

Groundwater Pumping Terminology

Head of Water

Head of Water is the distance between the top of a borehole until the water level. This is therefore the distance that the pump must "lift" the water. This concept is important because it is used to determine whether a pump is suitable and will perform correctly. So a peristaltic pump, for example, can only pump up to 10 metres head of water but if can, theoretically, tubing and other practicalities permitting, and so long as the head of water does not exceed 10 metres, quite easily pump from any depth.

Peristaltic Pumps

Peristaltic Pumps for groundwater sampling are usually battery operated. They have a number of rotating stainless steel rollers which compress a highly elastic tube made of silicone or other inert material creating a vacuum which "sucks" liquid. This type of pump cannot raise water from depths greater than 10 metres head of water. Because a peristaltic pump works by 'under-pressure' it can increase volatilisation of organic compounds so when measuring VOC's (Volatile Organic Compounds) please remember that these will be UNDER-stated when sampled with this type of pump.

Peristaltic pumps have proved themselves by virtue of their ease of use and versatility and they have one of the best REPEATABILITY of results. They should be seen as a favourite pump for low-flow sampling.

Caution: Peristaltic pump tubing is NOT interchangeable. Rollers work to a precise tolerance and damage will occur if the wrong tubing is used.

Footvalve Pumps

Inertial or Footvalve Pumps are small stainless steel, nylon or plastic tubes which contain a ball bearing which acts as a valve. The footvalves are connected to a polyethylene sampling tube and lowered into a well. The tube is raised and lowered with regular, short, smooth strokes which raises or drops the ball bearing valve, forcing the water to the surface.

Footvalve pumps are very powerful and can pump from great depths depending on the energy of the operator. Jerky movement prevents these pumps from being very useful when connected to flow-through cells, filters or water quality meters. Motorised activators are available but as these are petrol driven their use on sites for environmental monitoring is questionable.

Impeller Pumps

Impeller Pumps are the most common types of pumps and use electricity; either from a battery, generator or mains to spin an impeller at great speed, forcing the water to the surface. Some impeller pumps are very powerful and can pump from 100 metres and deeper. Impeller pumps are power hungry and intolerant of (suspended) sediments which will inevitably cause damage.

Bladder Pumps

Bladder Pumps have often and justifiably been called the ideal low-flow sampling pumps. Air pressure from a compressor or cylinder activates a polyethylene or Teflon sleeve (the bladder) which forces the water to the surface. The air is either inside or outside of the bladder and is never in contact with the sample. These are powerful pumps capable of sampling from depths up to 100 metres. Their low sample volume precludes them from being used for well development or purging.

Total Fluid Pumps

Total Fluid Pumps are powerful pumps and as the name implies can move water or product up to the viscosity of gearbox oils from depths up to 100 metres and beyond. Like a bladder pump, the sample is forced to the surface by air, supplied by a compressor. Total Fluid Pumps are used for well development and purging as they are not affected by suspended sediments. Because the air is in contact with the fluid these pumps should not be used for sampling.