

Improving Pump Performance in the Handling of Heavy Sludge and Solids-Laden Slurries



The Pump People®

Pumping dense sludge and high solids-content slurries has always pushed the performance limits of even the most robust rotary equipment. Now the benchmark has been pushed even higher with the introduction of a new generation of sludge and slurry handling pumps, the most recent being SludgeKat™ from Gorman-Rupp Pumps.

Pumps, centrifuges and other rotary equipment, critical to keeping production moving in industrial, manufacturing and municipal operations, are frequently subjected to extremely demanding conditions.

When heavy sludge or solids-laden slurries are pumped in industries like oil and gas, mining and wastewater treatment, where hydrocarbons, and inorganic solids like rock, sand, rust and heavy metal oxides are being transported, these challenges can place exceptional demands on pump performance, resulting in a high incidence of interruption and repairs, impacting production throughput and operational costs.

In the oil and gas industry, pumps are used to move slurries of drilling mud at well sites, comprising a mixture of various chemicals in a water-based, oil-based or synthetic-based solution, combined with drill cuttings – broken bits of rock varying in size and texture, ranging from fine silt to gravel. Pumps are also used with the extraction of oil sands – a mixture of sand, water, clay and plant life that is scooped up from



With 4" suction and discharge ports, this self-priming, positive displacement, hydraulic piston pump can pass up to 2-1/4" diameter solids without damaging or clogging the pump, while maintaining flows of up to 226 GPM.

open-pit mines. Pumps are used, as well, for cleaning out crude oil sludge from storage tanks – a water/oil/solid composite, composed primarily of heavy hydrocarbon deposits of clay, silica and calcite, and possessing a semisolid physical state.

In mining, rock tailings, whether they be aluminum, zinc, coal, gold or iron ore fines and fragments are pumped to thickeners, then in a thickened slurry of typically 50 – 60 percent mass, pumped out into tailing ponds.

Wastewater treatment facilities have their own brand of industrial digester sludge, which needs to be periodically cleaned out from holding tanks. A mixture of organic material, plastic, grit, rags, accumulated sand and other debris, notorious for clogging pumps in pump stations and plant headworks, requires more robust pumps designed for handling the periodic clean-out of this heavy sludge and solids build-up in digester tanks.

The performance of pumps under these conditions is determined by the characteristics of the solids, their concentration, the viscosity of the liquid, the materials used in the construction of the pump, and the operating conditions – in particular the pump speed and pressure.

The viscosity of the liquid carrying the solids plays a role in determining the degree of abrasive wear. If the viscosity is high, an efficient fluid film is maintained



between the pump's moving and static components. This cushions the impacts of solid particles, reducing wear.

The harder the solids, the greater the risk of pump wear. In addition

The SludgeKat™ comes standard with a one-year warranty. The pump end frame can be detached from unit for increased portability around the job site previously inaccessible by other pumps.

to hardness, the shape and size of solids are important factors in determining wear. When the diameter of the solids exceeds the clearances within the pump, extreme wear can occur even at low concentrations; however, if the fluid contains a high percentage of solids, a pump will generally experience greater wear.

Given these factors, conventional pumps which are in use for these rigorous applications, are limited to performing when the slurry is not heavy and the flow rate is slow. Conventional pumps generally perform poorly with heavy slurries, and their handling of solids is limited to very small particles. Generally, when handling solids, a grinder will be installed in-line upstream of the pump to reduce the size of the solids so the pump can pass the solids without interruption from pump clogging or component damage to the impeller, pump casing, shaft sleeve or seal.

New Generation of Pumps Designed for Heavy Sludge and Solid-Laden Slurries

A new generation of pumps has emerged that provide a better option for handling heavy sludge and solid-laden slurries. Designed for faster flow rates, the capability to handle heavy sludge and large solids, they provide a new and enhanced capability for industrial and municipal processes.

SludgeKat™ is a self-priming, positive displacement, hydraulic piston pump, with 4" suction and discharge ports, and capable of flows up to 226 GPM and heads up to 390' TDH. Depending on the product being pumped, the pump can pass up to 2-1/4" diameter solids without damaging or clogging the pump.

It is equipped with 40 hp Kohler air-cooled diesel engine-driven technology, which meets EPA Final Tier IV emission standards. The pump end frame is mounted to a 52-gallon fuel tank base, delivering a full load run time of 25.5 hours. The pump comes standard with a DOT-approved wheel kit. The pump end frame can be detached from the unit and when connected to optional 150-foot hoses, provides increased portability around the job site.

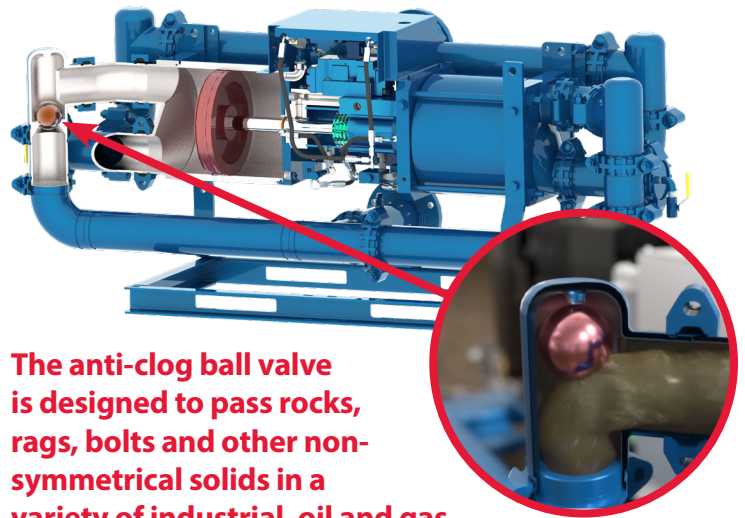


The SludgeKat hydraulic piston pump is a type of reciprocating positive-displacement pump that creates high amounts of pressure to help with the flow of fluids. It is powered by a hydraulic-drive mechanism that helps move the fluid down a cylindrical-shaped chamber.

These reciprocating pumps have an outer diameter seal with a piston rod attachment. They work by creating pressure by transferring energy into the pumped fluid. This action results in a pressurized fluid cylinder. Piston pumps are ideal when an application requires higher flow rates of fluid and low pressure, which can discharge fluid at a high rate with little effort.

The pump has added material and replaceable wear parts to withstand wear due to abrasion. The cast iron casing provides high-operation pressure capabilities. Alloy steel cylinder heads provide added wear resistance. A hardened, heavy-duty corrosion-resistant sleeve with O-ring seals at both ends protects the shaft. This action results in a pressurized fluid cylinder. Piston pumps are ideal when an application requires higher flow rates of fluid and low pressure, which can discharge fluid at a high rate with little effort.

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The anti-clog ball valve is designed to pass rocks, rags, bolts and other non-symmetrical solids in a variety of industrial, oil and gas, construction and municipal applications.

About Gorman-Rupp Pumps

For more than 85 years Gorman-Rupp Pumps has manufactured pumps for municipal, sewage, industrial, mining, construction, petroleum, OEM, government, agriculture and fire markets.

The company's extensive line of pump products include self-priming centrifugal pumps, standard centrifugal pumps, end-suction centrifugal, submersible pumps, rotary gear pumps, engine-driven pumps, and priming assist pumps. In addition, Gorman-Rupp manufactures a complete line of state-of-the-art packaged lift stations and booster stations that include pumps, motors, controls, piping, accessories and enclosures.



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FOR MORE INFORMATION, CONTACT CYNDI HOFFNER, ADVERTISING MANAGER | PHONE: 419-755-1011 | EMAIL CHOFFNER@GORMANRUPP.COM

GORMAN-RUPP PUMPS | P.O. BOX 1217 | MANSFIELD, OHIO 44901-1217 | USA | 419.755.1011 | GRSALES@GORMANRUPP.COM | GRPUMPS.COM