

WEMCO-HIDROSTAL

Screw Centrifugal Pumps

Excellent
Power & Industrial
Solutions



High Efficiency, Clog-Free Pumping



WEMCO®-Hidrostal® Pumps

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 and the high efficiency of a centrifugal pump.

The **Screw section** of the WEMCO-Hidrostal pump performs like an Archimedes spiral. In thick sludges, slurries, and suspended solids, it burrows like a corkscrew to start the material pumping and keep it pumping.

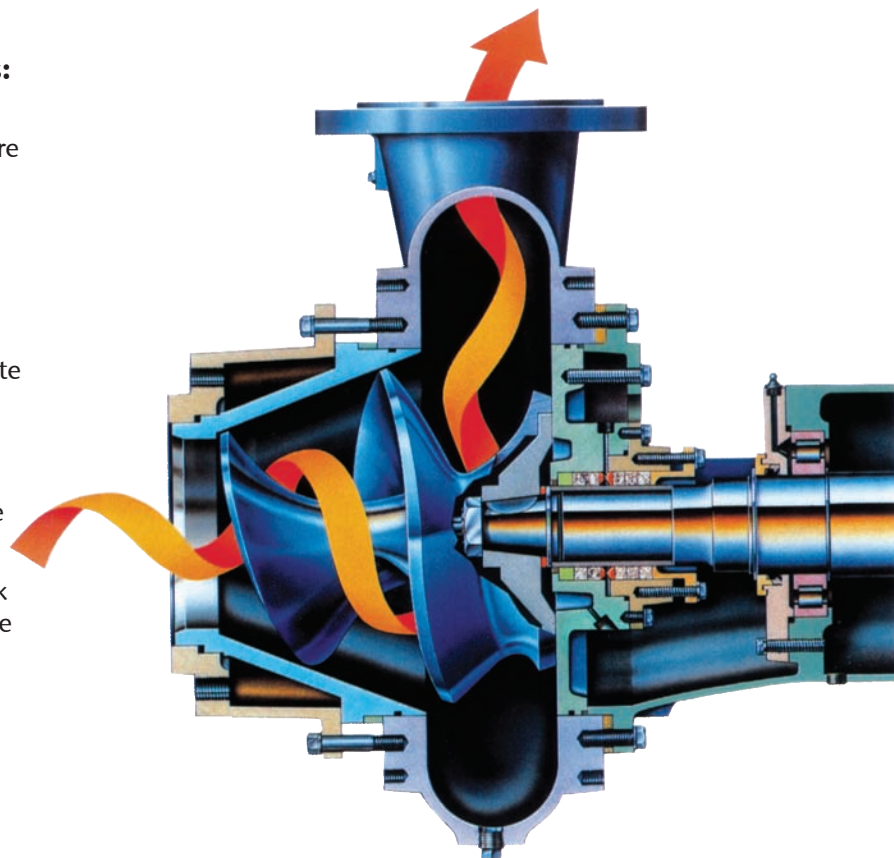
The **Centrifugal section** produces steep

head-capacity curve for non-overloading performance.

Combined, the screw/centrifugal action provides high, hydraulic efficiencies and clog-free pumping. The pump is able to handle large soft solids with efficiencies of more than 80%.

Performance & economic advantages:

1. **High Efficiency** – reduces power costs.
(Connected horse power can now cost more than \$1,000 per horse power per year.)
2. **Clog-free Operations** – no blockage means 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 the pump to easily handle thick sludges.
7. **Externally adjustable liners.**
8. **Abrasion-resistant construction** – with 550 Brinell, Hi-chrome iron impeller and externally adjustable suction liner available.



*Hidrostal screw-type centrifugal impeller as referenced in original U.S. Patent #3156190 issued to Martin Staehle.

Features of the WEMCO®-Hidrostal® Pump

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/gentle action* pump.

Clog-Free Pumping

The large, *open channel*, from suction to discharge, produces a highly 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- or two-port pumps, are not really clog-free because fibrous materials and solids can hang up on the impeller vane edge as they enter the suction. In addition, material must make an abrupt 90° turn between the inlet and discharge. Large, irregular objects can lodge here and cause clogging which could lead to mechanical damage if not quickly dislodged. While vortex pumps also provide true clog-free performance, they lack the high efficiency of the WEMCO-Hidrostal pump!

Applications requiring clog-free pumping:

- Raw Sewage & Sludges
- Food Processing & Handling
- Paper Stock & Wood Chips
- Sump Cleanup

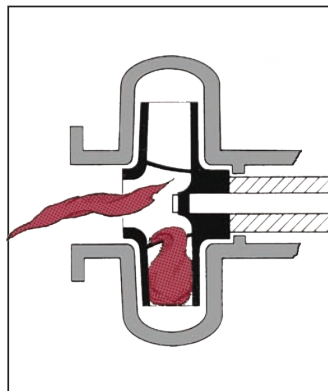
Gentle Action Pumping

Material enters the pump at a low entrance angle where it flows through a smooth, open channel to the discharge without any 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 the material encounters.

Applications requiring gentle action:

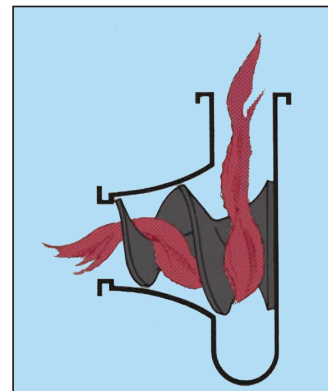
- Crystalline compounds
- Bacterial floc
- Easily damaged fruits & vegetables
- Live fish - WEMCO-Hidrostal pumps have been elected by a major consulting firm and several utilities as the safest method of removing live fish from cooling water inlets.

Conventional Non-Clog Pump



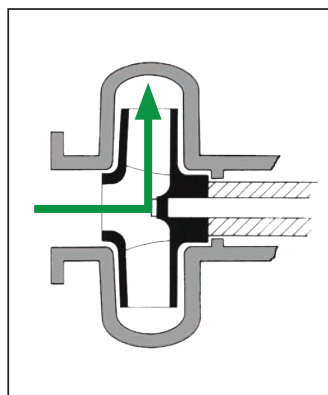
Rags and fibrous materials hang up on the leading edge of the impeller vane.

Clog-Free WEMCO-Hidrostal Pump



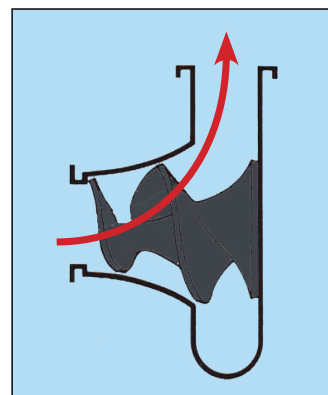
Rags and fibrous materials do not hang up in the open channel WEMCO-Hidrostal pump.

Conventional Non-Clog Pump



Abrupt 90° change in flow direction of the conventional pump.

Gentle Action WEMCO-Hidrostal Pump



Gentle change in flow direction of the WEMCO-Hidrostal Pump



Advantages of WEMCO®-Hidrostal® Pumps

Steep head-capacity curve

The head produced by the WEMCO-Hidrostal pump drops or climbs very quickly as flow rates change, 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 requirement, which then "tells" 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 WEMCO-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 system head can substantially reduce capacity. To maintain the flow rate near the original design, these pumps often require expensive variable speed drives.

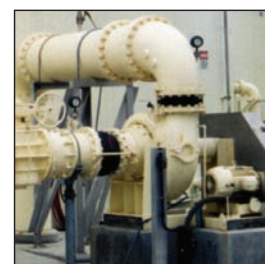
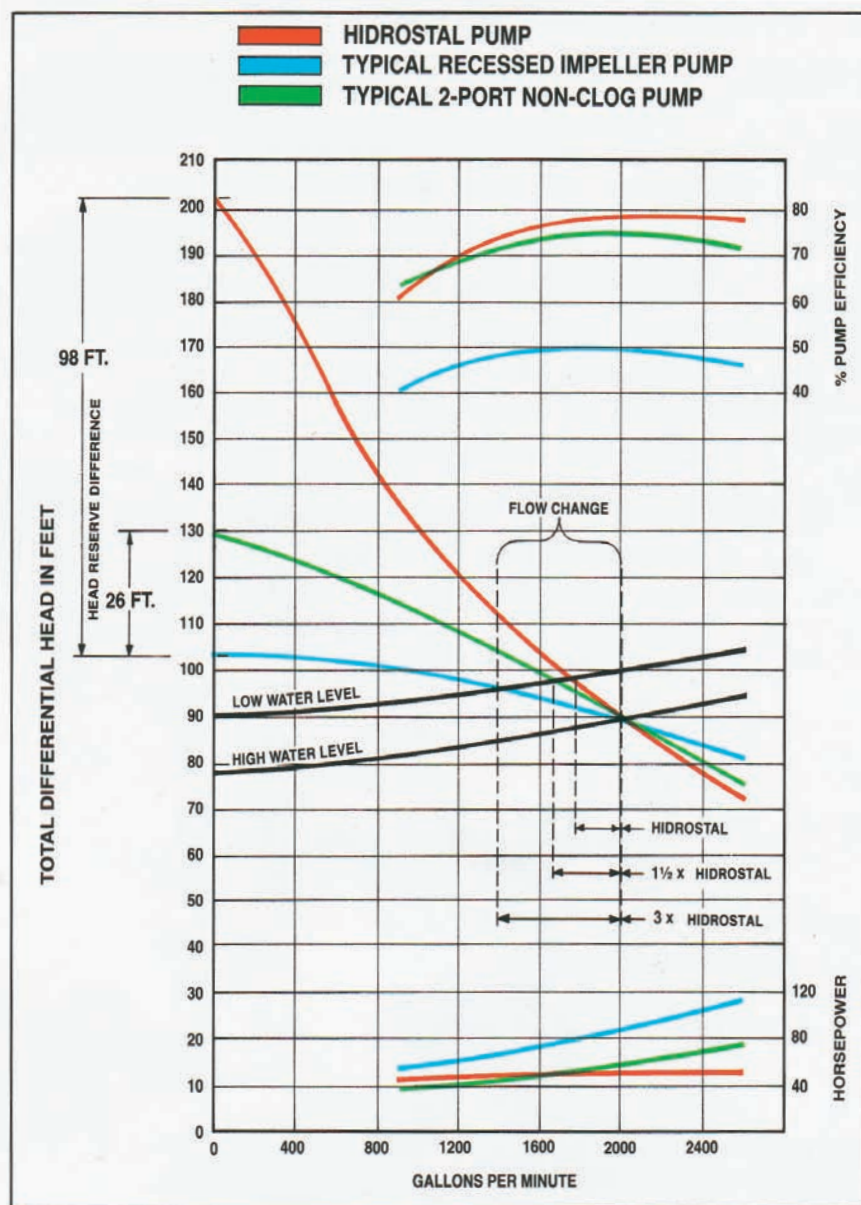
2- Supplies ample head reserve

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 the 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.



WEMCO-Hidrostal pumps are heavy-duty pumps which have been designed for the toughest applications. They will give many years of reliable service and only routine maintenance is needed.

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 large motor, the capital and operating costs of these pumps can be significantly more than the WEMCO-Hidrostal screw centrifugal pump.

Savings & Lower Long-Term Costs

1. Low NPSH requirements

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

The WEMCO-Hidrostal pump has one of the lowest NPSH requirements of any centrifugal pump. The reason is its screw/centrifugal impeller produces a smooth, low-turbulence flow which 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 pumps, it can handle *large solids*.

Low NPSH requirement helps to keep sludge moving as available 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.

2. Positive suction for sludge handling

The corkscrew action of the screw impeller plus its low NPSH requirements provide the suction flow necessary to start sludge pumping and keep it pumping. 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 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:

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

3. 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-Hidrostal'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 this feature.

4. Optional abrasion-resistant impeller & liner

For abrasive applications, the impeller and adjustable suction liner are available in 450 Brinell-hardened, Hi-Chrome iron (ASTM A532-III-A).

Low NPSH Applications:

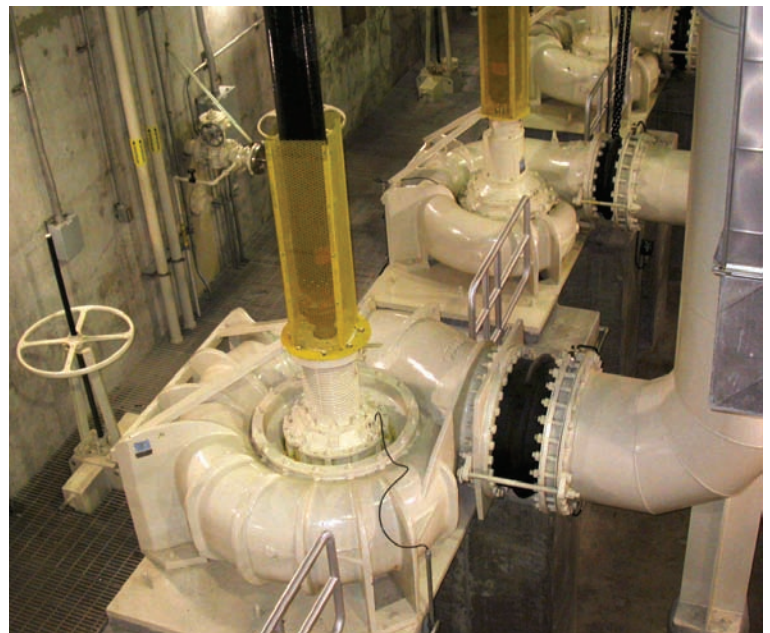
- Hot liquids
- Low vacuum suction sources
- Liquids near vapor pressure
- Heavy sludges or paper stock
- Stripper bottoms

Positive Suction Flow for Sludge Handling Applications:

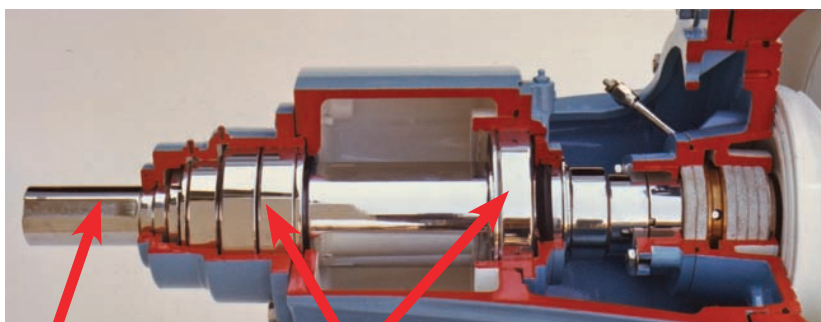
- Paper mill wastes
- Municipal & Industrial sludges
- Viscous materials
- Medium density pulp stock

Adjustable Liner and/or Abrasion-Resistance Applications:

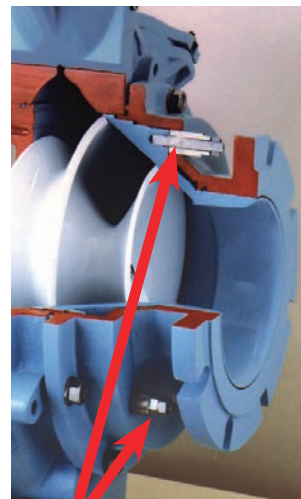
- Most gravity-thickened sewage sludges (except secondary)
- Sewage and stormwater
- Lift stations handling high infiltration loads
- Lagoon sludges
- Most vertical applications
- Most horizontal applications with 6" or larger pump sizes
- Wood room, bark, or chip operations



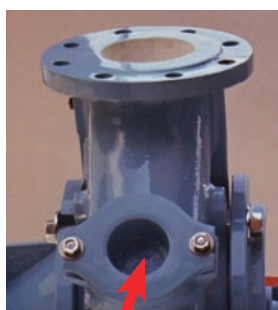
Only WEMCO®-Hidrostal® Pumps Offer All These Features:



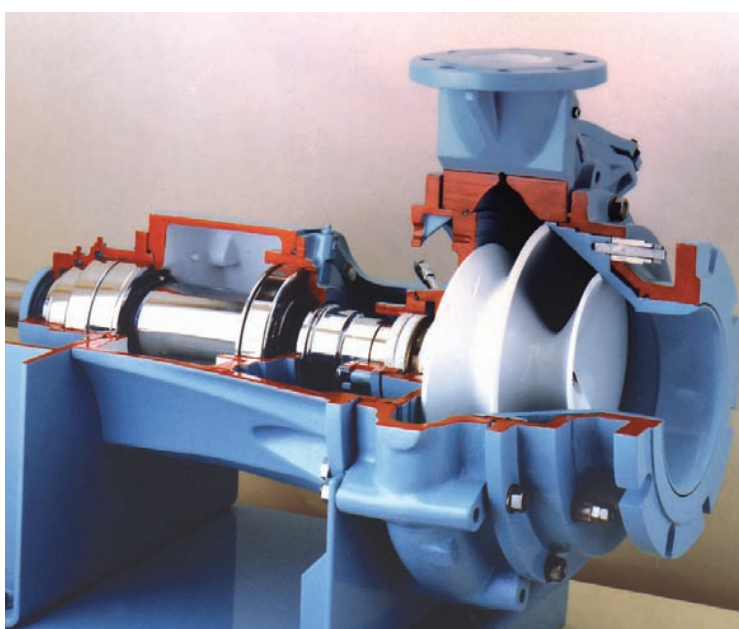
Large shaft and oversize bearings extend bearing life.



Optional liner easily adjusted for wear with external regulating screws.



Inspection port for easy replacement of deepest packing rings (front).

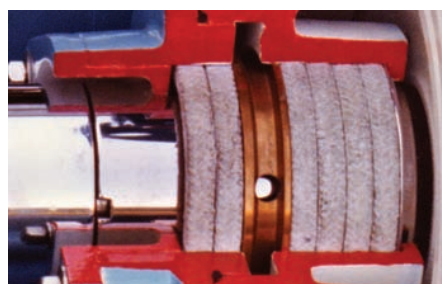


Back pullout design permits removal of bearing housing and impeller without disconnecting the casing from the suction and discharge piping.

Sealing Options



WEMCO®-Hidrostal® flushless tandem type W mechanical seal with a sealed oil chamber maintains optimum mechanical seal environment.



Specially-designed, radially-split packing box for easy replacement of deepest packing rings (front).

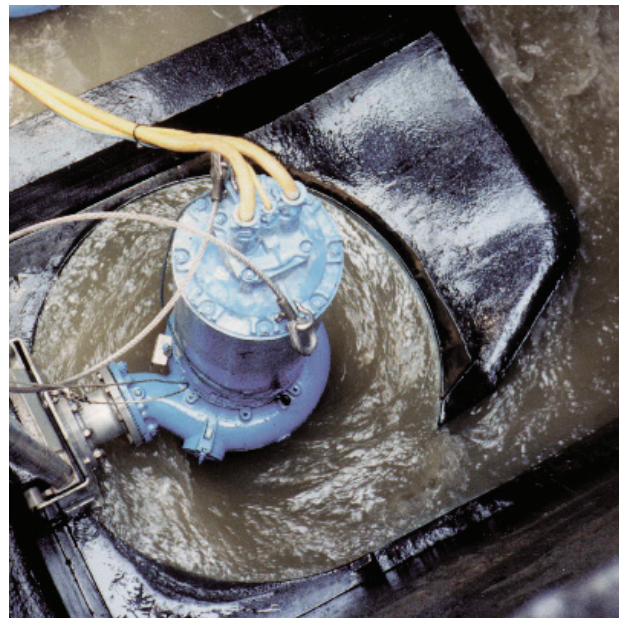
WEMCO®-Hidrostal® Immersible/Submersible Pumps offer a unique screw/centrifugal impeller with clog-free pumping to 80%+ efficiency

Only WEMCO-Hidrostal Immersible pumps offer these features:

- 1.** Clog-free pumping with a unique screw-centrifugal impeller which easily pumps solids and stringy, fibrous materials without lugging.
- 2.** High wire-to-water efficiencies.
- 3.** Steep head-capacity curve.
- 4.** Non-overloading motors in most sizes.
- 5.** Two-speed motors available.
- 6.** Exclusive top and bottom sealing systems.
- 7.** Immersible pumps will run continuously either in or out of the water.
- 8.** Explosion-proof motor design with all the features (moisture probes, etc.) normally found only in non explosion-proof design.

WEMCO-Hidrostal immersible/submersible pumps are in trouble-free service in thousands of installations world wide. No other pumps offer the ability to handle long, stringy, fibrous materials and solids without clogging, and operate with hydraulic efficiencies over 80%. In fact, no other pump offers more quality or experience-proven features than WEMCO-Hidrostal to insure reliability and unsurpassed performance.

There is a WEMCO-Hidrostal immersible/submersible pump available for virtually every application. One of our experienced representatives will welcome the opportunity to assist you in selecting a pump for your application. Contact us today for the name, address, and telephone number of the representative near you.



Clog-Free Pumping with the Unique Screw-Centrifugal Impeller

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.

1. The Screw section of the WEMCO-Hidrostal pump performs like an Archimedes spiral. In thick sludges, slurries, and suspended solids, it burrows like a cork-screw to start the material pumping and keep it pumping.

The **Centrifugal section** produces a steep head-capacity curve for non-overloading performance. Combined, the screw/centrifugal action provides high hydraulic efficiencies and clog-free pumping. The large, continuously open channel - from suction to discharge - offers these advantages:

- Pump will handle large solids with clog-free action.
- Hydraulic efficiencies over 80%.
- Gentle action - prevents damage to delicate solids and biological flocs.
- Low NPSH requirements help keep thick sludges and large solids moving as available suction head decreases. This, in conjunction with immersible motors that can operate dry, also allows lower wet well pump-down which reduces construction costs.
- Positive suction flow enables pump to handle thick sludges.

2. High Wire-to-Water. The cost of running any pump is measured by the amount of power it consumes which is a function of the combined (wire-to-water) efficiencies of the pump and the motor. The unique combination of the WEMCO-Hidrostal screw-centrifugal impeller and immersible motor routinely produce wire-to-water efficiencies that are among the highest, and in many instances, the highest in the industry.

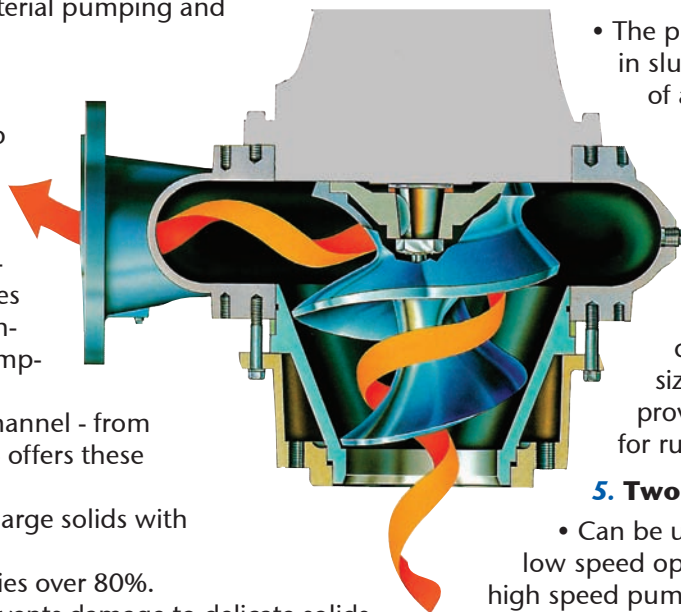
Since connected horsepower may cost more than \$1,000 year/HP, the cost savings from this pump are substantial when evaluated over the normal 10-20 year design-life of a station.

3. Steep head/capacity curves. The screw-centrifugal impeller produces head-capacity curves that are very steep. For example, the head drops very quickly in relation to increased flow. This type of curve gives designers and users the flexibility simply not found with other designs. The benefits are:

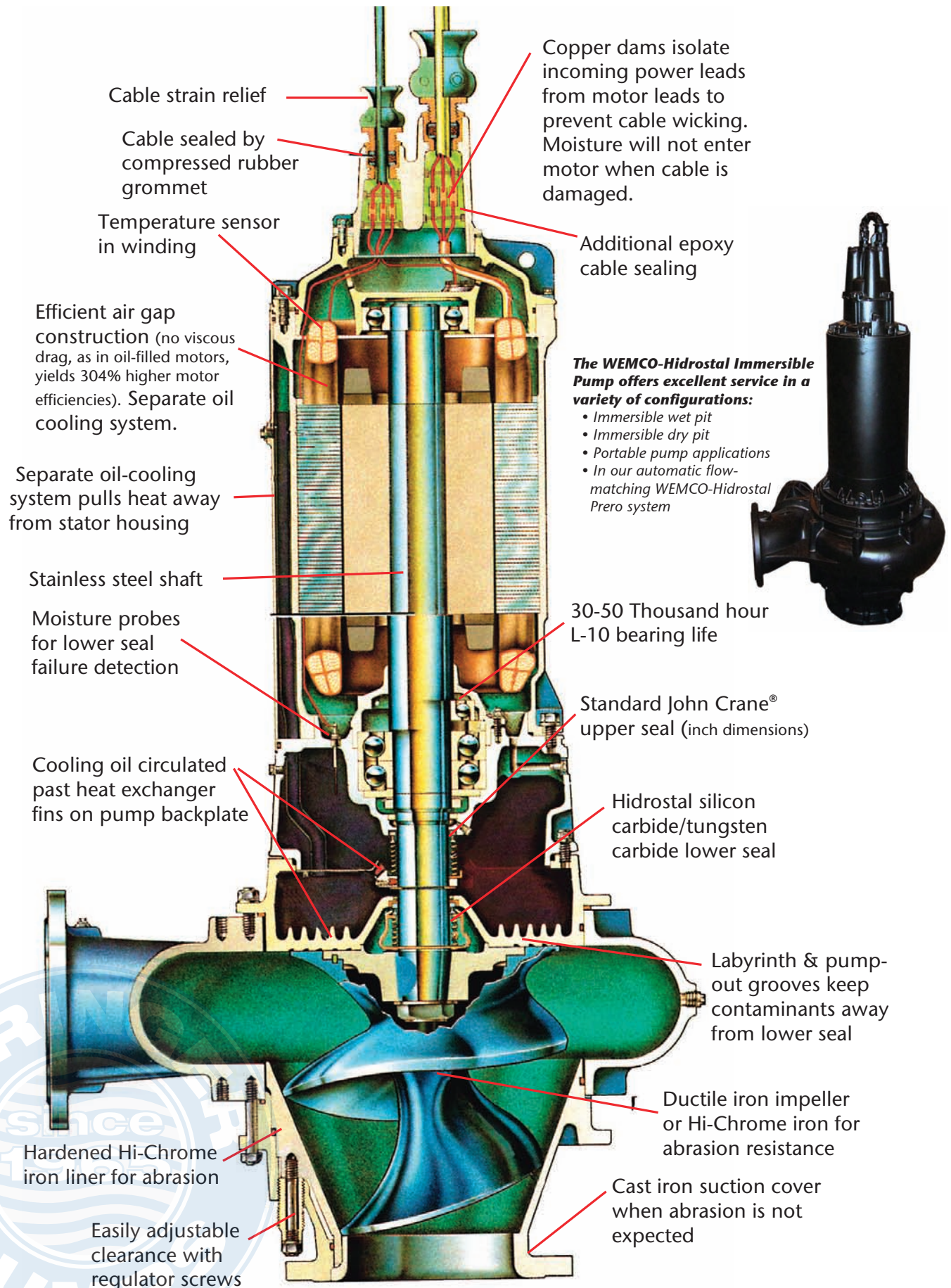
- The pump capacity stays relatively stable throughout the normal operating range of the wet-well.
 - The pump can handle a wide variation in sludge consistency without the need of a speed change.
 - Pressure reserves can dislodge temporary discharge line blockage.
- 4. Non Overloading**
- For many models, power requirements do not rise as capacity increases. Thus, motors sized for the design conditions also provide complete overload protection for run-out conditions.

5. Two-speed Motors

- Can be used in parallel operation at high/low speed operation without the problem of the high speed pump forcing the low speed pump to shut off.
- Two-speed operation allows pump to closely match station inflow rate, thus reducing wet-well size, buffer volume, and station construction costs.
- Allow automatic matching of inflow rates to the station when used with the Prerostal® Pumping System (see back page).



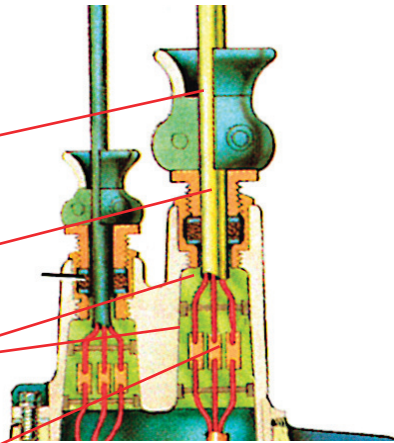
Immersible/Submersible Motor Design



Exceptional Sealing & Reliability Systems

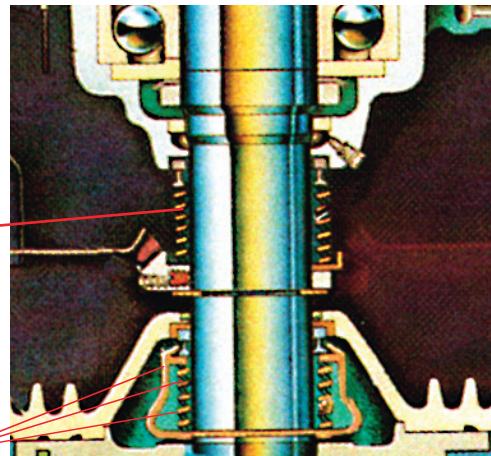
Submerged motors are most vulnerable in the two areas where liquid is sealed from the motor: the cable entry on top of the motor, and the shaft sealing at the bottom of the motor. The WEMCO-Hidrostal motor is the most reliable design to insure no leakage at these points and incorporates these features:

- 1- Strain relief clamp grips cable above sealing components to isolate the electrical components from any mechanical strain.
- 2- Cable sheath is sealed by an elastomer grommet compressed by a threaded follower gland.
- 3- Poured epoxy totally encapsulates cable-end insulation and copper dams, and offers redundant sealing for both the cable outside diameter and any internal leakage.
- 4- Each individual cable wire is isolated from the motor cable by a solid copper isolation dam which prevents wicking of moisture through cable strands in event of cable damage.
- 5- Motors are shipped with waterproof cap over panel end of the cable to protect the cable during storage, shipping, and installation (not shown).



Mechanical Seals

- 1- The upper seal is a standard domestic John Crane® type 21 carbon-ceramic face seal.
- 2- Both seals run in a clean oil bath, lubricating springs and seal faces, which permits the pump to run dry without seal damage.
- 3- The lower seal has a solid tungsten-carbide face rotating against a solid silicon-carbide stationary seat. Both seal faces are harder than any grit particles encountered, and the combination of two different faces insures that no molecular welding can occur as can happen when two identical seal faces are used. Springs are completely encased in a rubber boot or in a stainless steel bellows to avoid fouling by stringy materials. This seal is dimensionally interchangeable with standard John Crane® type 21 seals.



Temperature Sensor

Backup bi-metallic thermal sensors embedded in the stator windings protect the motor from overheating due to any reason.

Explosion-Proof Motors

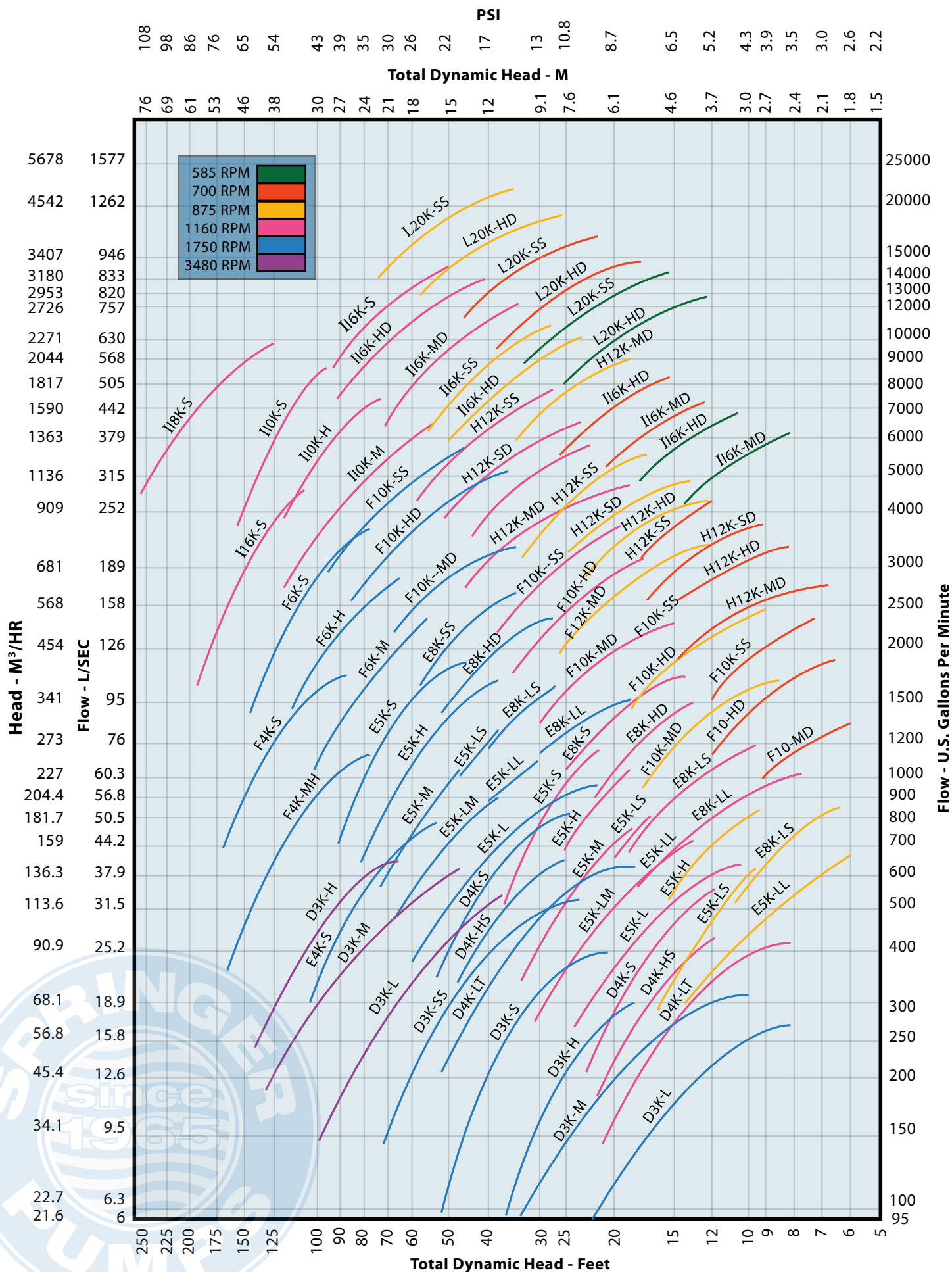
Motors are explosion-proof design approved by Factory Mutual for uses in Class 1 groups C & D "hazardous locations."

Although other motors incorporate one or two of these features, the WEMCO®-Hidrostal® motor is the only one that incorporates all of these redundant features. The result is the most positive and reliable design for excluding liquid.

Safeguards

Moisture Probes

Two probes constantly monitor conductivity of the cooling oil. If significant water leaks past the lower seal, an alarm circuit in the panel advises the operator of the failure so the seal can be replaced. However, the pump can continue to run for some time, as the motor is still protected by the upper seal. This feature is also available in explosion-proof motors.



Weir Specialty Pumps has the right pump for the job with its WEMCO® Brand Pumps & Equipment

Large Solids, Abrasive Solids, High Efficiency, Self-Priming, Non-Clog or Chopping

• Raw Sewage

Lift stations, collection basins, CSO discharges, headworks, and our prerotation system skims and cleans the wet-well, too!

• Screenings/Septage

Pumps and/or chops raw concentrated solids, stringy materials, latex, organics, plastics, hair, or rags.

• Clarifier Scum Pits

Pumps and/or chops primary or secondary scum.

• Primary Sludge

Our abrasion-resistant WEMCO® Torque-Flow recessed impeller pumps are the right choice.

• Return-Activated & Waste-Activated Sludge

Nothing better than our high-efficiency, solids handling WEMCO®-Hidrostal® screw centrifugal pumps.

• Digester Service

- Mixing

- High efficiency WEMCO®-Hidrostal® pumps for the lowest life-cycle costs of any pump available for this application.

- Our WEMCO® Chop-Flow pump for those services with nozzles to mix the digester.

- Heat Exchanger Circulation - Through the heat exchanger, either our WEMCO® Torque-Flow or WEMCO®-Hidrostal® pump, depending on the flow rate required, or the WEMCO® Chop-Flow pump if chopping is required.

- Transfer – Great application for the WEMCO® Chop-Flow pump. Chops and conditions sludge before going to dewatering. For larger flows, the WEMCO®-Hidrostal® pump is a cost-effective solution.

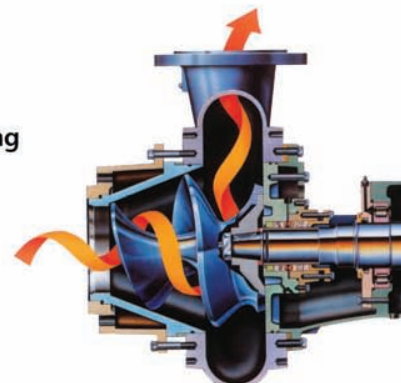
• Thickened Sludge

Any of our WEMCO® pumps for gravity-thickened sludges depending on the flow and amount of abrasives present.

New Product



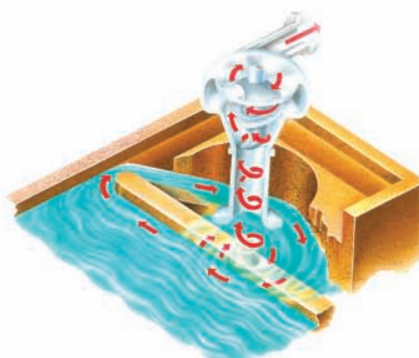
WEMCO® Non-Clog Pumps



WEMCO®-Hidrostal® Screw Centrifugal Pumps



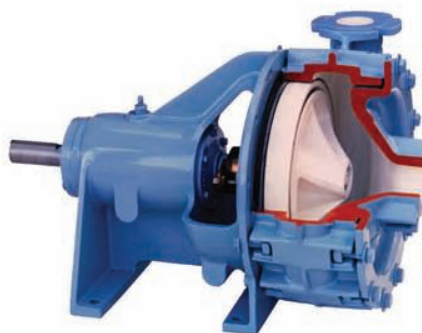
WEMCO® Self-Primer Pumps



WEMCO®-Hidrostal Prerotation System



WEMCO® Chop-Flow Pumps



WEMCO® Torque-Flow® Model



WEMCO® Hydrogritter™ Grit Removal System

Weir Specialty Pumps

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