



# 3"-6" VERTICAL RECIRCULATOR CHOPPER PUMPS

## Materials of Construction:

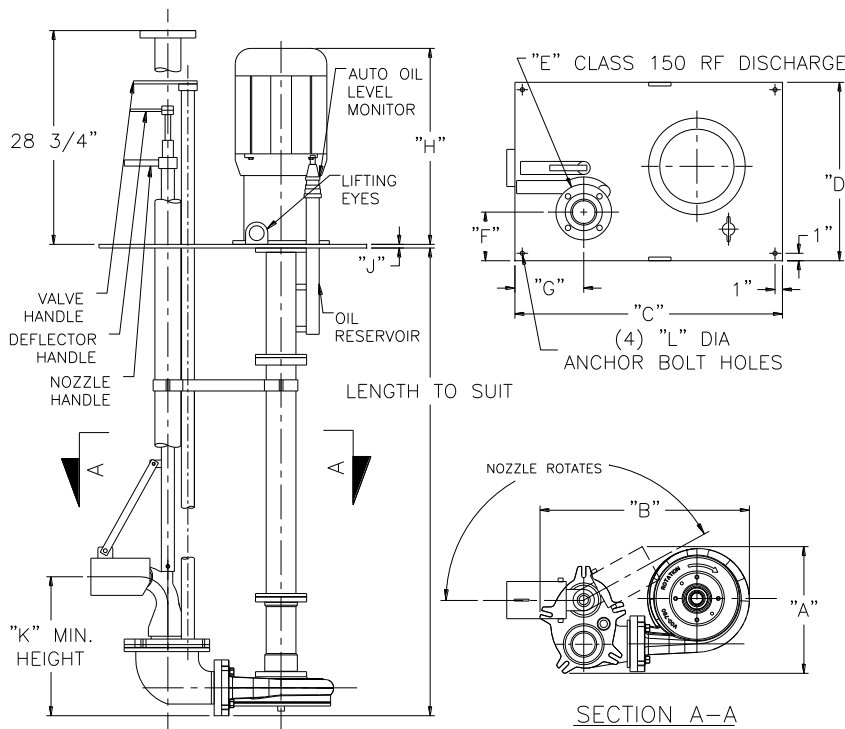
- Impeller/Upper Cutter/Cutter Bar Cutter Nut:** ..... Cast alloy steel, heat treated to minimum Rockwell C 60.
- Casing:**..... Ductile cast iron.
- Mechanical Seal:**..... Cartridge type with silicon carbide (or tungsten carbide) faces and stainless steel sleeve.
- Thrust Bearings:**..... Back-to-back angular contact ball type.
- Radial Bearings:** ..... Ball type.
- Shaft:**..... Heat treated alloy steel.
- Lubrication:**..... ISO Grade 46 oil.
- Discharge Flange:** ..... ANSI Class 150.
- Mounting Plate:**..... Carbon steel.
- Paint:**..... Epoxy.

DRAWINGS AND DIMENSIONS SUBJECT TO CHANGE WITHOUT NOTICE. DO NOT USE FOR CONSTRUCTION PURPOSES. CONTACT VAUGHAN FOR CERTIFIED CONSTRUCTION PRINTS.

MODEL	A	B	C	D	E	F	G	J	K	L
V3FR/V3GR	18-1/4	23	30	24	3	8-3/8	8-7/16	1/2	17-3/8	1/2
V3LR/V3MR	18-1/4	24-1/2	24	20	3	10	3-9/16	1/2	17-3/8	1/2
V3PR	16-1/4	28-1/4	36	24	3	6-9/16	9-1/4	1/2	17-3/8	1/2
V3VR/V3WR	18	25-1/2	30	24	3	8-3/8	8-11/16	3/4	17-3/8	1/2
V4KR/V4LR	19-1/4	28	36	24	4	6-3/4	9-9/16	1/2	18-1/4	1/2
V4SR/V4TR	19	32-3/8	36	24	4	12	6-13/16	1/2	20-1/2	1/2
5200	18-3/8	27	36	24	5	8-3/4	10-1/16	1/2	20-3/8	1/2
V6UR/V6XR	18-1/4	29-3/8	36	24	6	9-1/16	9-1/2	3/4	34-3/8	1/2

DIMENSIONS IN INCHES

HP	SPEED	FRAME	H*
5	1170	215TC	26
	1750	184TC	23
7.5	1170	254TC	30
	1750	213TC	25
10	1170	256TC	32
	1750	215TC	26
15	1170	284TC	33
	1750	254TC	30
20	1170	286TC	34
	1750	256TC	32
	3510	256TC	32
25	1170	324TC	36
	1750	284TC	33
	3510	256TC	32
30	1170	326TC	38
	1750	286TC	34
	3510	286TSC	34
40	1170	364TC	40
	1750	324TC	36
	3510	324TSC	36
50	1170	365TC	40
	1750	326TC	38
	3510	326TSC	38
60	1170	404TC	40
	1750	364TC	40
75	1170	405TC	40
	1750	365TC	40



\*DIMENSION WILL VARY SLIGHTLY WITH MOTOR MANUFACTURERS.



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## SPECIFICATIONS- 3"-6" VERTICAL RECIRCULATOR CHOPPER PUMPS

The vendor shall furnish one vertical wet pit recirculator chopper pump and all appurtenances as specified below. The pump shall be specifically designed to mix and pump waste solids at heavy consistencies. Materials shall be macerated and conditioned by the pump as an integral part of the pumping action. The pump must have demonstrated the ability to chop through and pump high concentrations of solids such as plastics, heavy rags, grease and hair balls, wood, paper products and stringy materials without plugging, both in tests and field applications.

### DETAILS OF CONSTRUCTION

- A. **Casing:** Shall be of volute or semi-volute design, spiraling outward to the Class 125 flanged discharge. Casing shall be ductile cast iron with all water passages to be smooth, and free of blowholes and imperfections for good flow characteristics. Casing shall include a replaceable Rockwell C 60 alloy steel cutter to cut against the rotating impeller pump out vanes for removing fiber and debris.
- B. **Impeller:** Shall be semi-open type with pump out vanes to reduce seal area pressure. Chopping/maceration of materials shall be accomplished by the action of the cupped and sharpened leading edges of the impeller blades moving across the cutter bar at the intake openings, with a set clearance between the impeller and cutter bar of 0.015-0.025" cold. Impeller shall be cast alloy steel heat treated to minimum Rockwell C 60 and dynamically balanced. The impeller shall be keyed to the shaft and shall have no axial adjustments and no set screws.
- C. **Cutter Bar Plate:** Shall be recessed into the pump bowl and shall contain at least 2 shear bars extending diametrically across the intake opening to within 0.010-0.030" of the rotating cutter nut tooth, for the purpose of preventing intake opening blockage and wrapping of debris at the shaft area. Chopper pumps utilizing individually mounted shear bars shall not be acceptable. Cutter bar shall be alloy steel heat-treated to minimum Rockwell C 60.
- D. **Cutter Nut:** The impeller shall be secured to the shaft using a cutter nut, designed to cut stringy materials and prevent binding using a raised, rotating cutter tooth. The cutter nut shall be cast alloy steel heat treated to minimum Rockwell C 60.
- E. **Upper Cutter:** Shall be threaded into the casing behind the impeller, designed to cut against the pump-out vanes and the impeller hub, reducing and removing stringy materials from the mechanical seal area. Upper cutter shall be cast alloy steel heat treated to minimum Rockwell C 60. The upper cutter teeth are positioned as closely as possible to the center of shaft rotation to minimize cutting torque and nuisance motor tripping. The ratio of upper cutter cutting diameter to shaft diameter in the upper cutter area of the pump shall be 3.0 or less.
- F. **Recirculation Nozzle Assembly:** The pump shall be fitted with a recirculation nozzle assembly to permit recirculation/conditioning of the pit contents prior to discharge. The recirculation nozzle shall be adjustable minimum 180° horizontally and 45° vertically. A valve assembly shall be connected to the pump discharge to adjust pump flow either to the nozzle or the pump discharge flange. Valve shall be ductile cast iron, with 316 SS valve disk. The operating levers shall be located above at a mounting plate for easy access.
- G. **Optional Automatic Valve Actuator:** An electrically operated valve actuator shall position the valve for pump out or mixed operation. A ball screw linear actuator shall be used to provide valve positioning. Unit shall operate on 110V or 220V AC, single-phase power with 25% duty cycle, and shall be capable of producing 500 pounds of actuation force, with a freewheeling feature to prevent over travel at the end of stroke. A capacitor for single phase-motor starting shall be included in the design. All components shall be housed in an enclosure suitable for outdoor operation. Includes a limit switch for indicating valve recirculation or discharge positions. External controls, housed in a separate control unit (by others), are required to indicate valve position.
- H. **Pump Shafting:** Shall be heat treated alloy steel. Upper shaft extension shall be turned, ground and polished. The shaft column shall be minimum 4" O.D. precision steel tubing welded to steel flanges and machined with piloted bearing fits for concentricity of all components. All support column tubes shall be leak tested. Distance between shaft bearings shall not exceed critical speed dimensions.
- I. **Pump Shaft Bearings:** Shall be oil bath lubricated by ISO Grade 46 oil, with the exception of the top bearing, which shall be grease packed. The bearings shall have a minimum L-10 life rated 100,000 hours. Shaft thrust shall be taken up by either a double row angular contact ball bearing or two back-to-back mounted single row angular contact ball bearings, which bear against a machined shoulder on one side and the seal sleeve on the other side. Overhang from the centerline of the lower thrust bearing to the seal faces shall be a maximum of 1.7", with a mechanical seal to isolate the bearings from the pumped media.
- J. **Pump Mechanical Seal:** The mechanical seal shall be located immediately behind the impeller hub to maximize the flushing available from the impeller pump-out vanes. The seal shall be a cartridge-type mechanical seal with Viton O-rings and silicon carbide (or tungsten carbide) faces. This cartridge seal shall be pre-assembled and pre-tested so that no seal settings or adjustments are required from the installer. Any springs used to push the seal faces together must be shielded from the fluid to be pumped. The cartridge shall also include a 17-4PH, heat-treated seal sleeve and a ductile cast iron seal gland.
- K. **Automatic Oil Level Monitor:** Shall be located above the mounting plate and be fitted with an internal oil level switch to monitor oil level and shut off the motor in event of low oil level. A relay shall be included for mounting in the motor control panel.
- L. **Pump Discharge Pipe:** The pump assembly shall be mounted vertically on a common steel base plate with a Class150 discharge flange. An NPT pressure tap shall be located above the deck plate.
- M. **Shaft Coupling:** Shall be T.B. Woods Sureflex elastomeric type with a minimum 1.5 service factor based on the drive rated horsepower, and shall be protected with a guard meeting OSHA requirements.
- N. **Motor Stool:** Shall be a fabricated carbon steel weldment machined with piloted fits to positively align the C-flanged motor and pump shaft, with no adjustments.
- O. **Pump Deck Plate:** Shall be fabricated carbon steel, 1/2" minimum thickness, and shall include lifting lugs.
- P. **Stainless Steel Nameplate:** Shall be attached to the pump giving the manufacturer's model and serial number, rated capacity, head, speed, and all pertinent data.
- Q. **Motor Requirements:** Drive motor shall be \_\_\_ HP, \_\_\_ RPM, \_\_\_ volts, 3 phase, 60 hertz, 1.15 service factor, TEFC enclosure. The motor shall be sized for non-overloading conditions.
- R. **Surface Preparation:** Degreased and coated with 5 – 8 MDFT epoxy (except motor).
- S. **OPTIONAL Surface Preparation:** SSPC-SP6 commercial sandblast (except motor), primed with 5-8 MDFT epoxy primer and finish coated with 5-8 MDFT epoxy (except motor).