Water Distribution Pumps

Different types of applications require different types of pumps. Pumps are selected based on system requirements, discharge pressure required, flow capacity required, and availability of space. The types of pumps most often found in water distribution systems are: centrifugal pumps, vertical turbine pumps and submersible pumps.

Centrifugal pumps are the most common type used in water distribution. Centrifugal pumps have a circular "fan/turbine shaped" structure called an impeller that is mounted on a centrally supported structure call the shaft. The motor rotates the shaft and can be powered by electricity or diesel fuel. Water enters at an opening in the center called the suction. The rotating impeller imparts a high velocity to the water, and it is circulated and thrown outward.

Vertical turbine pumps are most often used at raw water intakes and at booster stations in the distribution system. In vertical turbine pumps, the water flows vertically through a channel or uniform cross-sectional area. The impeller is positioned in the center along the axis and the blades of the impeller are shaped so that the water flows in a radial direction.

Submersible pumps are placed below the water level and are used mostly for pumping groundwater from wells. The pump is basically a multi-stage centrifugal pump and the impellers of the pump are mounted on a vertical shaft. The pump is driven by an electric motor placed adjacent to the pump and is constructed for submerged operation.

Type	Advantages	Disadvantages
Centrifugal Pumps	• Wide range of capacities • Uniform flow at constant speed and head • Low to moderate initial cost • Simple construction • Ability to adapt to several drive types – motor, engine, or turbine • Moderate to high efficiency at optimal operation • No need for internal lubrication	• Efficiency is limited to a narrow range of discharge flows and heads • Low capacity that is greatly dependent on discharge pressure • Generally no self-priming ability • Potential for impeller to be damaged by abrasive matter in water
Vertical Turbine Pumps	• Uniform flow at constant speed and head • Simple construction • Low noise level • Small footprint • Ability to adapt to several drive types – motor, engine, or turbine • Moderate to high efficiency at optimal operation	• High initial cost • High repair costs • Efficiency is limited to a narrow range of discharge flows and heads • Inability to pump water containing any suspended matter

Common Suppliers

- National Rural Water Association Online Buyer's Guide - http://nrwa.officialbuyersguide.net/

Water Distribution Pumps (continued)

Source

- National Drinking Water Clearinghouse – Tech Brief 2009, "Pumps"
  http://www.nesc.wvu.edu/pdf/dw/publications/ontap/2009_tb/pumps_DWFSOM56.pdf

Other Links

- National Environmental Services Center. "Reading Centrigual Pump Curves"
  http://www.nesc.wvu.edu/pdf/DW/publications/ontap/tech_brief/TB55_PumpCurves.pdf
- National Drinking Water Clearing House. "Water Hammer"
  http://www.nesc.wvu.edu/pdf/dw/publications/ontap/2009_tb/water_hammer_DWFSOM27.pdf

Chemical Dosing Pumps

Positive-displacement pumps are used in water supply operations for feeding chemicals at various stages of the treatment process. There are two types of positive-displacement pumps: reciprocating pumps and rotary pumps. Reciprocating pumps have a piston that moves back and forth in an enclosing cylinder. The arrangement pushes the fluid in the cylinder through check valves. Rotary pumps have an impeller that rotates within an enclosed structure and imparts energy to the water. The impeller can be in the shape of a gear, screw, or lobes.

Type	Advantages	Disadvantages
Reciprocating Pumps	• Suitable for applications where high pressure is required • Suitable for abrasive fluids, such as acids or viscous liquids	• Pulsating flow • Mechanical parts are prone to wear
Rotary Pumps	• Suitable for handling fluids of varying viscosities • Continuous and smooth operation	• Slippage can occur at higher pressures • Can jam if any solids enter the small clearance spaces between the impeller and casing

Common Suppliers

- National Rural Water Association Online Buyer's Guide - http://nrwa.officialbuyersguide.net/

Source

- National Drinking Water Clearinghouse – Tech Brief 2009, "Pumps"
  http://www.nesc.wvu.edu/pdf/dw/publications/ontap/2009_tb/pumps_DWFSOM56.pdf

Other Links

- National Environmental Services Center. "Calibrating Liquid Feed Pumps"
  http://www.nesc.wvu.edu/pdf/dw/publications/ontap/2009_tb/calibrating_pumps_DWFSOM105.pdf