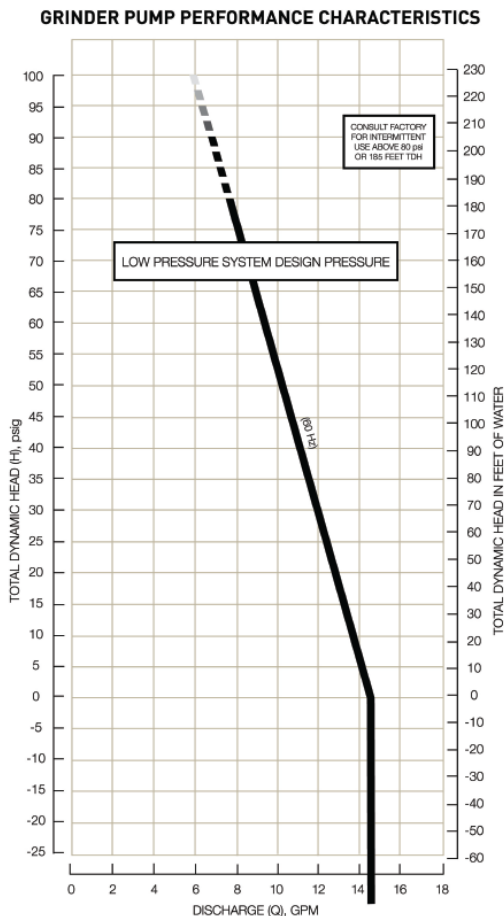


Can Low Pressure Grinder Pumps Discharge to Gravity Laterals?

We recently had a question regarding the impacts of a grinder pump discharging to a gravity sewer lateral.

The concern was that the flow rate or force of discharge would scour the receiving pipeline too much and cause damage. While E/One grinder pumps can operate at continuous duty heads of 185 feet or 80 psi; the short answer to the question - no we will not damage the pipeline.



Let's look at the hydraulics. The flow rate through an LPS pump is somewhere between 8 and 15 gpm from our performance curve (shown left). Discharge from a DH071 simplex station will be at 8 gallon intervals. Discharge is through a 1-1/4 to 1-1/2 inch lateral sized to provide proper scouring velocity in the lateral.

Using the Hazen Williams formula we can determine the proper pipe size to obtain a velocity in the lateral of 2 feet per second or greater.

Head Loss Calculations
 From Modified Hazen - Williams Formula

$$H_f = .2083 \left[\left(\frac{100}{C} \right)^{1.852} \times \frac{q^{1.852}}{d^{4.8655}} \right]$$

$$V = .3208 \frac{q}{A}$$

$$A = \frac{d^2 \pi}{4} = \text{cross-sectional flow, sq. in.}$$

C = 150

q = flow in gallons per minute

d = I.D. of pipe in inches =

[average O.D. - (2 x min. wall thickness)]

For our comparison we selected at 1-1/4 inch SDR 11 HDPE pipe and assumed a 20 foot lift to the gravity sewer lateral. We used a 6-inch SDR 35 sewer lateral to connect the final discharge of the grinder pump.

Velocity in the LPS lateral = 3.10 fps at a TDH of 21.47 feet with a flow rate of 14 gpm. The pipe inside area is 1.77 sq. in. The operating conditions in the LPS lateral are ideal.

So what happens at the gravity lateral? The inside area of the SDR 35 line is 27.48 sq. in. The area is 15.5 times larger than the LPS service line. Velocity will drop

dramatically when this controlled pump rate enters the gravity lateral and the energy from the LPS line will be spread out over the larger area.

You can try this at home. Take a garden hose with a pressure nozzle and feel the force of the water at the smallest stream setting. Take the hose nozzle off and feel the difference of the flow rate from an open hose. Now lay the hose on the driveway and watch the water spread out across the flat surface. You will see that the force is spread out and that the flow becomes far gentler.

Your gravity sewer lateral will be fine

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