



## 3" - 6" Vertical Wet Well Chopper Pumps Metric Specs

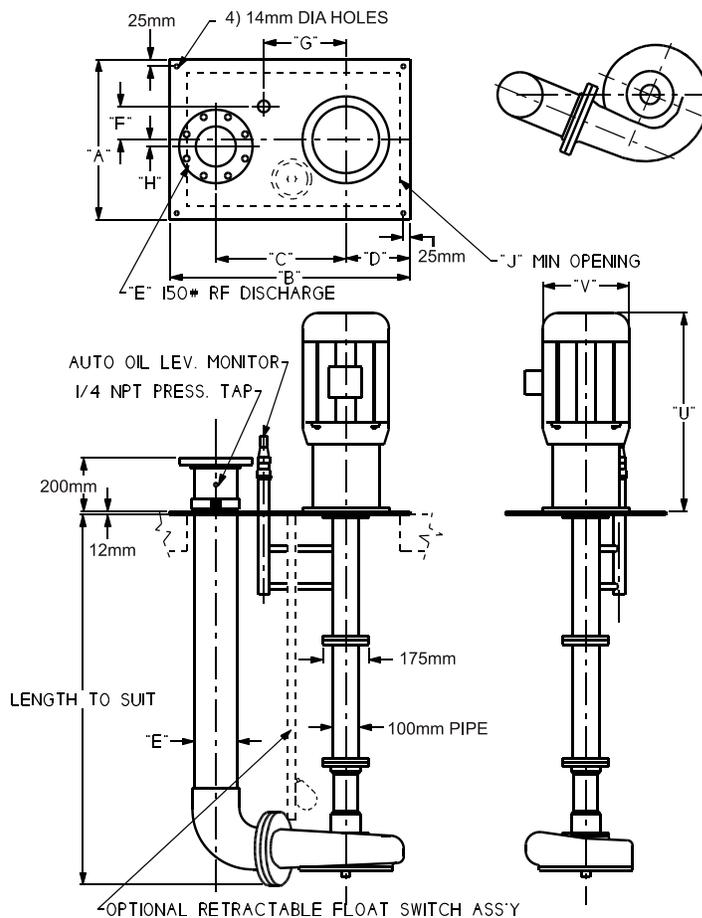
### Materials of Construction:

- Casing: .....Ductile Cast Iron.
- Impeller/Cutter Bar/  
Upper Cutter/Cutter Nut: .....Cast Steel, heat treated to minimum Rockwell C 60.
- Mechanical Seal: .....Cartridge type with silicon carbide (or tungsten carbide) faces.
- Thrust Bearings: .....Back-to-back angular contact ball type.
- Radial Bearings: .....Ball type.
- Shaft: .....Heat treated steel.
- Lubrication: .....ISO Gr. 46 oil.
- Discharge Flange: .....150 lb. ANSI rated.
- Mounting Plate: .....Carbon steel.
- Paint: .....Acrylic Urethane.

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

UNITS: mm  
UNLESS NOTED OTHERWISE

| MODEL     | A   | B   | C   | D   | E   | F    | G   | H  | J         |
|-----------|-----|-----|-----|-----|-----|------|-----|----|-----------|
| V3F / V3G | 508 | 610 | 298 | 191 | 76  | 152  | 325 | 0  | 305 X 521 |
| V3L / V3M | 508 | 610 | 324 | 195 | 76  | -152 | 262 | 0  | 349 X 526 |
| V3P       | 508 | 610 | 370 | 171 | 76  | -152 | 262 | 0  | 381 X 606 |
| V3V / V3W | 508 | 610 | 322 | 195 | 76  | -160 | 313 | 29 | 406 X 533 |
| V4K / V4L | 508 | 610 | 364 | 171 | 102 | 152  | 210 | 0  | 381 X 606 |
| V4P / V4R | 508 | 762 | 419 | 203 | 102 | 152  | 279 | 0  | 419 X 699 |
| V6U / V6X | 610 | 914 | 495 | 244 | 152 | 127  | 313 | 0  | 454 X 813 |



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CURRENT U.S. PATENTS: Nos. 7,125,221, 5,460,482; 5,460,483; 5,456,580; 5,256,032; 5,076,757; 4,840,384; 4,842,479.

CURRENT FOREIGN PATENTS: Nos. 2 371 834; 2 188 138; 1,290,981; 276224; 0 774 045.  
OTHER PATENTS PENDING.

## SPECIFICATIONS - 3"-6" VERTICAL WET WELL CHOPPER PUMPS

The Vendor shall furnish one vertical wet pit chopper pump and all appurtenances as specified. The pump shall be specifically designed to 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 125 lb. 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 steel cutter adjustable for clearance to cut against the rotating impeller pumpout 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 maximum set clearance between the impeller and cutter bar of 0.38-0.64mm 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 0.25-0.5mm 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 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 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. Pump Shafting: Shall be heat treated alloy steel. Upper shaft extension shall be turned, ground and polished. The shaft column shall be minimum 102mm inch 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.
- G. Pump Shaft Ball Bearings: Shall be oil bath lubricated by I.S.O. Grade 46 turbine oil, with the exception of the top bearing, which shall be greased packed. The bearings shall have a minimum B-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 43.2mm, with a mechanical seal to isolate the bearings from the pumped media at up to 250 F.
- H. Pump Mechanical Seal: The mechanical seal shall be located immediately behind the impeller hub to maximize the flushing available from the impeller pumpout vanes. The seal shall be a cartridge-type mechanical seal with Viton O-rings and silicon 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. Seal faces shall be tested for flatness within 2 Helium light bands under a Helium light source and optical flat.
- I. Automatic Oil Level Monitor: Shall be located above the mounting plate and be fitted with an internal oil level switch to detect oil level and shut off the motor in event of low oil level.
- J. Pump Discharge Pipe: The pump assembly shall be mounted vertically on a common steel base plate with 150 LB. Rated discharge flange. An NPT pressure tap shall be located above the deck plate.
- K. 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.
- L. 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.
- M. Pump Base Plate: Shall be fabricated carbon steel, 12.7mm minimum thickness, and shall include lifting lugs.
- N. Stainless Steel Nameplates: Shall be attached to the pump and drive motor giving the manufacturer's pertinent data.
- O. Motor Requirements: Drive motor shall be \_\_\_ KW, \_\_\_ RPM, \_\_\_ volts, \_\_\_ phase, \_\_\_ hertz, \_\_\_ service factor, \_\_\_\_\_ enclosure. The motor shall be sized for non-overloading conditions.
- P. Surface Preparation: Solvent wash. Coat with minimum 3 MDFT epoxy.  
OPTIONAL ADDER Surface Preparation: SSPC-SP5 commercial sandblast, primed with 3 MDFT zinc-filled primer and finish coated with 3 MDFT epoxy (except Motor).

SpecV120 (9/2010)

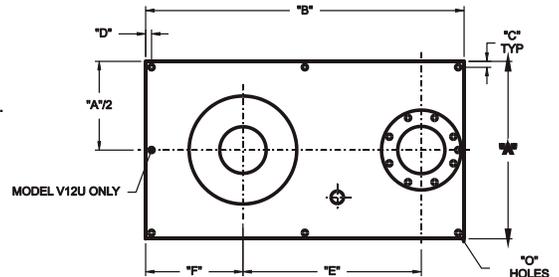


# 8" – 12" Vertical Wet Well Chopper Pumps Metric Specs

## Materials Of Construction:

### Impeller / Upper Cutter /

- External Cutter:** .....Cast Steel, heat treated to minimum Rockwell C 60.
- Cutter Bar:** .....Plate Steel, heat treated to minimum Rockwell C 60.
- Casing/Back Pull-Out Plate:** .....Ductile Cast Iron.
- Mechanical Seal:** .....Cartridge type with silicon carbide (or tungsten carbide) faces.
- Seal Sleeve:** .....Stainless steel.
- Thrust Bearings:** .....Back-to-back angular contact ball type.
- Radial Bearings:** .....Ball type.
- Shaft:** .....Heat treated steel.
- Lubrication:** .....ISO Gr. 46 oil.
- Discharge Flange:** .....150 lb. ANSI rated.
- Mounting Plate:** .....Carbon Steel.
- Paint:** .....Epoxy.

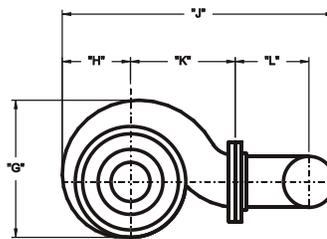


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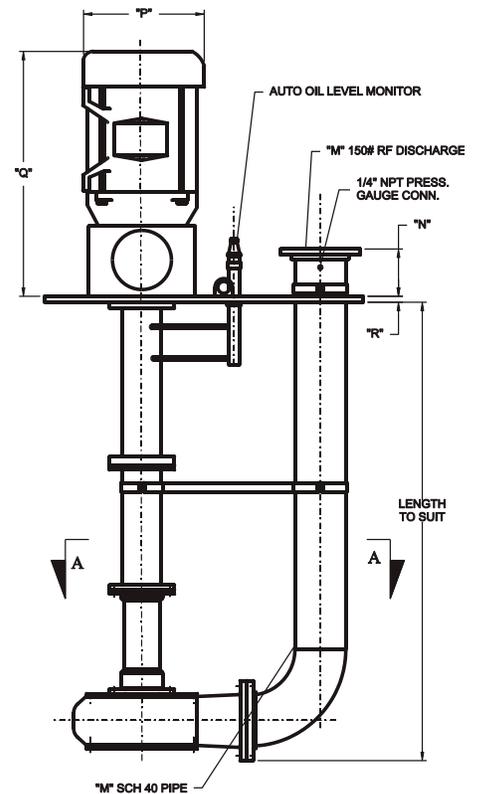
| MODEL | A     | B     | C  | D  | E     | F   | G   | H   |
|-------|-------|-------|----|----|-------|-----|-----|-----|
| V8N   | 762   | 1,372 | 25 | 25 | 768   | 419 | 589 | 294 |
| V8P   | 762   | 1,372 | 25 | 25 | 794   | 419 | 697 | 287 |
| V10R  | 1,219 | 1,829 | 38 | 38 | 995   | 552 | 810 | 406 |
| V12U  | 1,308 | 2,286 | 51 | 51 | 1,175 | 711 | 954 | 476 |

| MODEL | J    | K   | L   | M   | N   | O  | R  |
|-------|------|-----|-----|-----|-----|----|----|
| V8N   | 1172 | 451 | 318 | 203 | 203 | 25 | 22 |
| V8P   | 1191 | 476 | 318 | 203 | 203 | 25 | 22 |
| V10R  | 1537 | 584 | 413 | 254 | 203 | 25 | 22 |
| V12U  | 1813 | 686 | 487 | 305 | 254 | 38 | 32 |

UNITS: mm  
UNLESS NOTED  
OTHERWISE



SECTION A-A



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CURRENT U.S. PATENTS: NO. 5,460,482; NO. 5,460,483; NO. 5,456,580; NO. 5,256,032; NO. 5,076,757; NO. 4,840,384; NO. 4,842,479.

CURRENT FOREIGN PATENTS: NO. 2 371 834; NO. 2 188 138; NO. 1,290,981; NO. 276224; NO. 0 774 045.

OTHER PATENTS PENDING.

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The vendor shall furnish one vertical wet pit chopper pump and all appurtenances as specified. The pump shall be specifically designed to 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, Back Pull-Out Adapter Plate and Wear Plate: The pump casing shall be of volute design, spiraling outward to the flanged centerline discharge. A ½"-NPT pressure tap shall be included on or near the discharge flange. Back pull-out adapter plate shall allow removal of pump components from outboard of the casing, and allow external adjustment of impeller-to-cutter bar clearance. Casing and adapter plate shall be ductile cast iron with all water passages to be smooth, and free of blowholes and imperfections for good flow characteristics. The back pull-out wear plate shall be heat treated low-alloy steel plate. Backplate will include a replaceable Rockwell C 60 steel wear plate adjustable for .13-1.27mm clearance to cut against the rotating impeller pumpout 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 maximum set clearance between the impeller and cutter bar of .38-.64mm. Impeller shall be cast steel, heat treated to minimum Rockwell C 60 and dynamically balanced. The impeller shall be threaded 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 .51-1.02mm for 8"-10" pumps and 1.02-1.52mm for 12" pumps of the rotating external cutter tooth, for the purpose of preventing intake opening blockage and wrapping of debris at the shaft area. Chopper pumps utilizing individually mounted shear bars, and which do not have a rotating external cutter extending through to the opposite side of the shear bar, shall not be acceptable. Cutter bar shall be alloy steel heat-treated to minimum Rockwell C 60.
- D. Upper Cutter: Shall be bolted into the back pull-out adapter plate 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 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 3.6 or less.
- E. External Cutter: The external cutter shall be used to eliminate binding or build-up of stringy materials at the pump inlet. The external cutter shall consist of opposing cutter wings which shear against the outside surface of the shear bars on the cutter bar plate to within .25-.51mm, an integral cast anvil which shears against the adjacent surface of the shear bars on the cutter bar plate, and a hex head sufficiently sized for ease of removal. The external cutter shall be cast steel and heat treated to a minimum 60 Rockwell C Hardness.
- F. Pump Shafting: Shall be 2-7/16" diameter minimum. Lower stub shaft shall be heat treated. Upper shaft extension shall be turned, ground and polished. The shaft column shall be 6-5/8" inch 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.
- G. Pump Shaft Ball Bearings: Shall be oil bath lubricated by I.S.O. Grade 46 turbine oil, with the exception of the top bearing, which shall be greased packed. The bearings shall have a minimum B-10 life rated 100,000 hours. Shaft thrust shall be taken up by 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 2.75", with a mechanical seal to isolate the bearings from the pumped media at up to 250 F.
- H. Mechanical Seal: The mechanical seal shall be located immediately behind the impeller hub to eliminate the stuffing box and maximize the flushing available from the impeller pumpout vanes. The seal shall be a screw-in, cartridge-type mechanical seal with Viton O-rings and silicon carbide (or tungsten carbide) faces. This cartridge seal shall be a pre-assembled, 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 iron seal gland.
- I. Automatic Oil Level Monitor: Shall be located above the mounting plate and be fitted with an internal oil level switch to detect oil level and shut off the motor in event of low oil level.
- J. Pump Discharge Pipe: The pump assembly shall be mounted vertically on a common steel base plate with 150 LB. rated discharge flange. A 1/4" NPT pressure tap shall be located above the deck plate.
- K. 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.
- L. 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.
- M. Pump Base Plate: Shall be fabricated carbon steel, 1" minimum thickness, and shall include lifting lugs.
- N. Stainless Steel Nameplates: Shall be attached to the pump and drive motor giving the manufacturer's pertinent data.
- O. Motor Requirements: Drive motor shall be \_\_\_ KW, \_\_\_ RPM, \_\_\_ volts, \_\_\_ phase, \_\_\_ hertz, \_\_\_ service factor, \_\_\_ enclosure. The motor shall be sized for non-overloading conditions.
- P. Degreased and coated with an minimum 3 MDFT epoxy (except motor).

OPTIONAL ADDER Surface Preparation: SSPC-SP5 commercial sandblast, 3 MDFT zinc-filled primer, and 3 MDFT epoxy finish coat (except Motor).  
Spec VM354 (5/2011)