

# WEMCO PUMP

## Extra Heavy Duty Vortex Pumps

Excellent  
Power & Industrial  
Solutions



### Model C® Torque-Flow Pumps

The Toughest Grit-Handling Pump for Municipal Applications



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# WEMCO® Model C Torque-Flow® Pump

**Durability & Performance unmatched by any other grit-handling vortex slurry pump**

Two of the most pump-punishing industries, mining and dredging, had a serious problem: In addition to wear from severe abrasives, large solids were continually clogging conventional slurry pumps. They demanded constant service to unclog them, as well as frequent maintenance and parts replacement. Downtime and costs were excessive.

WEMCO® Pump engineers, experienced in designing pumps and minerals-handling equipment, tackled the problem.

They began with the design criteria for a slurry pump. Then they added two unique features: (1) To totally eliminate clogging, they designed a fully recessed, cup-type impeller which would efficiently handle pipe-sized solids. (2) For durability and economy they designed the impeller extra thick. The case was made in two pieces

with a sacrificial suction piece which could be replaced quickly, easily, and economically.

For endurance, all wet-end parts were constructed of Hi-Chrome - an alloy of greater hardness than destructive silica sand and other materials.

The model C pump quickly proved its superior toughness, durability, and clog-free performance.

## **Proven in sewage treatment plants**

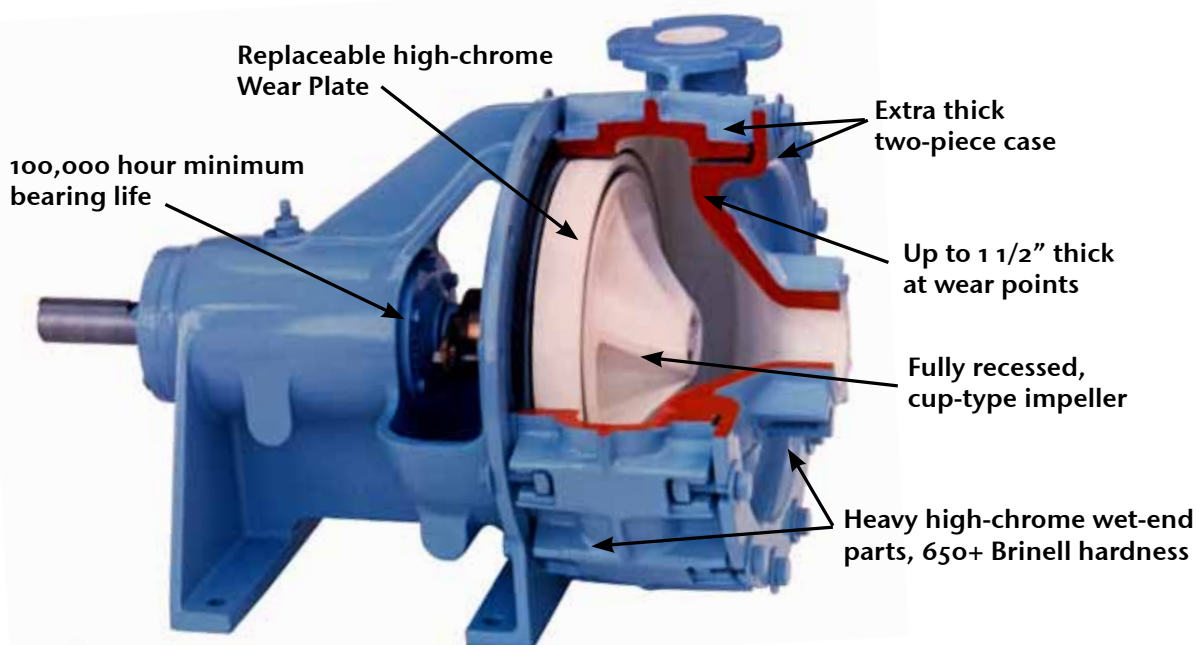
Sewage treatment plants were having even more serious pump-clogging problems than mining and dredging. Raw sludge and sewage - contained large solids, long, fibrous materials wire, rags, cans, etc. - were strangling their pumps. Most important, highly abrasive silica sand was grinding them to pieces.

When they heard about the Model C pump's reputation, they put it to the test. It proved to be the solution to their problems, as well as the toughest, most durable pump they had ever used. It still is.

To this day, the Model C pump offers three benefits not available in any other single vortex pump: (1) More than 10 times longer wear life than any other vortex pump; (2) pumps pipe-size solids and long, fibrous materials without clogging; and (3) operates continuously for years with only occasional oil check and inspections.

Records show that Model C pumps installed back in 1955 have given continuous, trouble-free performance ever since.

Today, this pump is standard equipment in virtually every sewage treatment plant.



## **Meets slurry pump design criteria**

From the beginning, WEMCO® Model C pumps have met the exacting design criteria for a superior slurry pump. These criteria are:

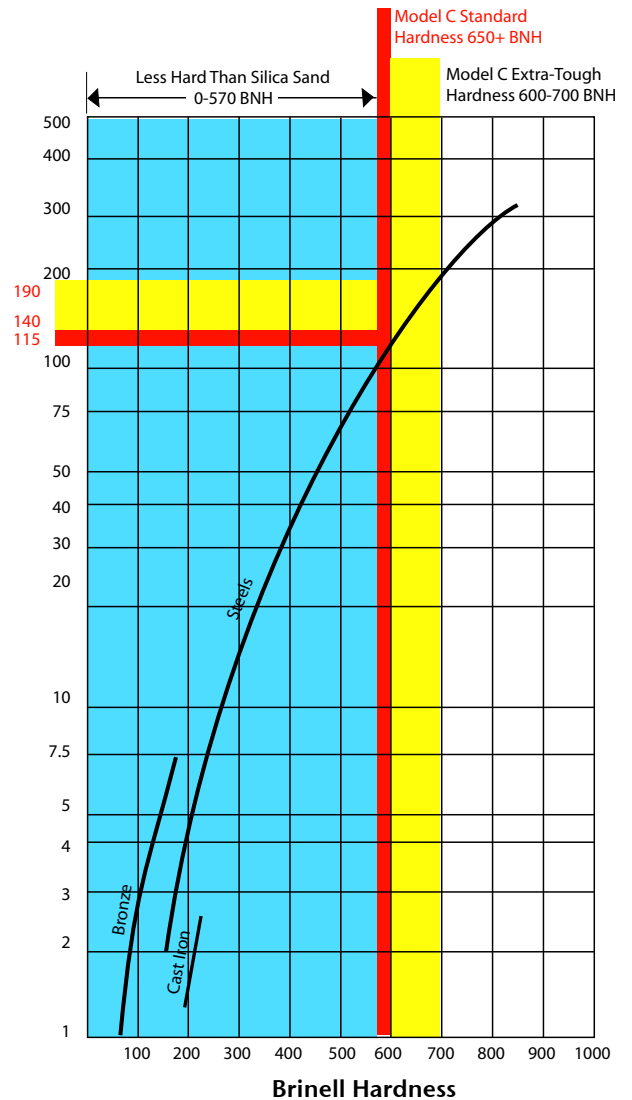
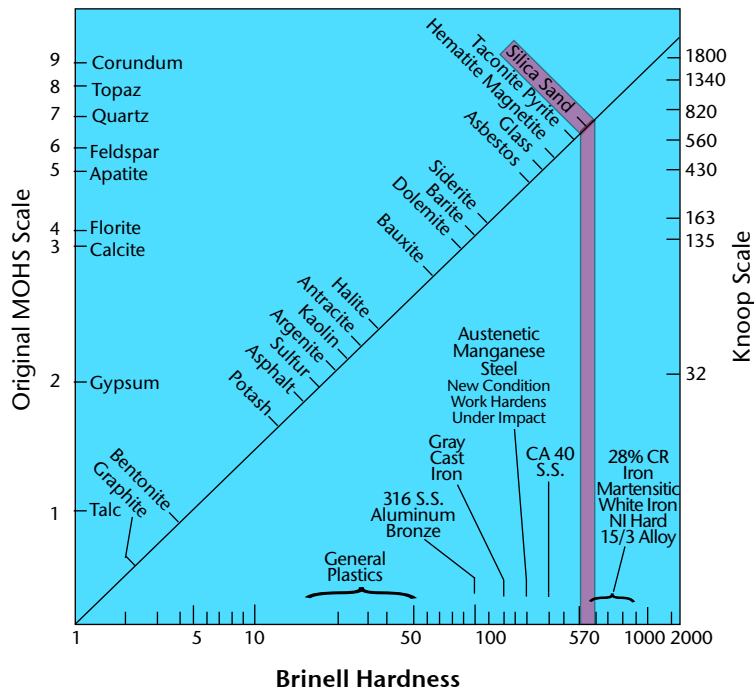
1. Construct the pump with good abrasion-resistant materials.
2. Provide generous wear allowances on all parts subject to abrasion.
3. Adopt hydraulic designs which minimize wear.
4. Adopt mechanical designs which are suitable for the materials of construction, and allow ready access to the wearing parts for renewal.

***If your application demands the type of pump prescribed above, write these design criteria into your specifications!***

# Abrasion-resistant Alloy Extends Pump Wear Life

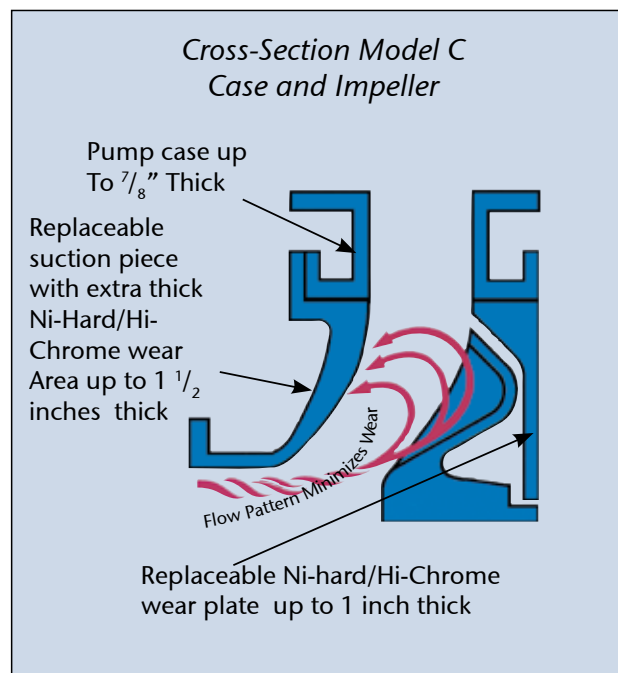
Silica sand is the most common grit particle any pump must handle. It is also one of the hardest (570 Bhn), most abrasive minerals on earth. To resist this abradant, pump wear-parts must be of greater hardness than silica sand. (see charts)

With this in mind, Weir Specialty Pumps constructs the WEMCO Model C wet-end parts from Ni-Hard or Hi-Chrome - two of the industry's toughest, most abrasion-resistant alloys. Standard hardness ranges from 650+ Bhn.



## Generous Wear Allowances

After extensive testing and analysis of wear, each wear part's thickness has been designed specifically to the amount of abrasion it would be exposed to in actual pumping use. Wear components are up to 1 1/2" thick. Impeller vanes and cups are up to 600% thicker, and the case and replaceable suction piece are 100% thicker, than those of any other vortex pump.





# Hydraulic Design of Cupped Impeller Minimizes Wear

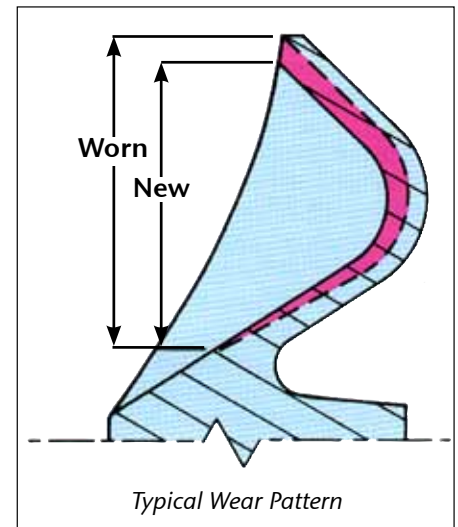
**The unique feature of the Model C pump is the performance and wear characteristics of its exclusive cup-type impeller.**

The impeller vanes and rim are the thickest in the industry - up to 1 3/8". Due to this thickness and exceptional hardness, erosion not only takes longer than conventional impellers, but actually extends the length of the vane. Since vane length determines pump performance, the additional length results in "better-than-new" performance. The practical benefit of this is a pump that continues to perform with "as-new" reliability without maintenance or adjustments until the rim is completely gone. Wearing out the rim of the impeller usually takes several years. Most competitive impellers have less than half the rim thickness of a Model C impeller, so they quickly lose top performance just as radial impellers do.

**Deflects material back into flow stream**  
Unlike most pumps, the cupped impeller action deflects material away from the case and back into the flow stream toward the extra-thick sacrificial suction piece. Behind the impeller is an easy-to-replace Hi-Chrome wear plate to withstand the grinding action of grit.

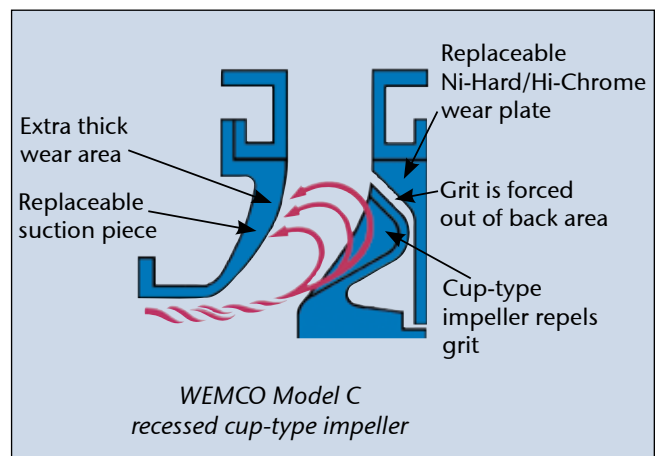
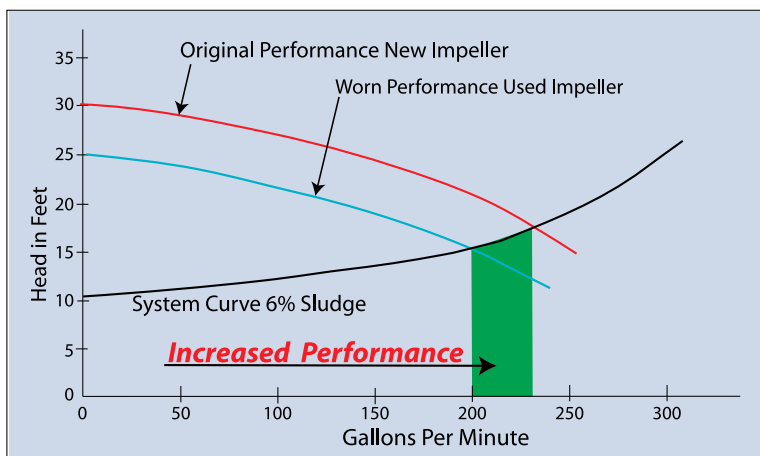
To further maximize performance and minimize wear, the large diameter impeller is fully recessed and operates at slow speeds.

This exclusive WEMCO® cup-type impeller design is the key to the Model C pump's unmatched durability and non-clog performance.



## WEMCO Model C Pump, Cupped Impeller

Compare this performance to the typical radial vane impeller on the following page.



System head for 1000' equivalent length of 4" cast iron force main



*Cup-type impeller - new condition*



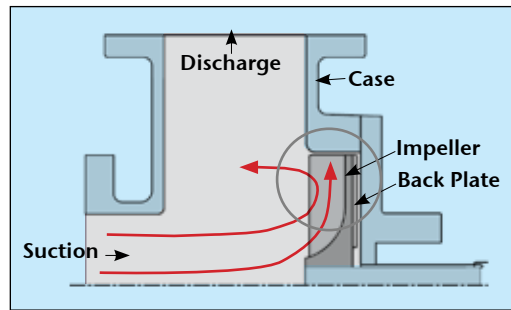
*Cup-type impeller - after thousands of hours of service, vane and cup areas increase.*



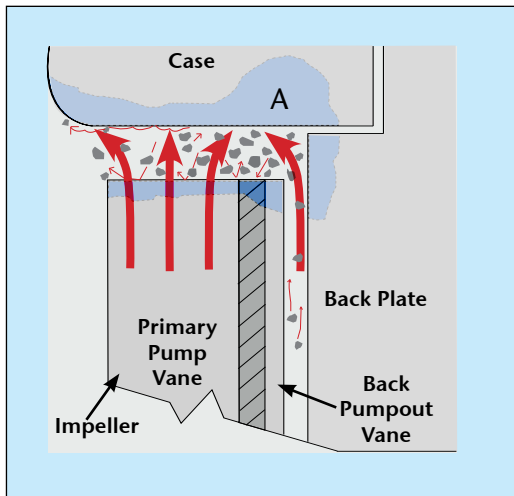
# Hydraulic Design of Competitive Vortex Impeller Increases Wear

Other vortex pumps use radial design impellers, which are highly efficient for handling soft, pipe-size solids and long fibrous materials. WEMCO should know: they invented the radial pump for that specific application.

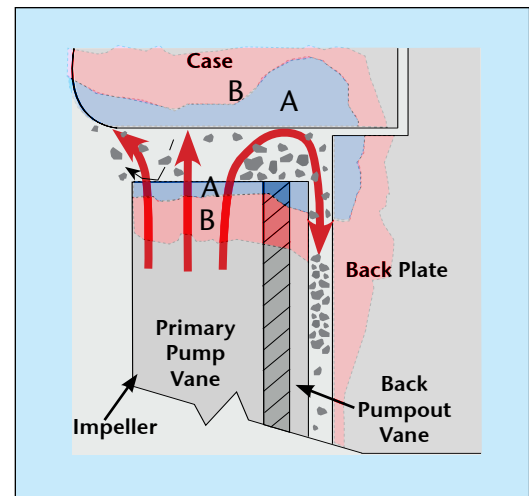
Unfortunately, when used to pump highly abrasive grit, radial impeller pumps literally grind themselves to pieces. Performance as well as hydraulic efficiency drops drastically, as shown below.



Because the radial impeller operates in a confined area of the pump case, it discharges grit particles at a high velocity directly against the case or wear ring. Compare this hydraulic action to that of the cupped impeller.



The balanced pumping pressure of the primary and back pumpout vanes hydraulically traps grit, which ricochets between the case and impeller tips, before it is discharged. This ping-pong action greatly accelerates wear in areas A and B (see drawings above), and causes premature loss of pump performance and hydraulic efficiency as shown in the chart below.

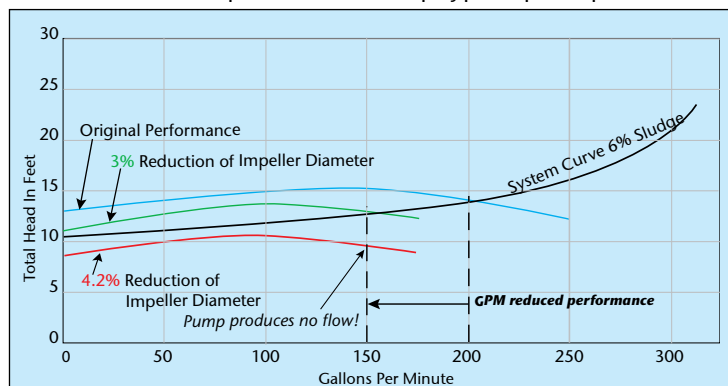


As the smaller back pumpout vanes wear, the higher pressure from the primary vanes forces greater amounts of grit back between the impeller and the backplate, trapping it and creating a grinding wheel effect.

After even a small amount of wear, the impeller may have to be replaced to maintain original performance. Wear to the case or wear ring also affects performance.

## Conventional Pump Radial Vane Impeller

Radial vane impeller loses pump performance rapidly with only a little wear. Compare this to the cup-type impeller perfor-

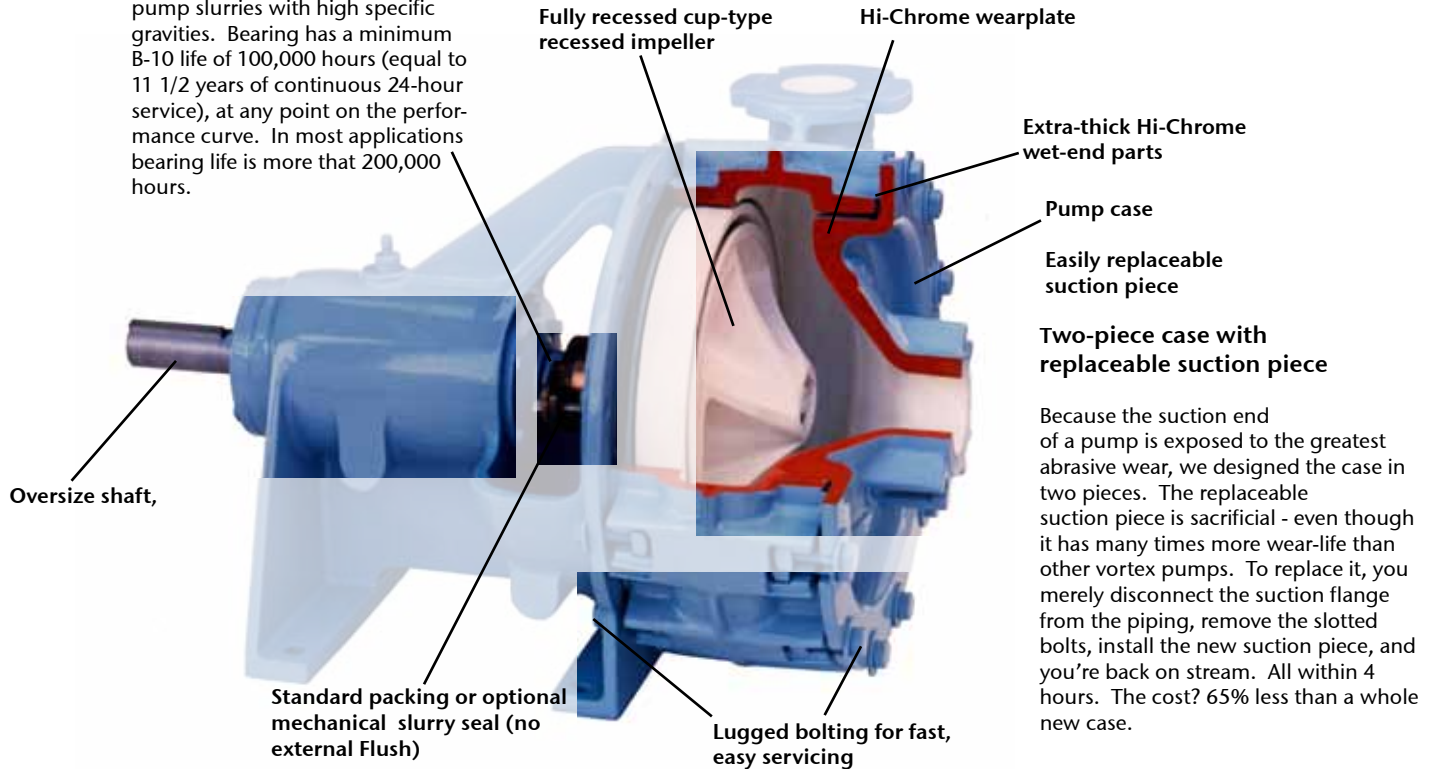


System head for 1000 equivalent length of 4" cast iron force main

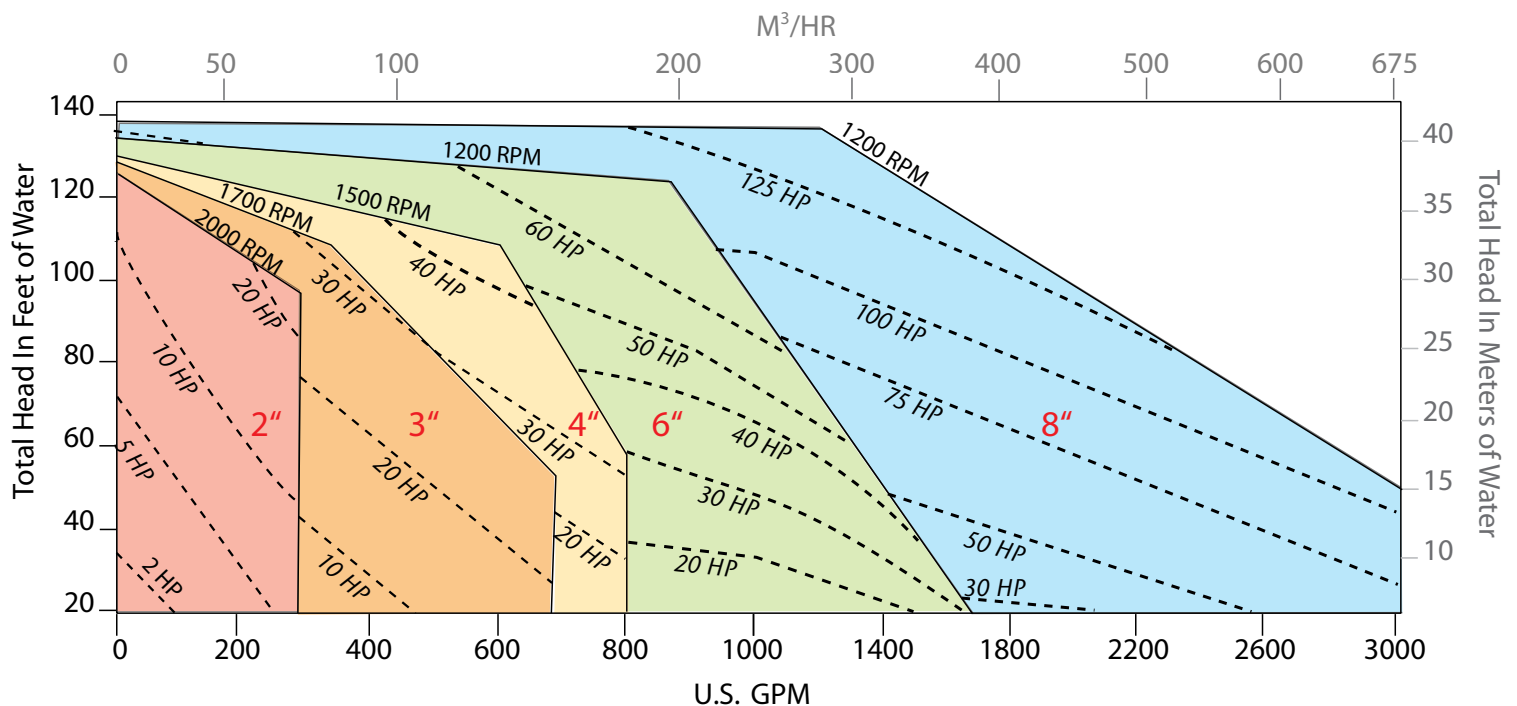
## Advantages of Model C Mechanical Design

### 100,000 hour bearing life

The power-end of the pump has a heavy duty shaft, designed to pump slurries with high specific gravities. Bearing has a minimum B-10 life of 100,000 hours (equal to 11 1/2 years of continuous 24-hour service), at any point on the performance curve. In most applications bearing life is more than 200,000 hours.



## Model C Pumps Performance



# Compare Performance Advantages Before Buying A Vortex Pump



WEMCO 4" cup-type  
impeller pump  
Weight: 866 lbs.



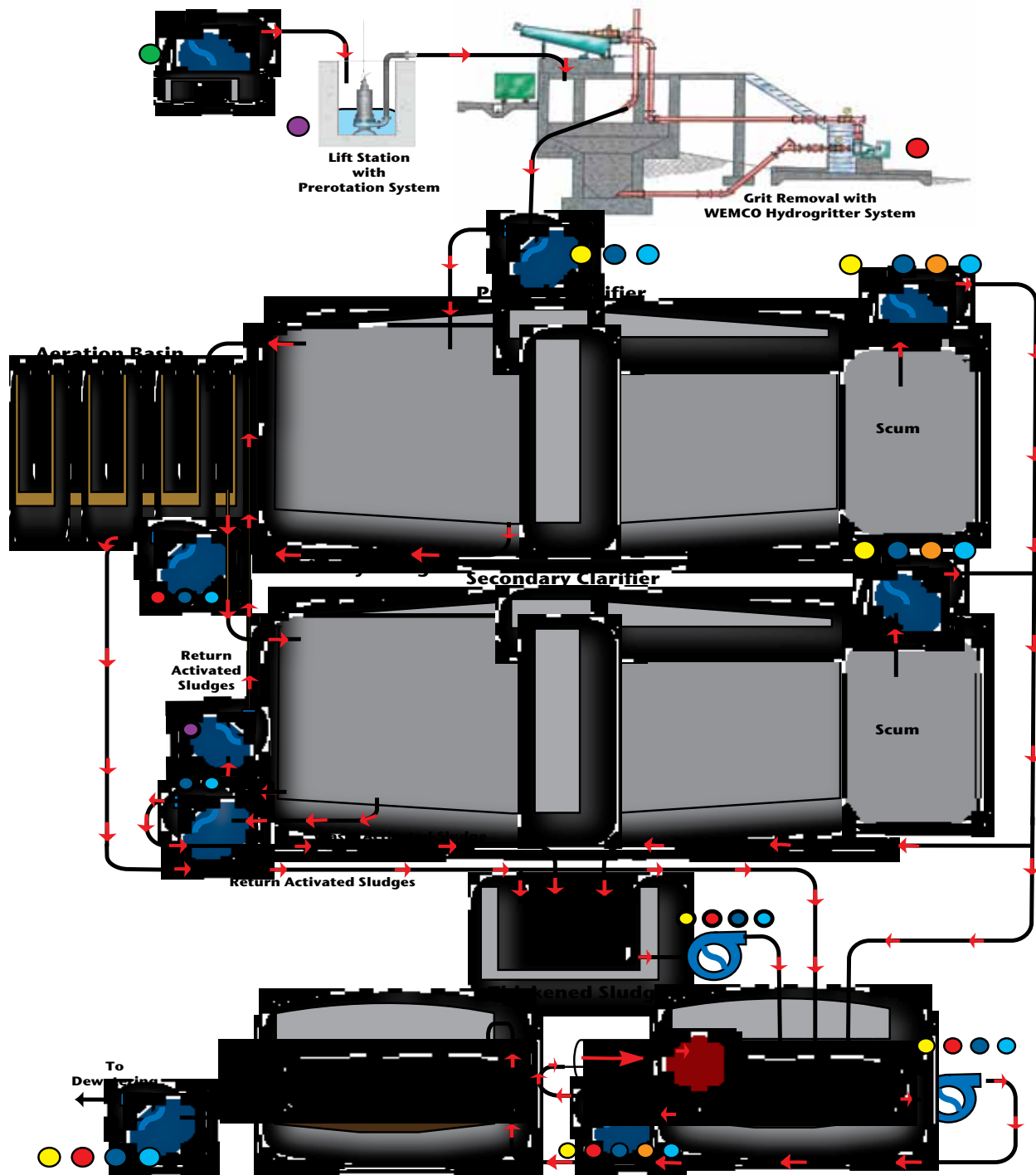
Conventional 4"  
radial impeller pump  
Weight: 350 lbs.

Slurry Pump Criteria	Model C Pump (Cup-Type Impeller)	Conventional Pump (Radial Impeller)	Model C Pump Advantages
• <b>Abrasion-Resistant Material</b>	Wet-end parts constructed of Hi-Chrome 650+ Brinell hardness.	Wet-end parts constructed of Mid-Chrome 400-600 Brinell hardness. (Silica sand is 570 Bhn)	Harder High-Chrome parts will wear longer.
• <b>Generous Wear Allowances</b>	<ul style="list-style-type: none"> <li>a. Extra-thick wear parts, including the impeller.</li> <li>b. Two-piece case with 1 1/4" sacrificial suction piece. Pump case is 3/4" Hi-Chrome.</li> <li>c. Impeller vanes 1 1/2" High-Chrome, enclosed within 1" Hi-Chrome rim.</li> <li>d. Wet-end parts exposed to wear weigh 525 lbs. Total pump weight 870 lbs.</li> </ul>	<ul style="list-style-type: none"> <li>a. Wear parts are thin-sectioned for machine ability and impeller performance.</li> <li>b. One-piece case has no sacrificial parts. When worn out, entire case must be thrown away. Pump case is 3/8" to 3/4" Mid-Chrome alloy. Wear areas are often thinnest part of pump.</li> <li>c. Impeller vanes 1/4" (3/8" maximum) Mid-Chrome alloy. Has no impeller rim to protect vane tips against wear.</li> <li>d. Wet-end weighs from 175-320 lbs. Total pump weight 230-500 lbs.</li> </ul>	<ul style="list-style-type: none"> <li>a. Designed specifically to maintain original performance when pumping abrasive slurries.</li> <li>b. Case and sacrificial suction-piece are up to 150% thicker than other vortex pump cases.</li> <li>c. Impeller vanes up to 600% thicker than radial vanes. Sturdy rim protects vanes against premature wear.</li> <li>d. Wear parts are 165% to 300% heavier than those of radial pump. Model C is 175% to 375% heavier than other competitive pumps.</li> </ul>
• <b>Hydraulic Design Minimizes Wear</b>	<ul style="list-style-type: none"> <li>a. Cup-type impeller.</li> <li>b. Cupped impeller smoothly changes direction of discharge.</li> </ul>	<ul style="list-style-type: none"> <li>a. Radial vane impeller, designed to pump soft solids. Operates in confined area where hydraulically trapped grit quickly abrades impeller tips and diameter (see drawing page 5). Impeller and case must be replaced prematurely, and frequently, to maintain original pump performance.</li> <li>b. Discharge from impeller causes direct impact of grit against case, and accelerates wear (see drawing page 5). Pump demands constant attention and frequent parts replacement.</li> </ul>	<ul style="list-style-type: none"> <li>a. Unique cup-type impeller - designed specifically to pump slurries and abrasive solids - eliminates confined areas. As wear progresses, impeller vanes and cups increase in area. Original pump performance is consistently maintained, with virtually no attention, and only periodic inspections and minimal parts replacement.</li> <li>b. Prevents direct impact of grit against case, and greatly extends pump wear life.</li> </ul>
• <b>Mechanical Design</b>	<ul style="list-style-type: none"> <li>A. Two-piece case with sacrificial suction-piece.</li> <li>b. Robust mechanical design. More than 100,000 hours of B-10 bearing life at any place on the performance curve.</li> </ul>	<ul style="list-style-type: none"> <li>a. One-piece case. When worn out, complete pump case and impeller must be replaced, requiring disassembly of suction and discharge piping.</li> <li>b. Most radial pumps have a B-10 bearing life of 20,000 to 50,000 hours.</li> </ul>	<ul style="list-style-type: none"> <li>a. Suction piece, when worn out, is replaced in 4 hours, at 65% less cost than a whole new case. Two-piece design permits fast, easy access to parts, without disassembling suction or discharge piping.</li> <li>b. 500% to 2000% longer bearing life than any radial pump.</li> </ul>
<b>Summary of Customer Benefits Model C Pump</b>		<p><i>This vortex slurry pump can consistently pump severe abrasives, pipe-size solids, and long, fibrous materials with virtually no attention and minimum parts replacement. It outlasts and outperforms any other pump of its type!</i></p>	



# WEMCO® Pumps & Equipment In The Municipal Flow Diagram

- = Model CF™ Chop-Flow™   
 ● = Model C™ Torque-Flow®   
 ● = Model CE™ Torque-Flow®   
 ● = Model E™ Torque-Flow®  
● = WEMCO® Self Primer   
● = WEMCO®-Hidrostal® Screw Centrifugal   
● = WEMCO®-Hidrostal® Prerotation   
● = WEMCO Hydrogritter®



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