

Suggested Specifications Vertical Non-Clog Column Pumps Type NC

{ **Engineer's Note:** These specifications are intended to allow you maximum flexibility throughout. Items in bold parentheses () represent choices. Inappropriate choices should be struck. Options should be selected as required.}

1.10 Scope: The contractor shall furnish and install as shown on the plans and described in these specifications. One (**simplex, duplex**) vertical column type non-clog sewage system mounted over a _____ inch diameter by _____ inch deep (**concrete, steel, cast iron, fiberglass**) basin. The vapor tight cover plate shall have removable steel access and inspection covers. The contractor shall also furnish all valving, piping, level and motor controls necessary to provide the owner with a fully operational system.

1.20 Manufacturer: These specifications describe pumping equipment manufactured by PACO Pumps, Brookshire, TX. This is done to indicate the type, function and minimum standards of design, efficiency and quality required. This shall not be construed as elimination of other manufacturers capable of showing through the submittal and total cost evaluation process, equipment of comparable and equal quality, performance and value.

1.30 Submittals: The equipment selected was deemed to be the best selection based on design, efficiency, quality and performance. Other manufacturers of equally acceptable equipment shall submit to the engineer 15 days prior to the published bid opening date a minimum of three (3) sets of preliminary submittal data, consisting of the following:

1. Manufacturer's standard brochure of the equipment submitted.
2. Manufacturer's standard technical data sheet.
3. Manufacturer's standard dimensional drawings.
4. Manufacturer's standard installation instructions.
5. Manufacturer's standard operation and maintenance manual.
6. Manufacturer's standard published performance curve.
7. Performance data and physical characteristics showing actual design pump performance.
8. Exceptions taken sheet, listing in detail, each exception taken to the engineer's specifications and the value added by that exception.

1.60 Installation: The installation of the pumping equipment shall be in accordance with the drawings and manufacturer's instructions. All equipment shall be supported and securely anchored, making sure all connections are plumb and tight. All construction debris shall be removed from the system and wet well prior to operation of the pumping equipment.

1.70 Start-up and Field Testing: Operational field tests shall be conducted by the pump manufacturer's factory trained start-up representative. The start-up and operational test shall be conducted in the presence of the engineer, owner operator personnel and the contractor. Final site specific level control adjustments shall be made to ensure proper functioning of the system.

1.90 Warranty: The pump unit or any part thereof shall be warranted against defects in material or workmanship within one year from date of installation or 18 months from date of

manufacture, whichever comes first, and shall be replaced at no charge with a new or manufactured part, F.O.B. Factory or authorized warranty service station. The warranty shall not assume responsibility for removal, reinstallation or freight, nor shall it assume responsibility of incidental damages resulting from the failure of the pump to perform. The warranty shall not apply to damage resulting from accident, alteration of design, misuse or abuse.

2.00 Pumping System:

2.10 Operating Conditions: Each wastewater pump shall be capable of delivering a design flow capacity of _____ GPM of raw unscreened wastewater against a total dynamic head of _____ feet, including a suction head of _____ feet, and static discharge head of _____ feet. Each pump shall also be capable of passing a _____ inch spherical solid. The pump shall be of broadband efficiency design allowing the motor to operate throughout the entire calculated system curve range without utilizing the motor _____ service factor. Utility power at the site shall be _____ phase, _____ Hertz, _____ volt, and _____ wire service.

2.30 Motor Electrical Data:

	Model	Model
Motor		
HP		
RPM		
Volt		
Service Factor		
Enclosure		
Amperage		
Start		
Run		

3.0 Pump Construction

3.10 Impeller

The impeller shall be on one-piece ASTM A48, Class 30B, close grain cast iron (**double shrouded, fully enclosed, Chenault, vortex**) design. The impeller shall be of non-clog design, with large smooth contours, without acute turns, free of blowholes and imperfections. The large free passages shall be capable of handling solids, fibrous materials, sludge and other matter normally found in conventional wastewater applications.

The impeller shall be of _____ vane design with high efficiency throughout a broad-band operating range, capable of passing a minimum of _____ inch sphere.

Single and multi-vane impellers shall be capable of field trimming and balancing to meet actual site specific conditions. The impeller hub shall be accurately slip fitted and key driven to the motor shaft. The impeller shall be securely attached to the shaft by means of a locking washer and impeller screw of AISI-304 stainless steel.

3.20 Wear Plates: (Optional): The pump volute shall be fitted with a (**brass, stainless steel**) case wear plate to provide efficient sealing between the impeller and volute. The case wear plate shall be fitted to the case at a suitably machined recess and securely fastened with 300 series stainless steel recessed head screws. The case wear plates shall be of full circle deep section design to prevent distortion.

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(Optional): The impeller shall be provided with **(brass, stainless steel)** impeller wear plate of dissimilar grade material to prevent galling. The continuous full circle, deep section wear plate design shall be fastened to a suitably machined surface with 300 series stainless steel recessed head screws.

3.30 Volute: The pump volute casting shall be of high strength ASTM A48, Class 30B, close grain cast iron, single piece non-concentric design, with smooth contoured surfaces and fluid passages capable of passing any solid which passes through the impeller.

All non-clog volutes 6" and larger shall be provided with double volute passages to minimize radial shaft loadings.

3.40 Motor Support Bracket: The motor support bracket shall be of ASTM A48, Class 30B, close grain cast iron with accurately machined rabbet fit between the motor and bracket. The thrust bearing housing shall be integrally cast to insure positive alignment and that the thrust bearing is a minimum of 6" above the floor.

3.42 Shafts: The pump shall be provided with a AISI 416 stainless steel main pump shaft and AISI 303 stainless steel lower stub shaft.

3.43 Upper Thrust Bearing: The thrust bearing shall be of single row, deep groove, ball bearing design, mounted in a dust proof housing with moisture seal.

3.44 Lower Pump Bearing: The lower pump bearing shall be of **(media lubricated fluted synthetic, cast iron grease lubricated, bronze grease lubricated)** design.

3.45 Intermediate Bearing: (Optional): The pump column shall be fitted with a **(media lubricated PACOLOY composition, bronze-grease lubricated)** intermediate bearing for each four (4) foot increment of column beyond the initial six (6) foot sump depth.

3.50 Column: The pump, shall be provided as standard, schedule 40 steel column with machined flanges, assuring perfect alignment between the pump volute and motor.

3.55 Pressurized Column: (Optional): The pump shall be protected against highly abrasive pumpage with a pressurized column. The pump rotating element shall be carried by grease packed, deep-groove, self-aligning, radial ball thrust bearing in dust proof housing, machined in motor support bracket located above the sump cover. Shaft shall be sealed above the sump cover by deep stuffing box, with split type gland for ease of servicing. Bottom column bearing at pump shall be fluted synthetic rubber. Intermediate main shaft bearings for sump depths greater than five (5) feet shall be fluted bronze. Pump column shall be pressurized with fresh water supplied through an automatic solenoid valve with water line to column. Throttle bushings at lower bearing allow fresh water purge and prevent pumpage from entering column or bearings. Fresh water supply is to be provided to the solenoid valve at a minimum of 10 PSI above pump discharge head at a rate of 1 – 2 gpm.

4.00 Motor Construction

4.10 Motor: A _____ HP (**1750, 1150, 870**) RPM, _____phase, _____ Hertz, _____ volt, vertical mounted, C-face **(drip proof, totally enclosed, explosion proof)** electric motor of ball bearing design, shall be directly connected to the pump through a flexible coupling. The motor shall be of ample capacity to deliver the specified GPM and TDH.

5.00 Pump Accessories

5.10 Sump Cover: The basin sump cover shall be of fabricated steel, _____ inches OD by _____ inches thick, and shall be of vapor-tight construction with sub-plates and openings as indicated on the plans.

5.20 Sump Basin: The contractor shall provide a _____ foot, _____ inch deep **(steel, cast iron, fiberglass, concrete)** sump basin with sub-plates and openings as indicated on the plans.

6.00 Controller

6.10 Control Panel: The electrical controls shall be mounted inside a NEMA (**1, 3R, 4, 7**) enclosure fabricated of steel. The enclosure shall be provided with a through the door disconnect and bear a UL label of an enclosure manufacturer.

All components will bear a UL label. All wiring, workmanship and schematics will comply with standards set forth by the National Electrical Code (NEC) and Underwriters Laboratory (UL).

6.20 Wiring/ Conduit: All pilot duty volt control circuit wiring inside the control panel, shall be a minimum of MTH, 600 volt rated, 18 gauge with 90oC temperature rating, in accordance with UL standards. All conduit connections are to be UL listed and installed in accordance with

NEC standards.

All current carrying wire and conduit shall be properly sized in accordance with NEC standards.

6.30 Motor Protection: Each pump motor shall be protected by a properly sized motor starter.

The magnetic motor starter is to be of open, across the line type, bearing a UL label for motor control devices and properly sized by motor horsepower.

All motor starters shall be equipped with under-voltage release and overload protection.

An overload reset button shall be mounted through the door to permit resetting of the starter overload without opening the panel door.

6.41 Mechanical Float Switch (Simplex): The automatic pumping cycle shall be controlled with a NEMA (**1, 4, 7, 9**) mechanical ball and rod float switch, mounted onto the coverplate with vapor tight stand. The float switch shall be provided with DPST, lever operated, snap action contacts. The mechanical float switch shall be field adjustable. The electrical contact shall maintain pump operation between the on and off level.

6.42 Mechanical Float Alternator (Duplex): The automatic pumping cycle, alternation and override function shall be controlled with a NEMA (1, 4, 7, 9) mechanical ball and rod float alternator switch, mounted onto the coverplate with vapor tight stand. The mechanical alternator shall be provided with 2 sets of DPST, lever operated, snap action contacts. The mechanical alternator shall be field adjustable, and provide automatic alternation of two pumps. Automatic override starting the second pump when needed shall also be provided.

6.43 Mercury Level Sensory: (Option): The automatic pumping cycle shall be controlled with sealed mercury level sensors, to sense the wet well level and control the pumping cycles. Each mercury level sensor shall be field adjustable to sit specific conditions. Electrical interlocks are to maintain pump operation between each level.

6.70 Compression Alarm: (Standard): An additional compression type sensor shall be provided to sense the static pressure of air trapped in the compression pipe as the liquid level rises. The compression alarm switch shall be provided with DPDT snap action contacts.

6.72 Mercury Sensor Alarm: (Optional): An additional level sensor shall be provided to indicate high wet well level conditions. The sensor shall activate a panel mounted red alarm light.

(Option A) In addition, the high water alarm sensor shall activate a remote mounted NEMA 3R red alarm light.

(Option B) In addition, the high water alarm sensor shall activate an audible-visible combination remote mounted NEMA 3R red light and **(bell, horn)**. A "Push-To-Silence" button shall be provided which will activate a relay silencing the audible alarm, the visual light will continue to indicate an alarm condition until the condition has been corrected.

6.75 Dry Telemetry Contacts: Dry telemetry contacts shall be provided inside the control panel to interface with the local volt alarm.

7.00 Equipment Manufacturer

7.10: These specifications and accompanying plans indicate specific equipment and materials which are deemed most suitable for the service anticipated. The pumping equipment shall be the product of a manufacturer with a minimum of eighty (80) years experience in the design and manufacturing of pumps. This is not done, however, to eliminate others of equal quality and experience. The contractor shall prepare his bid on the basis of the particular equipment and material specified for the purpose of determining the low bid.

After the execution of the contract, should the contractor desire to substitute "approved" equipment of makes other than those named in the contract, such substitutions will be considered for one reason only: the equipment proposed for such substitution is equal or superior in construction and performance to that named in the contract, and higher quality has been demonstrated by at least ten (10) years of service in similar installations.

In the event the contractor obtains the engineer's approval on equipment other than that which was originally laid out, the

contractor shall, at his own expense, make any changes in the structure, building, valving, or piping necessary to accommodate the substitute equipment.

It will be assumed that the cost to the contractor of the equipment proposed for substitution is less than that of the equipment named in the specifications, and if the substitution is approved, the contact price shall be reduced by an amount equal to the savings.