

RELIABLE LEAK-FREE PUMPING WITHOUT A PUMP

- No Seals & No Leaks
- Substantially Higher Reliability Than Centrifugal Pumps
- Built-In Flow Meter Provides Verification of Flow
- 50% Reduction in Electrical Cost vs Centrifugal Pumps
- Typical Payback of 6 to 12 Months

In fact, the Pumpless Pump can provide years of leak-free, maintenance-free operation. You will more likely change your fluid handling system before you would have to consider replacing a pump again.



BACKOS PUMPLESS PUMPS

Plant and fluid process engineers select the Backos Pumpless Pump because they know each one exactly meets their needs. There is no compromise. As a system of components, each pump is uniquely adapted to its specific application, providing optimum performance and, often, the very means to accomplishing your fluid processing objectives. Combined with various Backos Engineering developed control, metering, and analysis options, a Backos Pumpless Pump can virtually be a system within itself.

Backos Pumpless Pumps can be adapted to almost any type of fluid, including:

- Steam condensate
- Acids and caustics
- Sludges and slurries
- Foodstuffs and pastes

The Pumpless Pump can be supplied for:

- Outdoor applications
- Continuous pumping modes
- Batch cycle modes
- Retrofit applications

Before you spend another dollar on pump maintenance, contact Danish-Canadian Controls. This could be the last call regarding pump maintenance you'd ever have to make.

DANISH-CANADIAN CONTROLS

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CASE STUDY AND PAYBACK

GM OSHAWA BODY PLANT PAYBACK CALCULATION FOR PURCHASE & INSTALLATION OF BACKOS PUMPLESS PUMP TO REPLACE EXISTING PUMPS (2) AT COLUMN #AA-43

BACKOS Pumpless Pump returns condensate 20-30°F hotter through a vented return system than a conventional electric-motor driven mechanical pump.

Average condensate load on pumps at Column #AA-43 Condensate Receiver Station = 40,000 lbs/hr (8 month heating season) - 5,760 hours.

Assume the following costs:

Steam Production.....	\$8/1,000 lbs.
Natural Gas	\$0.50/100,000 BTU
Hydro	\$0.06/kw-hr
Treated Condensate	\$0.50/100 US Gallons
Compressed Air	\$0.30/1,000 cubic feet

CALCULATIONS

BOILER-FUEL SAVINGS FROM 20°F HOTTER RETURN TEMPERATURE:

Average condensate return 40,000 lbs/hr (x) 20 BTU (x) natural gas cost @ \$.50 / 100,000 BTU (x) 5,760 hours/year = **\$23,040 ANNUAL FUEL SAVINGS.**

ELECTRICAL CONSUMPTION OF PUMP MOTORS:

5 HP electric motor @ 60% efficiency - 5,760 hours running time per year @ \$.06 per kw-hr (see attached motor cost sheet) = **\$2,000/YEAR** (assuming 1 motor in service continuously).

CONDENSATE LEAKS THROUGH PUMP SEALS:

10 USGPH (x) 5,760 hours (x) \$.50/100 US Gallons = **\$288/YEAR** (x) 2 = **\$576/YEAR**

MAINTENANCE COST OF EXISTING PUMP & MOTOR: = \$2,500/YEAR

ELECTRICAL CONSUMPTION OF BACKOS PUMPLESS PUMP:

140 kw/hr (x) \$.06 = **\$8.40/YEAR**

AIR CONSUMPTION OF BACKOS PUMPLESS PUMP:

For condensate load of 40,000 lb/hr @ 100' discharge head = 11 SCFM (x) 60 (x) 5,760 (x) \$30/1,000 cu. ft. = **\$1,140.48/YEAR** (3,801,600 cubic feet)

COST OF OPERATION & INEFFICIENCY OF COOLER RETURN WITH EXISTING PUMPS & MOTOR

Annual excess boiler-fuel cost because of cooler return temperature.....	\$ 23,040
Annual electrical cost of pumps & motors	\$ 2,000
Annual cost of condensate leaks through pumps seals & casing	\$ 576
Annual maintenance cost of existing pumps & motors.....	\$ 2,500
	<u>\$ 28,116</u>

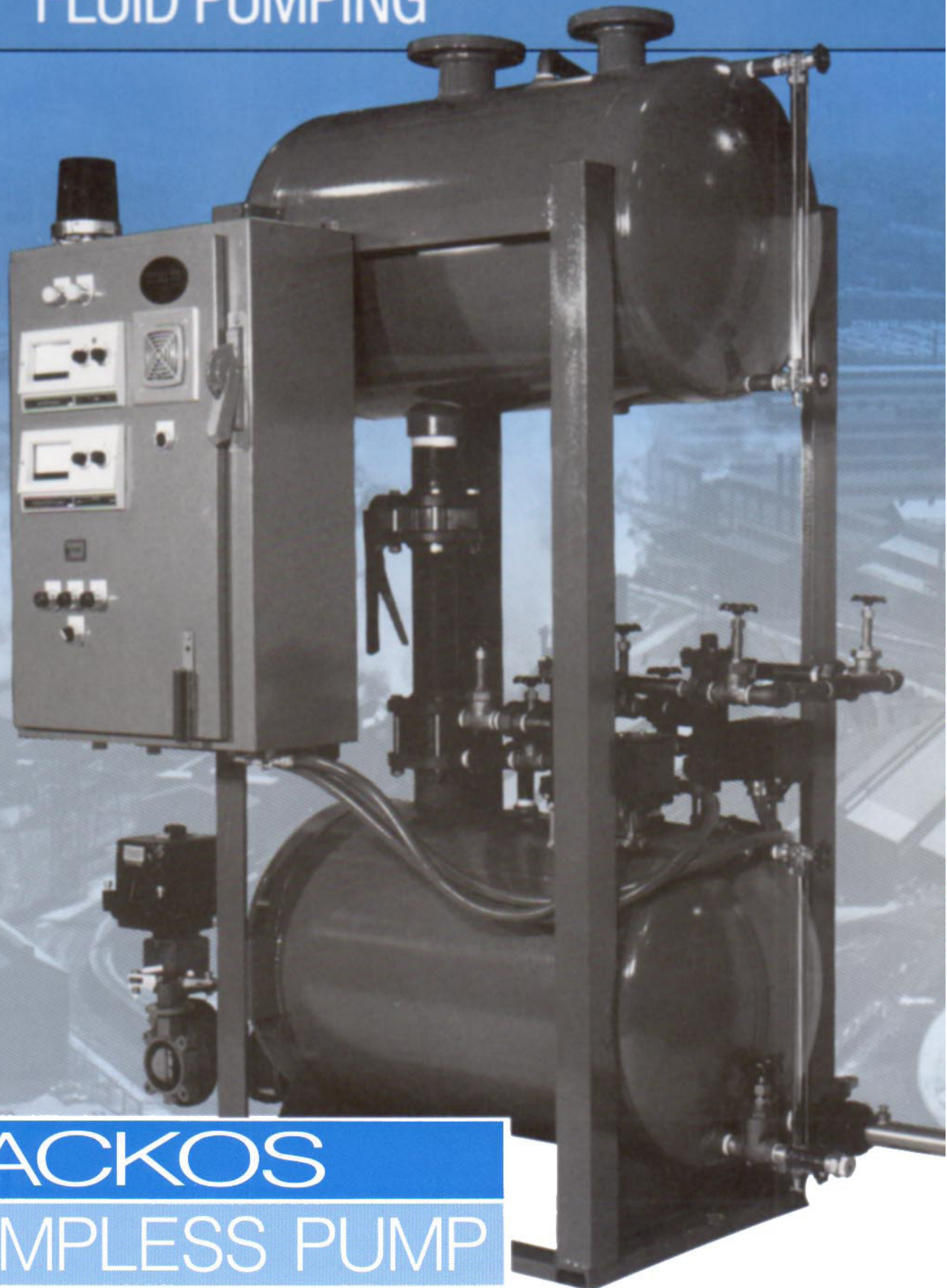
COST OF BACKOS PUMPLESS PUMP & INSTALLATION & ANNUAL OPERATING COSTS

Cost of BACKOS Pumpless Pump as per attached quote for AA-43	\$ 10,862
Cost of installation.....	\$ 2,500
Annual air consumption.....	\$ 1,141
Annual electrical consumption.....	\$ 9
Annual maintenance cost (LIFETIME NO-MAINTENANCE GUARANTEE)	\$ 0
	<u>\$ 14,512</u>

Cost of BACKOS System \$14,512

PAYBACK = Cost of Existing Pumps \$28,116 = 6 MONTHS

LEAK-FREE, MAINTENANCE-FREE
FLUID PUMPING



BACKOS
PUMPLESS PUMP

LEAK-FREE, MAINTENANCE-FREE PUMPING

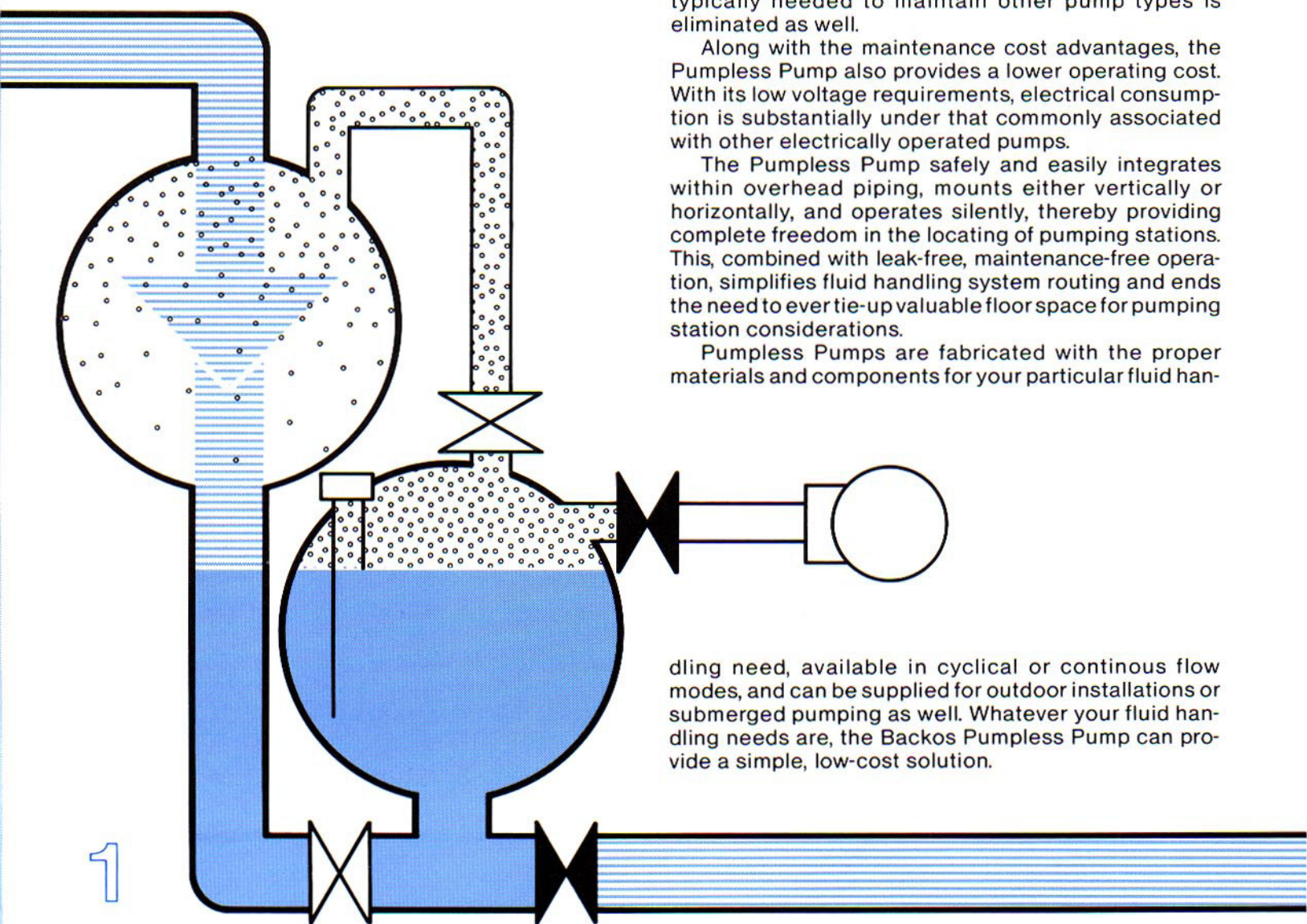
How many dollars and hours do you spend repairing and maintaining fluid pumps? Add the frustration and inconvenience you endure when pumps leak. You experience none of this with the Pumpless Pump™. Backos Engineering's Pumpless Pump systems are the maintenance-free way to handle fluids, from high temperature steam condensate, acids and caustics, to semi-solids and hard to handle slurries.

The Pumpless Pump has no mechanical impeller that can be subject to cavitation, no bearings to breakdown, nor any seals to wear out. Operation is vibration free. And, with all connections made with hard piping, the Pumpless Pump virtually has no point at which it can leak. It is this simplicity of design and construction that provides the many years of trouble-free service you get from a Pumpless Pump. The costly parts inventory typically needed to maintain other pump types is eliminated as well.

Along with the maintenance cost advantages, the Pumpless Pump also provides a lower operating cost. With its low voltage requirements, electrical consumption is substantially under that commonly associated with other electrically operated pumps.

The Pumpless Pump safely and easily integrates within overhead piping, mounts either vertically or horizontally, and operates silently, thereby providing complete freedom in the locating of pumping stations. This, combined with leak-free, maintenance-free operation, simplifies fluid handling system routing and ends the need to ever tie-up valuable floor space for pumping station considerations.

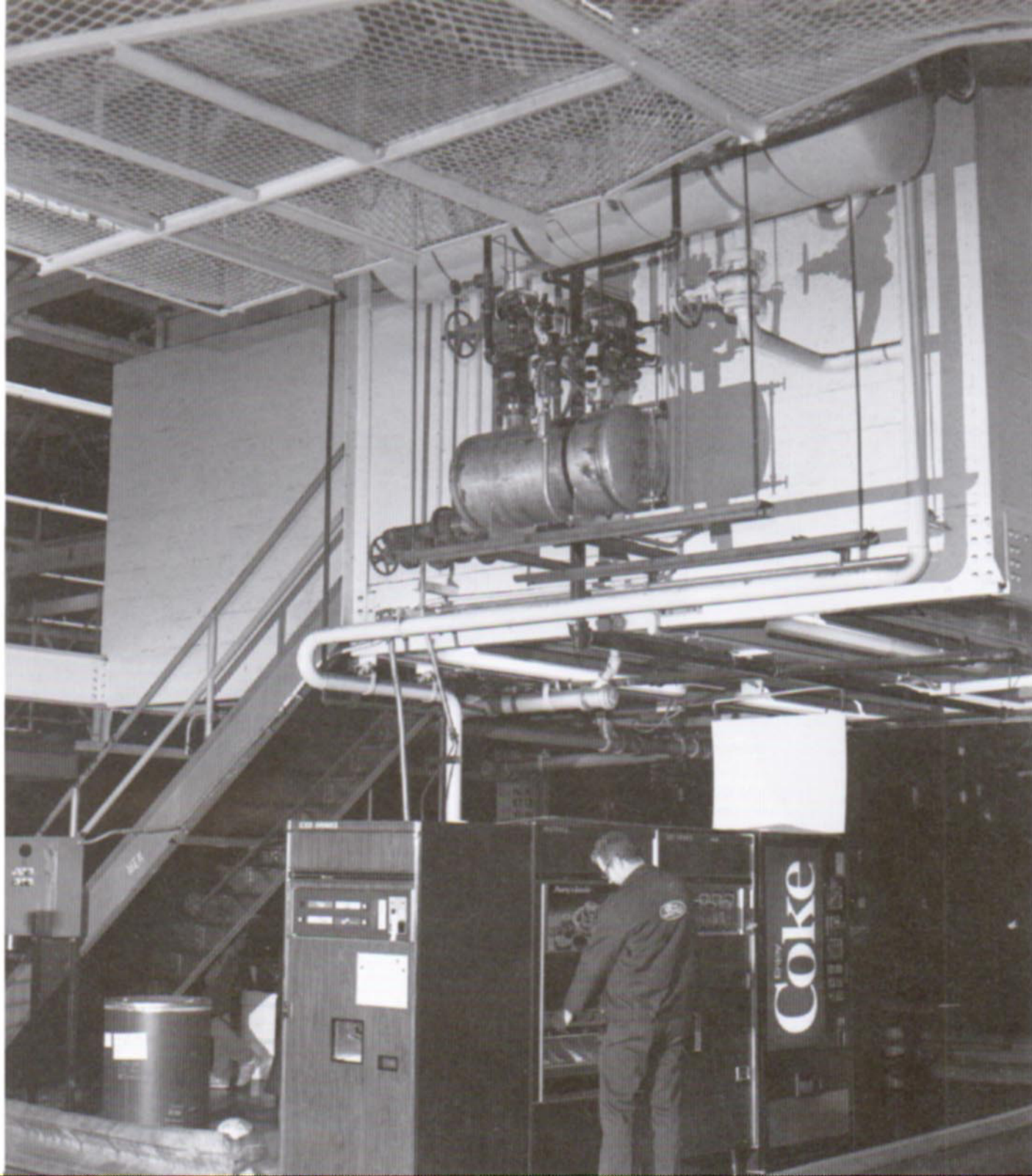
Pumpless Pumps are fabricated with the proper materials and components for your particular fluid handling



need, available in cyclical or continuous flow modes, and can be supplied for outdoor installations or submerged pumping as well. Whatever your fluid handling needs are, the Backos Pumpless Pump can provide a simple, low-cost solution.

Fluid flows by gravity through inlet valve to lower pumping chamber. The pumping chamber is back vented to the receiving chamber, equalizing the pressure in both tanks, so that incoming fluid flows immediately into the pumping chamber and does not collect in the receiver.

Note: open valves are outlined, closed valves are solid.



This employee vending/rest area was created on floor space that was occupied by a steam condensate pumping station. By changing the pump to a Backos Pumpless Pump, it was possible to raise the station from the floor and integrate it into its overhead piping network. The leak-

free Pumpless Pump allowed employee use of the area beneath without there being a safety hazard, and its silent operation maintained the type of environment suitable for a rest area.

Getting pumping stations off the floor to free up floor space is a pop-

ular application of the Pumpless Pump. Its maintenance-free, leak-free operation allows it to be safely used over employee work areas, process locations, inventory storage areas, and even over the plant manager's parking space.

APPLICATIONS and ADVANTAGES

STEAM CONDENSATE

The return of hot condensate is an ideal application of the Pumpless Pump. Since condensate contains large amounts of heat energy, returning it back to the boiler as quickly as possible saves fuel. Unlike conventional condensate return stations which must pump from a large reservoir, the Pumpless Pump returns condensate as it is received. As much as 20 to 30 BTUs per pound can be saved resulting in a two to three percent reduction in total fuel usage. In addition, due to flashing characteristics of hot condensate, conventional pumps can cavitate causing damage to impellers and seals. The Backos Pumpless Pump is unaffected by flashing condensate even when it is overheated by improperly operating steam traps. In fact, the Pumpless Pump can provide a system which eliminates flash loss altogether and effect an overall reduction in total steam use.

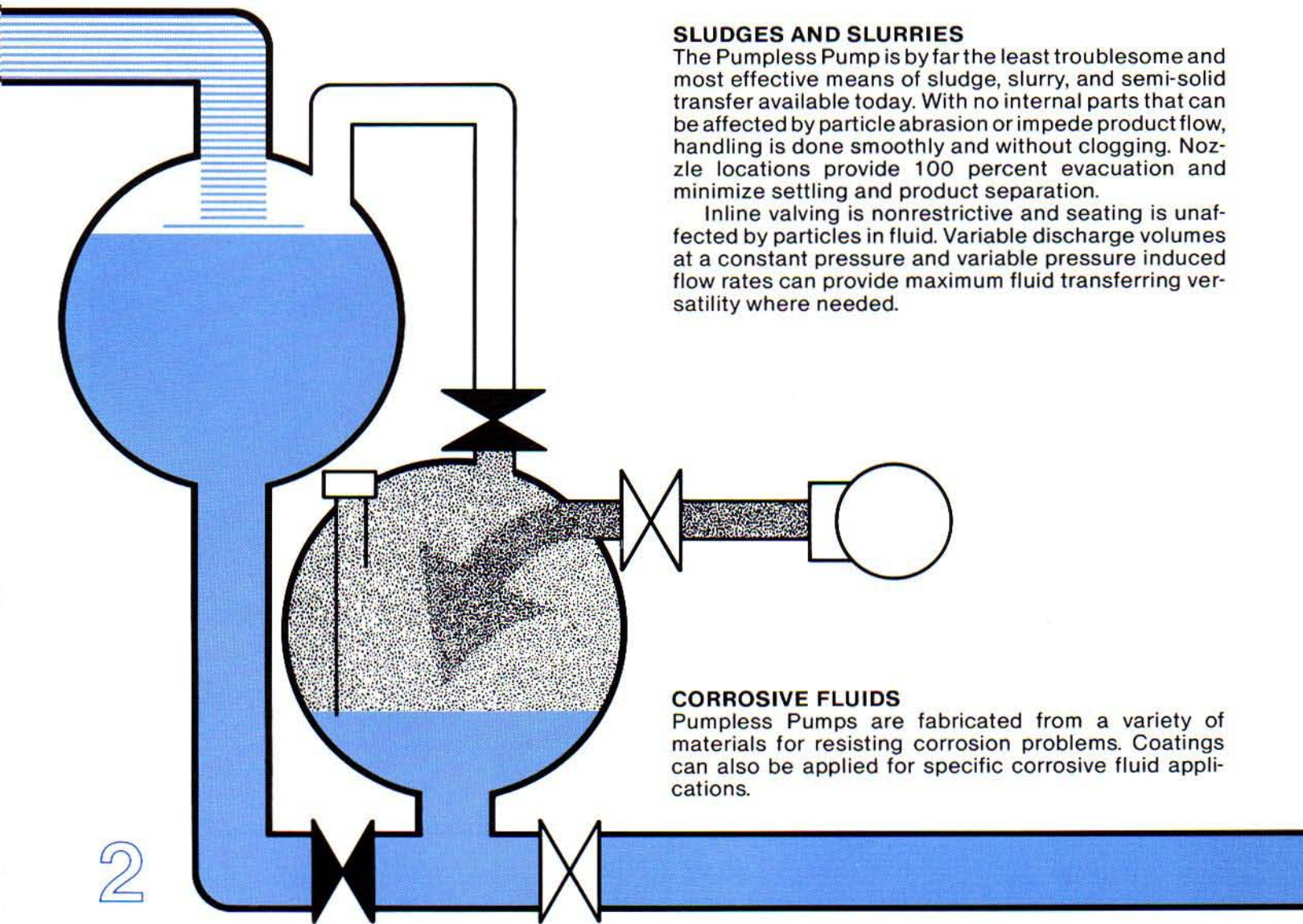
SLUDGES AND SLURRIES

The Pumpless Pump is by far the least troublesome and most effective means of sludge, slurry, and semi-solid transfer available today. With no internal parts that can be affected by particle abrasion or impede product flow, handling is done smoothly and without clogging. Nozzle locations provide 100 percent evacuation and minimize settling and product separation.

Inline valving is nonrestrictive and seating is unaffected by particles in fluid. Variable discharge volumes at a constant pressure and variable pressure induced flow rates can provide maximum fluid transferring versatility where needed.

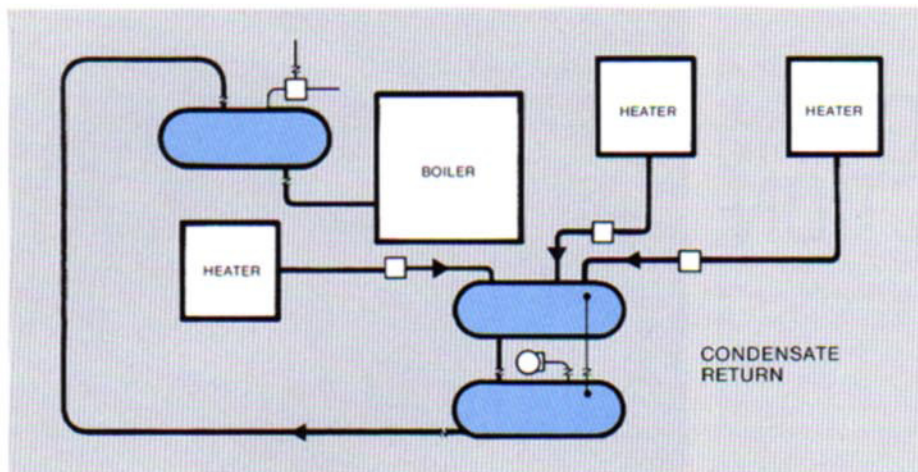
CORROSIVE FLUIDS

Pumpless Pumps are fabricated from a variety of materials for resisting corrosion problems. Coatings can also be applied for specific corrosive fluid applications.

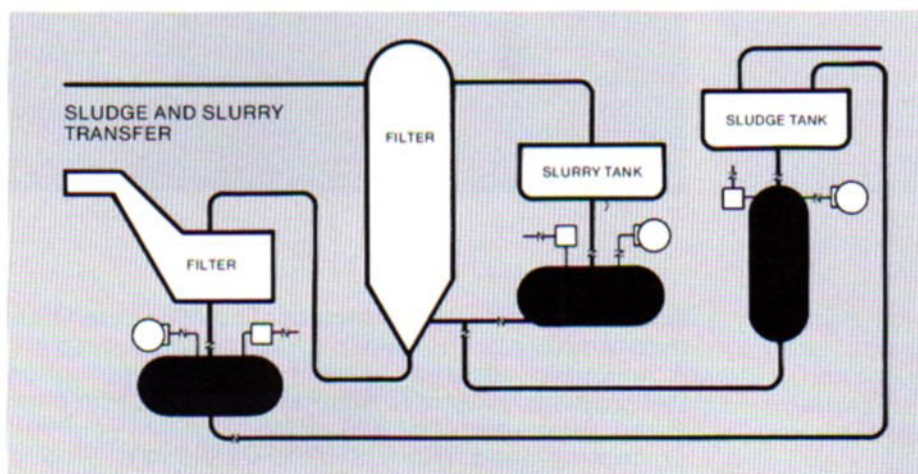


After fluid level reaches an upper set point, a compressed air/steam valve opens and, simultaneously, the inlet and pressure equalizing valves close. The pressure introduced into the pumping chamber pushes the fluid out the discharge valve until the level drops to a lower set point. No floats or linkage assemblies are involved, the only moving parts are the valves.

Since all connections are made with hard piping, there is no potential for leaks to occur, and 100 percent evacuation of pumping chambers and receiver tanks minimizes corrosion from residue. Also, there are no diaphragms or internal parts which can be damaged by corrosive action. Pumping can be in either continuous or batch modes, and standby systems with either automatic or manual switch over may be added.

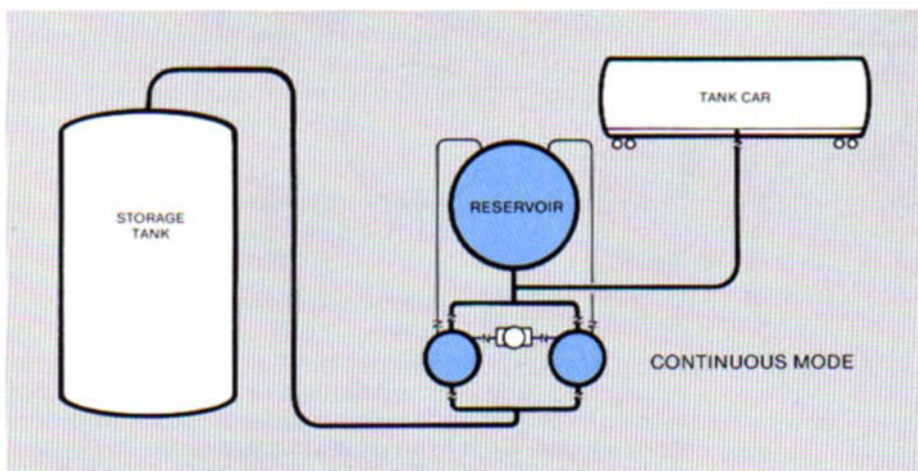


(A) The reliability and efficiency obtainable with the Pumpless Pump through designed application often-times makes possible consolidation of a number of pumping stations into a single station. Inherent, low-operating cost, combined with this greater fluid handling efficiency, results in our pump being very cost effective. Add to that the fuel savings gained from the higher temperatures at which condensate can be returned to a boiler, and you can see why the Pumpless Pump is an unbeatable cost cruncher in condensate handling.



(B) With sufficient consideration for motive force, thick, sticky fluids are easily moved with a Pumpless Pump, including semi-solids like processed foodstuffs. There are no internal moving parts to impede this type of fluid's transfer, and in-line valving eliminates any constrictions in piping.

Lowest point inlet and discharge locations and 100 percent evacuation of pumping chamber prevents settling and potential clogging of pump. And, having no moving parts internally, slurries containing such particles as iron filings or stones do not wear down the pump's performance. The Pumpless Pump significantly reduces pump maintenance in sludge and slurry applications.



(C) The Pumpless Pump's leak-free construction is well suited for toxic and corrosive fluid handling. In outdoor applications, besides protecting the environment, it eliminates the exterior corrosion that some chemicals will cause as a result of contact with the atmosphere through the most minute seepage. Pump is unaffected by northern winter weather, and can be equipped with heating elements to maintain fluid temperatures.

Control Options and Accessories

Backos Engineering can supply Pumpless Pumps with a wide variety of controls and accessories, such as flow metering, cycle counting, function alerts, and monitors for measuring conductivity, contamination,

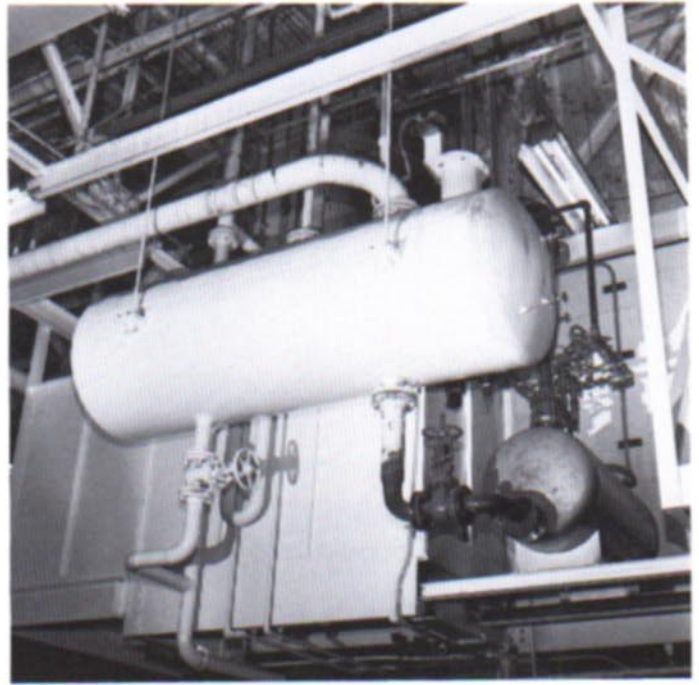
changes in PH, and temperature. Self-activating controls are available for diverting flow or adding product to counteract a condition.

Complete assemblies for blending, testing, changing, and selective distribution, as well as heating systems to keep a fluid at a constant

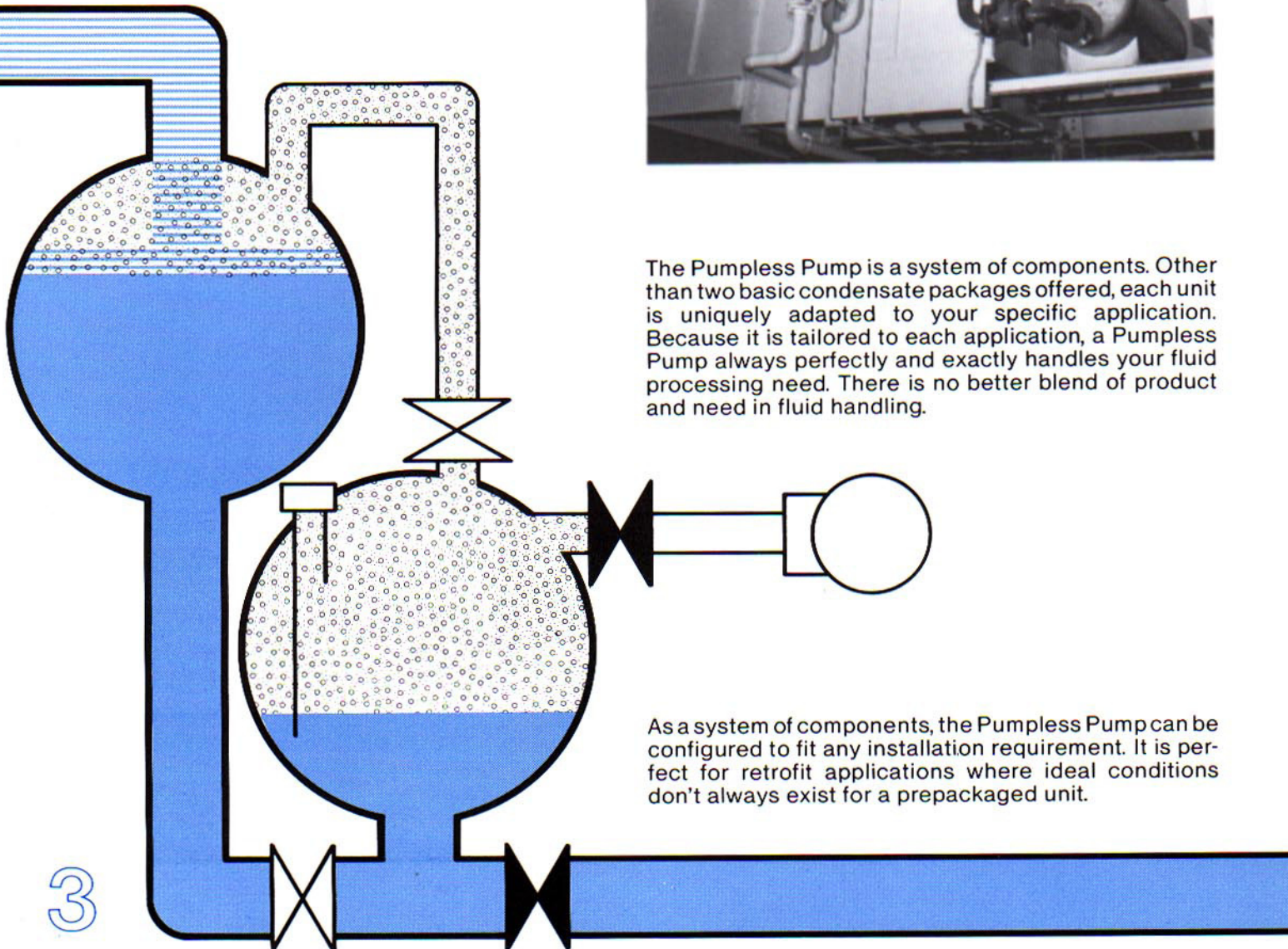
temperature throughout its handling are typical accessories that can be added.

For unique system applications and controls, Backos Engineering will design and build a low-cost, effective, solution that meets the specific fluid handling need.

SIZING and SELECTION



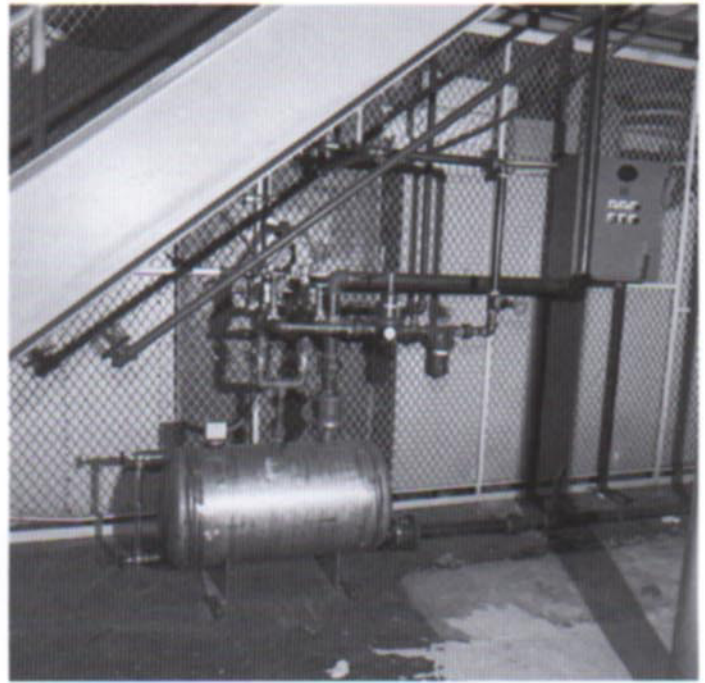
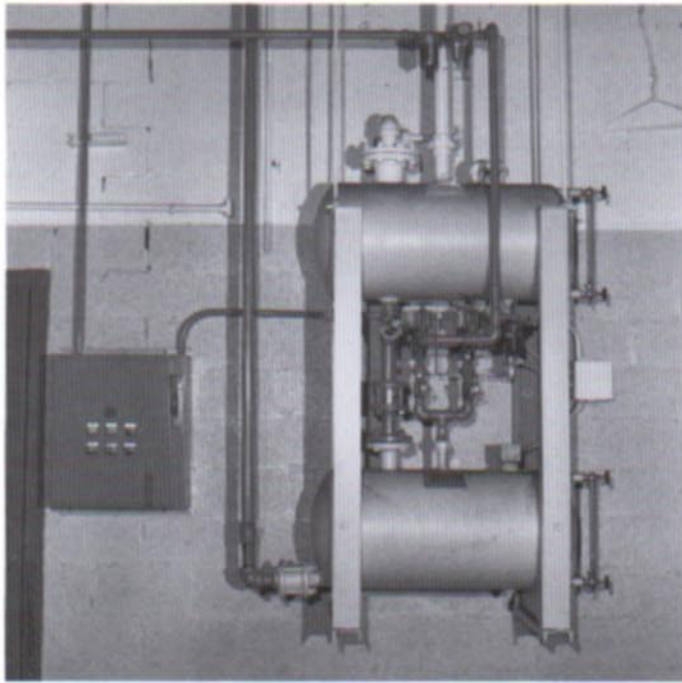
The Pumpless Pump is a system of components. Other than two basic condensate packages offered, each unit is uniquely adapted to your specific application. Because it is tailored to each application, a Pumpless Pump always perfectly and exactly handles your fluid processing need. There is no better blend of product and need in fluid handling.



As a system of components, the Pumpless Pump can be configured to fit any installation requirement. It is perfect for retrofit applications where ideal conditions don't always exist for a prepackaged unit.

When fluid being discharged reaches lower set point, the compressed air/steam and discharge valves close, and the inlet and equalizing valves open. Pressure in the pumping chamber vents to the receiver until equal in the two tanks (fluid seal prevents venting into discharge line). Fluid collected in the receiver during discharge period then flows into pumping chamber and the cycle begins again.

Pictured above are three Pumpless Pump installations: (A) a retrofit installation where pumping station has been moved into its overhead piping network using existing receiver tank, (B) prepackaged unit wall-mounted over a sludge pit, (C) single tank receiving and pumping unit installed on floor beneath a stairway.



Q. How are Pumpless Pump systems sized?

A. Pumpless Pumps are designed around your capacity requirements. Information on fluid characteristics, such as specific gravity, density and viscosity, are used to determine proper pipe sizing and volume requirements. Standard sizes are available for steam condensate based on load requirements.

Q. Are there any restrictions on how high or how far a fluid can be pumped?

A. There are no restrictions on lift or distance pumped. The Pumpless Pump operates on pressure differential; therefore, consideration is based on total lift relative to available pressure. In cases where only

designed around your system, construction is based on the type of fluid handled. Standard units may be constructed from carbon steel or stainless steel; however, a wide variety of tank materials and coatings are available.

Q. How much maintenance is required?

A. Pumpless Pumps are designed to require virtually no maintenance. Systems have a minimum of moving parts and no seals. Standby systems are available so that if an occasional valve change is necessary, the system can operate while being repaired.

Q. Is the Pumpless Pump more expensive to operate?

Q. Does a Pumpless Pump cost more?

A. The Pumpless Pump is a designed system which eliminates the need for conventional pumps. Many times, more than one pump is replaced with a single Pumpless Pump unit. In some cases, such as returning steam condensate, the Pumpless Pump costs 40 to 50 percent less than conventional condensate stations.

Q. What utilities are required?

A. All that is required is 110 volt electrical for control operation and compressed air or steam for motive force requirement.

Q. How can I be sure that this system will work for my application?

low pressure is available, systems can be staged to pump the fluid where required.

Q. What are the materials of construction?

A. Since the Pumpless Pump is

A. Operational costs will vary; however, it is less expensive than electric motors. It is 100% efficient and only utilizes what is necessary to move the fluid. All that is required is approximately 1 cfm of compressed air per every 7½ gallons of fluid pumped.

A. Backos Engineering will evaluate your application and recommend a system that will perform as specified. A written, money-back, performance guarantee means there is no risk to you.

BACKOS PUMPLESS PUMPS

- Replace the need for ever putting in another replacement pump
- Reduce high operating costs
- Reduce expensive maintenance
- Reduce costly downtime

In fact, the Pumpless Pump can provide years of leak-free, maintenance-free operation. You will more likely change your fluid handling system before you would have to consider replacing a pump again.

Backos Pumpless Pumps can be adapted to almost any type of fluid, including:

- Steam condensate
- Acids and caustics
- Sludges and slurries
- Foodstuffs and pastes

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The Pumpless Pump can be supplied for:

- Outdoor applications
- Submerged applications
- Continuous pumping modes
- Batch cycle modes
- Retrofit applications
- New system development

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Sanford Backos, P.E.
President
Backos Engineering

Backos Engineering Company