GRIFFIN

THE DRAWDOWN

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What is Wellpoint Dewatering?

Wellpoint dewatering is one of the most common systems used in shallow construction dewatering processes. A wellpoint dewatering system is a versatile, cost-effective, pre-drainage solution that features individual wellpoints which are closely spaced around the excavation. The technique utilizes vacuum to assist in lowering groundwater levels to create a stable, dry working environment.

History of Wellpoints

The use of this type of system dates back over 100 years to the days of steam pumps. One of the first relatively large projects took place in the Hammond-Gary portion of Northern Indiana during a sewer line construction project. The system consisted of a series of 1.25” diameter drive-type wellpoints jetted into the ground utilizing a jet pipe. Individual wellpoints were connected to 3” and 4” header lines (manifolds) and multiple plunger pumps.

Over the last 100 years, advances in wellpoint installation methods, screen and casing design/materials and pumping equipment have significantly increased the efficiency of this common dewatering method. Improvements in pumping equipment have led to pumps that can handle large volumes of both air and water. Customary installation methods for wellpoints include self-jetting, hand jetting and mechanical jetting utilizing a steel casing.

Pumping Principles - How Wellpoints Work

Let’s now focus on how a single wellpoint works. A wellpoint is typically a small diameter (1.50”) PVC well. An inch and a half well is too small for a submersible pump; so how is the water removed? Rather than do a bunch of math and physics let’s look at illustrations.

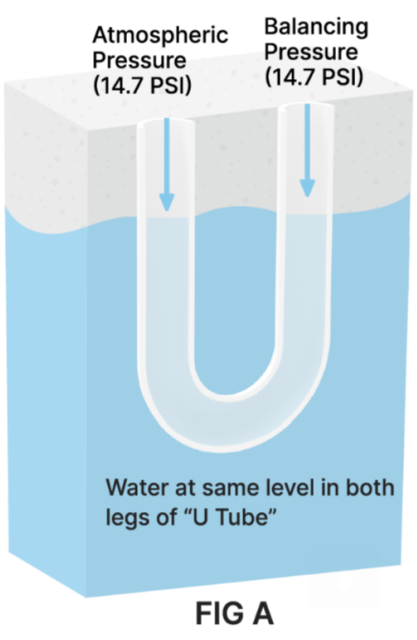

FIG A

- **FIG A** is an example of a u-shaped tube, buried in the ground into which water has been poured.
- The water seeks its own level & will stand at the same height in both legs of the tube. This is because atmospheric pressure (14.7 psi at sea level) is pushing on both sides of the tube as indicated by the blue arrows.

- In the next step we extend one leg of the tube & connect it to a wellpoint pump which draws air from the leg of the tube **FIG B.**

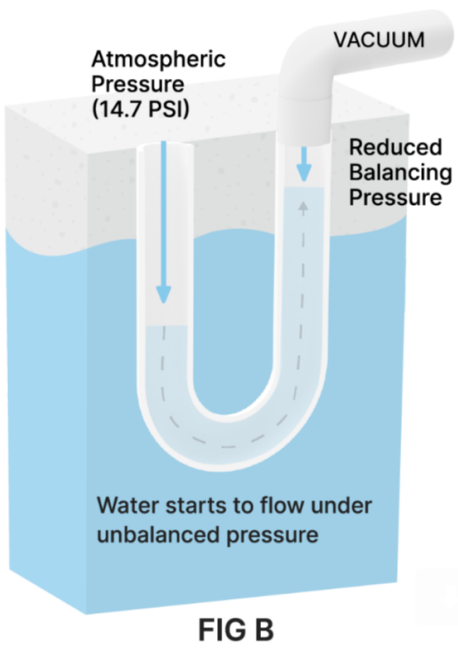

FIG B

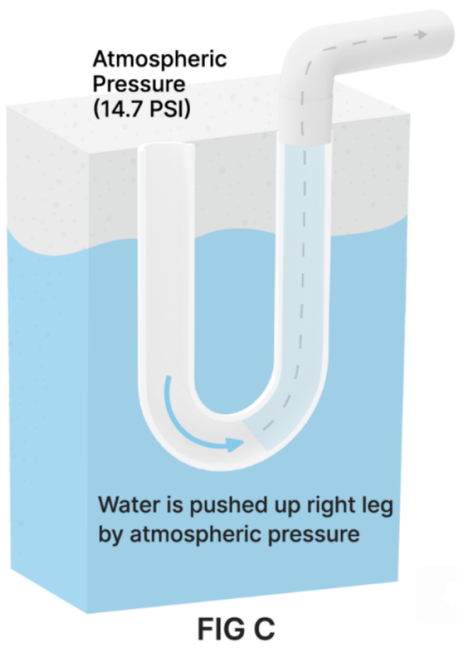

FIG C

- Once the air is removed, the balancing pressure is reduced & the atmospheric pressure in the left leg pushes the water (practically incompressible) up in the right leg- **FIG C.**
- The vertical distance the water must be pushed is measured from the level of the water supply up, to the center line of the pump impeller; this is commonly called the “SUCTION Lift”. In reality, the water is not lifted, but pushed by atmospheric pressure.

As detailed above, atmospheric pressure is the only force that will permit a wellpoint system to pump water. We must follow the laws of nature, or this great force will not work. When we play with math and physics, at sea level, with perfect vacuum and no friction losses in the system, the theoretical maximum suction lift is about 34’ or 10.33 meters.

Now we all know that a wellpoint pump can’t generate a perfect vacuum and that friction losses occur along the above ground swing joints and header lines. Other detriments to our perfect system include air leaks in the piping and even friction loss from the groundwater flowing into the wellpoint screen.

At Griffin, our rule of thumb is that maximum lift from a wellpoint system at sea level is about 18'. Now remember, thumbs and rules can be broken… it may be possible to have more than 18' of lift in certain situations and possibly less. Speaking of less, let's remember the driving force of suction lift is atmospheric pressure and that changes based on elevation.

The industry common conversion is that for each 1,000' in elevation gain you lose about 1' of suction lift; so, a wellpoint system in Vail, CO will have significantly less lift than a system in Fort Myers, FL.

We discussed a brief history of wellpoints and how water is “pumped” from this type of dewatering system. But many questions remain about this most common type of dewatering operation such as: how are wellpoints installed in the ground and how can a wellpoint system remove water from an excavation 60’ deep if the maximum lift is only 18’? **Stay tuned for future issues of *The Drawdown* when we discuss these and other burning questions about construction dewatering.**

News Alert! Griffin Acquires Pump & Integrity

Griffin Dewatering has acquired the Pump & Integrity Rental segment (“Pump & Integrity”) of Cross Country Infrastructure Services.

Originally founded in 1978, Pump & Integrity is a leading specialty pump & equipment rental and solutions provider serving customers in the industrial, commercial, construction, and energy & renewables end markets. Pump & Integrity’s fleet of rental pumps, ancillary equipment, and operational and technical expertise provides mission-critical pump-based systems and solutions across various applications, including water transfer, bypass & pipeline maintenance.

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