

# WEMCO<sup>®</sup> - HIDROSTAL<sup>®</sup> PUMPS

SCREW-CENTRIFUGAL  
IMPELLER OFFERS  
HIGH EFFICIENCY,  
CLOG-FREE PUMPING



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## WEMCO, HIDROSTAL, PUMP

Unique screw/centrifugal impeller permits clog-free pumping with 80% + efficiencies.

The screw/centrifugal impeller with *open channel* design — combines the clog-free features of a vortex pump... the gentle action of a screw pump... and the high efficiency of a centrifugal pump.

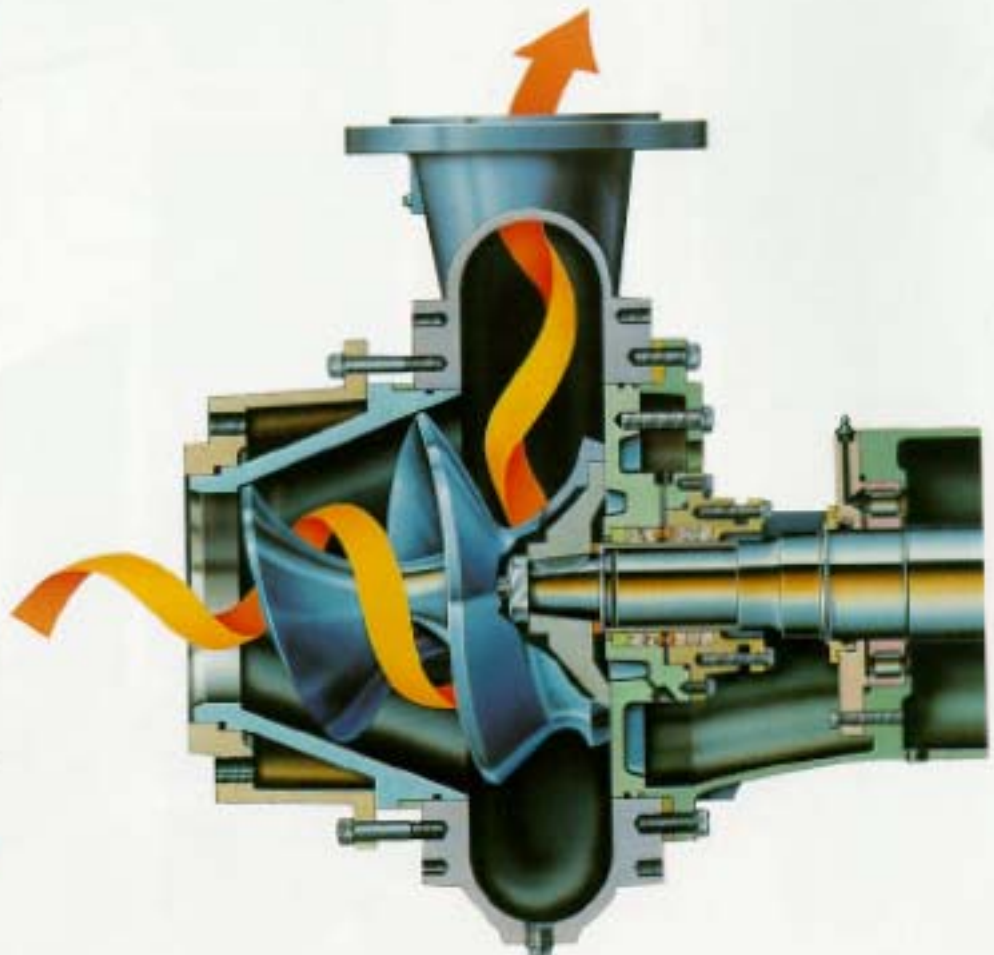
**The screw section** produces positive action. In clear liquid, it performs like an Archimedes spiral. In thick sludges, slurries, and suspended solids, it burrows like a corkscrew to *start* material moving and *keep* it moving.

**The centrifugal section** produces steep head-capacity curve for non-overloading performance.

Combined, the screw/centrifugal action provides high, hydraulic efficiencies and clog-free pumping. The large, continuous open channel — from suction to discharge — makes it possible to handle large, soft solids with efficiencies of more than 80%.

### Performance and economic advantages:

1. **High Efficiency** — reduces power costs. (Connected H.P. can now cost as much as \$1,000 per H.P. per year.)
2. **Clog-free Operation.** No blockages mean minimum attention and minimum maintenance, except for periodic adjustments.
3. **Gentle Action** — prevents damage to delicate solids.
4. **Steep Head-Capacity Curve** — minimizes interruptions in capacity, prevents motor overloads, and provides additional pressure to blow out plugs.
5. **Low NPSH requirements** help to keep thick sludges and large solids moving as available suction head decreases. It also reduces installation costs.
6. **Positive suction flow** — enables pump to handle thick sludges.
7. **Externally adjustable liner.**
8. **Abrasion resistant construction** — with 550 Brinell, Hi-chrome iron impeller & externally adjustable suction liner available.



\*Hidrostal screw-type centrifugal impeller as referenced in original U.S. Patent #3,156,190 issued to Martin Staehle.

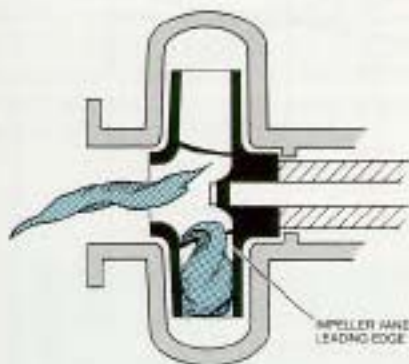
## Efficiency

Smooth flow, and low turbulence produced by the screw/centrifugal impeller, keep hydraulic losses to a minimum. The result is pumping efficiencies unequalled by any other "clog-free" pump.

## Clog-free

The large, *open channel*, from suction to discharge, produces highly efficient clog-free operation. The screw tip has a shoulder shield to prevent blade edges from hooking into solids such as long, fibrous materials.

So-called non-clog pumps, such as standard one-port or two-port, are not really clog-free because fibrous materials and solids can hang up on the



### CONVENTIONAL NON-CLOG PUMP

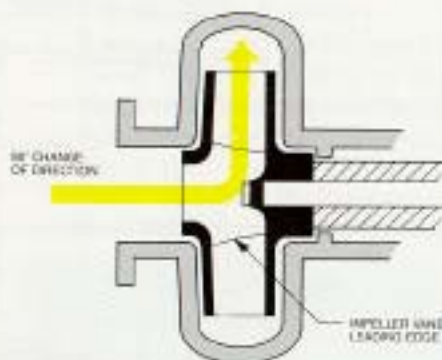
Rags and fibrous materials hang up on leading edge.

impeller vane edge as they enter the suction. What's more, material must make an abrupt 90° turn between the inlet and discharge. Large, irregular objects can lodge here and cause clogging and possible mechanical damage if not quickly freed.

While vortex pumps also provide true clog-free performance, they lack the high efficiency of the WEMCO-HIDROSTAL pump.

## Applications requiring clog-free performance:

1. Raw sewages & sludges.
2. Food handling.
3. Paper stock & wood chips.
4. Sump cleanup.



Abrupt 90° change in flow direction

## Gentle Action

Material enters the pump at a low entrance angle, where it flows through a smooth, open channel to the discharge... *without* abrupt changes of direction. This gentle action enables fragile material to move through the pump without damage. Vane pumps cannot provide this gentle handling because of the abrupt 90° turn, and high turbulence that material encounters.

## Applications requiring gentle actions:

1. Crystalline compounds.
2. Bacterial floc.
3. Easily damaged fruits and vegetables.
4. Live fish. WEMCO-HIDROSTAL pumps have been selected by a major consulting firm and several utilities as the safest method of removing live fish from cooling-water inlets.



### WEMCO-HIDROSTAL PUMP

Rags and fibrous materials can't hang up in open channel.



Gentle change in flow direction

## Steep head-capacity curve

The head produced by the Wemco-Hidrostal pump drops or climbs very quickly as flow rate changes, thus resulting in a "steep" slope. This type of performance is ideal for most applications.

### 1. Compensates for system head changes.

The head requirement of every pump depends on the piping, static lift, flow requirements, and resistance to flow of the material being pumped. These factors define the application's system-head requirements, which then "tell" centrifugal type pumps where they should operate on their own characteristic pump curve.

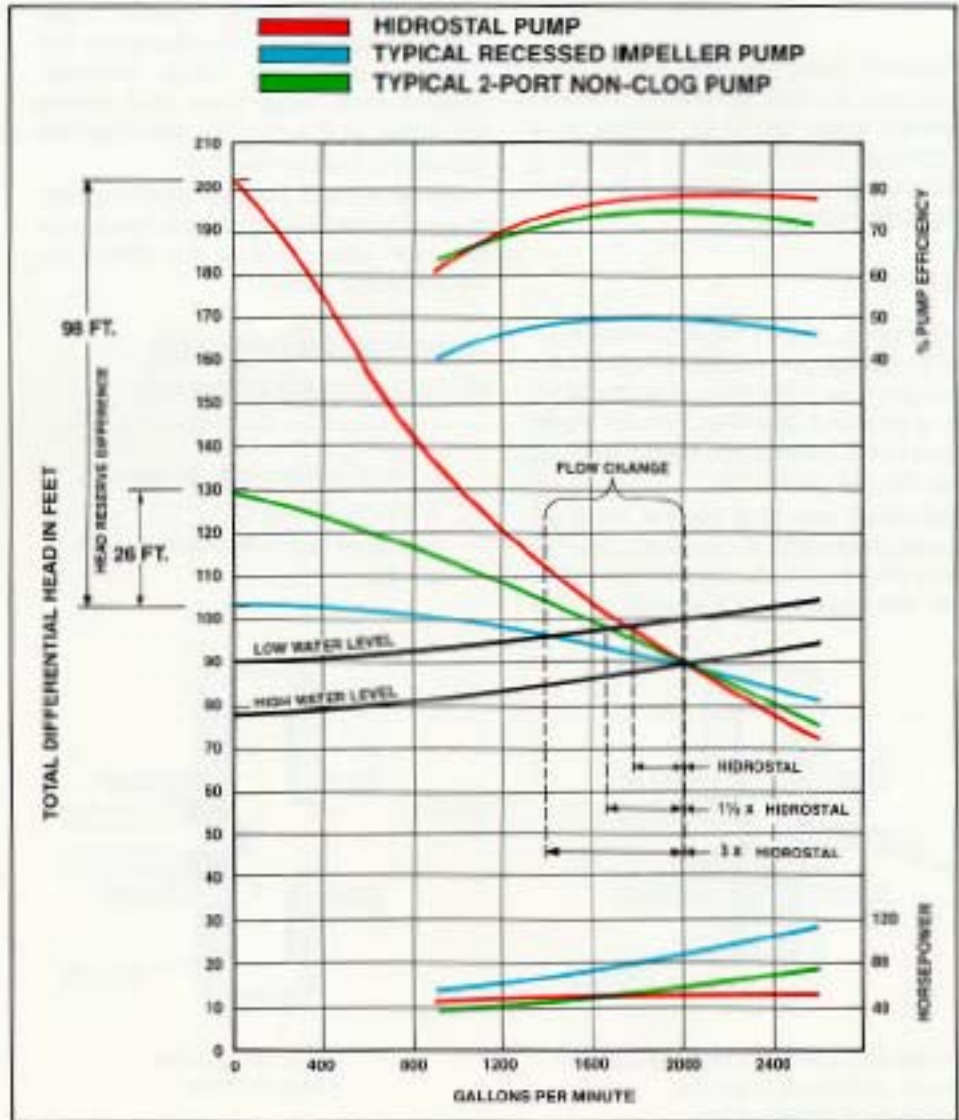
As liquid levels vary or sludge consistency changes, the system head curve changes, and the pump has to operate on a different portion of its head capacity curve.

When the Hidrostal screw/centrifugal pump encounters system head changes, capacity changes are small, as shown on the curve. However, most non-clog pumps (vortex or vane) have very flat head-capacity curves, so a small change in the system head can substantially reduce capacity. To maintain the flow rate near original design these pumps often require expensive variable speed drives.

### 2. Supplies ample head reserve.

If a blockage occurs in the pumping system's discharge piping, the normal system head curve steepens due to the large pressure resistance. With normal non-clog (vortex or vane) pumps there is a very small head reserve between the normal flow rate and pump shut-off with which to dislodge these blockages.

However, the WEMCO-HIDROSTAL pump, with its steep head capacity curve, offers a large head reserve which is often enough to blow out the blockage without having to rod or pig lines.



### 3. Produces "non-overloading" power curve.

The horsepower curve of the WEMCO-HIDROSTAL pump is relatively flat throughout normal operating range and in many cases actually begins to drop as capacity increases. This is because the head drops more quickly than the flow increases. Less work is therefore being done by the pump, so the HP requirement is reduced. It is impossible to overload the motor when the capacity increases due to a drop in head, so interruptions in

pumping due to motor overload are prevented.

Most vane and vortex pumps have constantly rising HP curves. Motors selected for specific operating points can become overloaded with a drop in head, and the only protection is to buy an oversized motor. Combined with the larger electrical starting equipment and service necessary to run this larger motor, the capital and operating costs of these pumps can be significantly more than the Hidrostal screw/centrifugal pump.

## Low NPSH requirements

NPSHR (net positive suction head requirement) is the minimum absolute pressure required to keep a pump performing effectively.

The WEMCO-HIDROSTAL has one of the lowest NPSH requirements of any centrifugal pump. This is because its screw/centrifugal impeller produces a smooth, low-turbulence flow that gradually builds pressure without sustaining the high entrance losses usually associated with normal high-turbulence pumping.

The screw portion of the impeller actually acts as a suction inducer, but unlike ordinary inducer pumps, it can handle *large solids*.

Low NPSH requirements help to keep sludge moving as available suction head decreases. This is a substantial economic benefit, because it doesn't require additional construction, or special installation, to elevate the liquid source to meet a pump's minimum NPSH requirements.

### Applications requiring low NPSH:

1. Hot liquids.
2. Low vacuum suction sources.
3. Liquids near their vapor pressure.
4. Heavy sludges or paper stock.
5. Stripper bottoms.

## Positive suction flow for sludge handling

The corkscrew action of the screw impeller, plus its low NPSH requirements provide the suction flow necessary to *start* sludge moving and *keep* it moving. In addition, the steep head-capacity curve makes it possible to pump sludges of widely varying consistencies without changing speed. It also provides reserve head for dislodging temporary line blockages.

Positive displacement pumps may be ideal for handling thick sludges, but they are expensive, and have problems with large solids — usually requiring grinders in front of the pump. They are impractical for high-volume pumping, and require extensive maintenance. While vane pumps can handle some sludges, their capabilities are limited by the following factors:

1. Relatively high NPSH requirements make it difficult to start sludge moving and keep it moving.
2. Relatively flat head-capacity curves can't provide the reserve head necessary to compensate for changes in sludge consistency.

### Applications requiring positive suction flow for sludge handling:

1. Paper mill waste.
2. Municipal and industrial sludges.
3. Viscous materials.
4. Medium density pulp stock.

## Adjustable Liner

The clearance between the impeller and suction liner is a factor in any pump's performance and must be adjusted at intervals to compensate for wear. Wemco's optional adjustable liner easily does this by means of three external regulator screws. Other pumps, lacking this feature, must rely on shims between the case and suction piece. Those who have to maintain large pumps, or pumps in abrasive service, will especially welcome the adjustable feature.

## Optional Abrasion-Resistant Impeller and Liner

For abrasive applications, the impeller and adjustable suction liner are available in 550 Brinell hardened Hi-Chrome iron (ASTM A532-III-A).

### Applications Requiring Adjustable Liner and/or Abrasion Resistance

1. Most gravity thickened sewage sludges (except secondary).
2. Sewage and stormwater.
3. Lift stations that handle high infiltration loads.
4. Lagoon sludges.
5. Most vertical installations.
6. Most horizontal installations with 6" or larger pump sizes.
7. Wood room, bark, and chip operations.

## New, patented pump system — economical solution to varying inflow rates

The Prerostal® prerotation system is a unique, economical, uncomplicated method of automatically adjusting pumping volume to varying inflow rates using a **CONSTANT SPEED MOTOR-PUMP**. It combines the screw centrifugal impeller characteristics of the Hidrostal pump with a specially configured vortex inducing chamber around the suction pipe of the pump. The chamber utilizes gravity to impart a fluid spin in the same direction of rotation as the pump impeller, and this spin produces a flow reduction without the necessity of changing pump speed.

### Benefits include:

1. Lower overall energy use than variable speed installations.
2. Less capital investment than other systems.
3. Less maintenance.
4. No sophisticated controls to service.

Your WEMCO representative will be happy to show you how this system can be of benefit to your specific application. Ask for bulletin P25-84.



### WEMCO-HIDROSTAL PUMP FEATURES



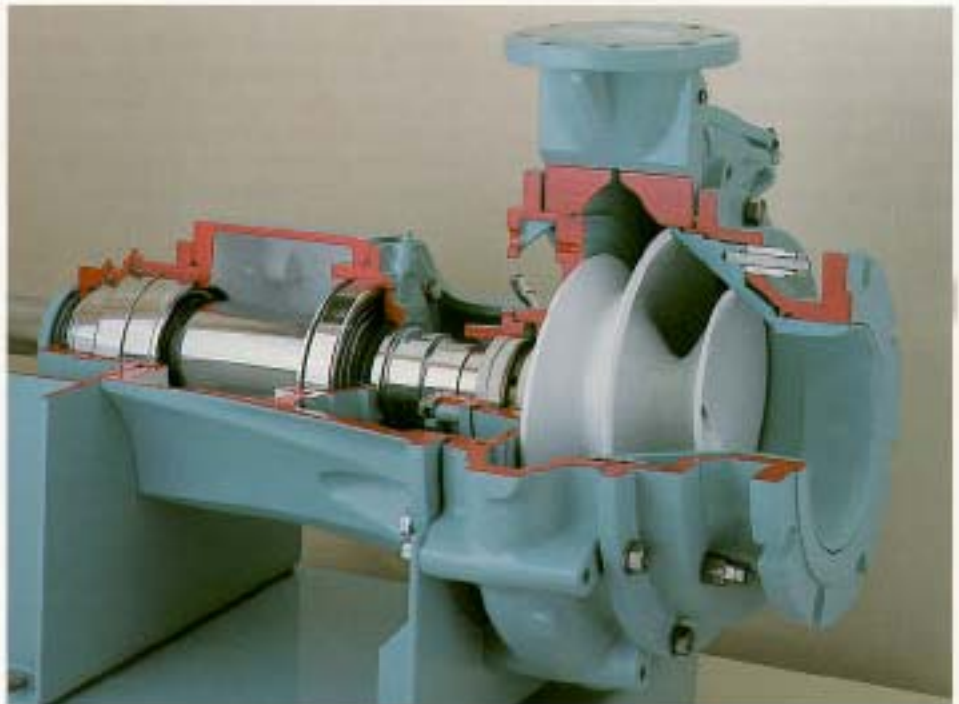
Large shafts and oversize bearings extend bearing life.



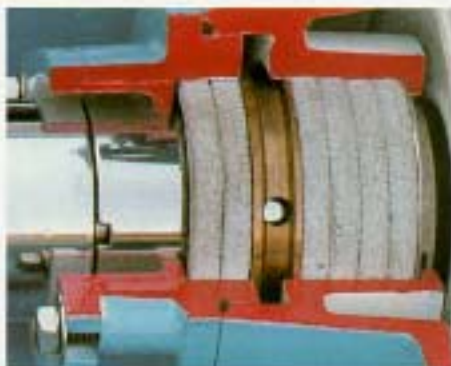
Optional liner easily adjusts for wear with external regulator screws.



Inspection port.



Back pullout design permits removal of bearing housing and impeller without disconnecting the casing from the suction and discharge piping.



Special radially split packing box for easy replacement of deepest (front) packing rings.



