

TECH TIPS

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TECH TIPS BY NASSCO IS A BI-MONTHLY ARTICLE ON TRENDS, BEST PRACTICES AND INDUSTRY ADVICE FROM NASSCO'S TRENCHLESS TECHNOLOGY MEMBERSHIP PROFESSIONALS.

FLOWS VERSUS PRESSURES IN SEWER CLEANING

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Without a doubt, the most misunderstood facet of sewer cleaning is the relationship between flows and pressures. Generally, pressure is mistakenly viewed as the wildcard or the reason for concern, and flow is usually ignored. Operators often misunderstand the operation of their pump, the relationship to hose diameter and length to performance and other variables of jetting. A knowledgeable sewer equipment operator should know several things about the equipment being used and the lines to be cleaned:

GPM (GALLONS PER MINUTE) OF THE PUMP

What is the total output capacity of the pump on board? How long can a machine jet before being out of water? If a pump operates at a max of sixty (60) gallons per minute, and the truck being used has a fifteen hundred (1,500) gallon water tank, then the answer is twenty-five (25) minutes, i.e. $1500/60 = 25$.

PSI (POUNDS PER SQUARE INCH) PRESSURE RATING OF THE PUMP

How is the pump on board rated to operate in a pressure range up to a maximum pounds of pressure (there are safety factors built in, but it is not wise to exceed the manufacturer's designed operating pressure)? It should be noted that a pump does not create pressure (this is done by the nozzle and how it restricts flow at the end of the hose), it only creates flow.

HOSE DIAMETER, HOSE LENGTH, AND PRESSURE RATING THE JETTER HOSE

What is the diameter hose being used? Half inch (1/2") systems have a greater pressure loss per hundred feet than a three quarter inch (3/4") system, and so on. Further, how much hose does the jetter have on board? A jetter with a four hundred foot (400') hose experiences far less pressure loss per hundred feet than a jetter with an eight hundred foot (800') hose, etc. Finally, what is the pressure rating of the hose being used? Sewer hoses are color-coded to indicate operating pressures.

DIAMETER AND OTHER CHARACTERISTICS OF THE PIPE

What is the pertinent information about the pipe being cleaned, including type of pipe, diameter, slope, and condition of the conduit? Eight inch (8") pipe should be cleaned with less flow in GPM than fifteen inch (15") pipe. Flat pipe will flow more slowly than pipe on a steeper grade, so minimizing GPM on flat grades is a good idea. Finally, clay pipe with severe cracking should be cleaned with lower PSI (and narrower angles on the nozzle), than concrete pipe in relatively good condition.

Armed with this information, an operator is ready to begin the cleaning process. The general rule of thumb in jetting and cleaning is this: *In smaller pipe, pressure is more important than flow; in larger pipe, flow is more important than pressure.* Here is how it works:

Pressure in PSI is a measure of force applied to the pipe wall. Pressure produces a scouring effect and is important in "stirring up" debris for removal. Smaller jettors typically operate at high pressures,

THE GENERAL RULE OF THUMB IN JETTING AND CLEANING IS THIS: IN SMALLER PIPE, PRESSURE IS MORE IMPORTANT THAN FLOW; IN LARGER PIPE, FLOW IS MORE IMPORTANT THAN PRESSURE.

for example, most 1/2" system operate at up to four thousand (4,000) PSI. Larger jettors and combo trucks typically operate at half that pressure range, i.e. two thousand (2,000) PSI.

GPM is a measure of flow induced into the pipe to move debris. Pipe of any diameter has a finite capacity to store or hold water (debris loads and defects only reduce that storage ability). Small, high pressure jettors typically don't exceed twenty five (25) GPM and clean small pipes effectively. Large jettors and combo machines can operate at eighty (80) GPM or higher and clean large pipes effectively,

In general, GPM and PSI required are diameter driven. Smaller pipes require more pressure and less flow. Larger pipes require more flow and less pressure.

Finally, a word on the dreaded "blown toilet" is necessary. If you ask ten people in the sewer industry why they blow toilets, eight will reply "too much pressure was used". *WRONG! The correct answer is too much flow was used in the pipe.* For example: an eight inch (8") pipe twenty feet (20') long can only hold thirty (30) gallons of water. Adding debris loads and defects (sags, bellies, etc.), limiting a pipe's ability to discharge water (flat slope), plus inducing huge volumes of water and air that are generated by a cleaning nozzle only increase the likelihood that a backup will occur and the dreaded "blown toilet" will occur.

For more information, go to www.nassco.org and order the *Jetter Code of Practice*.