pump. An example of this is a pressure reducing valve or PRV. I am not talking about the zone PRVs we use to reduce the pressure at the lower floors. This would be a PRV in the main at the discharge of the pumping system.

Most codes today require the pressure booster to be variable speed. The ASHRAE 90.1 energy standard specifically says not to use pressure reducing valves unless they are needed as a safety device. If you use bypass electrical starters in your design, you can assume someone will use the bypass and the system will be constant speed when they do. There will need to be some means of controlling the pressure in this situation. I don't recommend using bypass starters, but once in a while they are used so you would have to account for the pressure drop added by PRV.

Using the R. L. Deppmann Pressure Booster Tool

If you go to our website plumbing page at the link above, you can enter your project information in the "engineering selection tool" we offer. The screenshot below shows all of the example information included. There is also a short video showing how to use the tool.

For help with this or any selection please contact your local B&G representative bellgossett.com/representatives

Pressure Booster

[Help](#)

Pressure Booster

The following section may be used to calculate the inlet and outlet conditions for the pressure boosters. It includes minimum and maximum so you may review the advantages of variable speed vs. constant. Developed by Norm Hall of RL Deppmann, <http://www.deppmann.com/>

Discharge Items		Input	Units
A	Absolute Minimum Pressure required in PSIG at the farthest fixture or process. (This is used for variable speed savings calcs. So make it minimum with no safety factor)	35	PSIG
B	Design Pressure required in PSIG at the farthest fixture or process (This is the pressure you want at the fixture including any safety factor)	40	PSIG
C	Elevation of the system from booster pump discharge to top fixture in feet (This is the lift)	120	FEET
D	Horizontal piping distance to farthest fixture or process (This is used for friction drop calcs. It should be the longest horizontal run out to a fixture. Only do this for one floor)	200	FEET
E	Friction loss that you use for pipe sizing. (suggest 5 PSIG per 100 feet if you are not sure)	3	PSIG
F	Total Pressure drop in PSIG of equipment on discharge of the booster. (THIS IS A VERY RARE example, Backflow preventor on the pump discharge with total flow through it, mixing valve, process heat exchanger.)	0	PSIG

Pressure Booster Pumping System walk ...
"Better" Pressure Boosters

Bell & Gossett Model "TechnoForce e-HV" Booster Package

Welcome to the cost-effective TechnoForce e-HV Booster Package from B&G, a larger domestic water pressure booster with all of the features of the "Good" selection (Bell & Gossett and Goulds Water Technology Aquabost Pressure Booster Package) plus more. Up to 4 higher efficiency multistage pumps. This system is for the larger plumbing systems up to and over 10 stories. Tighter PLC controls give smooth operation and constant pressure.

This system is designed with the building owner in mind. Easy start menus and diagnostics through a LCD panel. **Exclusive Multi-Master Control** feature allows duplex units to continue operation if one pump or its control fails. The system is able to continue to function while a pump is being repaired. Motors are not proprietary allowing purchase locally and faster delivery. Pump seals are replaced without moving the motor.

Cost Range

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Features/Highlights

- Multiple BMS communication types
- Single point wiring connection with fused disconnect and separate pump circuit breakers
- Variable speed energy saving meets ASHRAE 90.1-2013 energy standards
- Standard low suction pressure cutoff

Capacity Ranges

Hydraulic Performance Range

Optional Accessories

1. Bell & Gossett No Flow Shutdown Tank. We recommend this tank for steady pressure operation at low or no flow rate.
2. Signal splitters for use of remote mounting of pressure transducers
3. Metraflex flexible pipe connectors: bronze braided copper sweat series (BBSC 2", 3"); stainless steel flanged series (MINI 4", 6").

Additional Information

- [Click here](#) to learn more about TechnoForce e-HV
- [Learn more about Understanding Domestic Water Booster Systems and Discharge Pressure](#)

Next week the R. L. Deppmann Monday Morning Minute will look at the suction side of the pressure booster pumping system.