|  |  |  |
| --- | --- | --- |
| Version | Date | Description of Revisions |
| 1 | August 30, 2006 | Approved final document. |
| 2 | September 22,2009 | Insertion of the pre-approved suppliers/manufacturers names and review/update of document cross-references |
| 3 | March 16, 2011 | Minor revisions |
| 4 | May 10, 2013 | First Draft – Consolidated Comments Spec Update Project |
| 5 | June 17, 2013 | Finalized for Legal Review. Incorporation of new Commissioning and Computerized Maintenance Management System Data Requirements Specification cross references. |
| 6 | May 27, 2014 | Revised to incorporate Legal Services’ comments |
| 7 | July 15, 2014 | Amended to reflect changes related to commissioning specification and name change (AV) |
| 8 | September 24, 2014 | Updated, Finalized Specification – Reference eDOCS #1029452-v6 (AV) |
| 9 | February 18, 2015 | Updated standards (AV) |
| 10 | March 2, 2015 | Updated, Finalized Specification – Legal Reference eDOCS #5043354 v12 (AV) |
| 11 | March 18, 2016 | Updated AWWA Standards |
| 12 | February 14, 2017 | Updated standards references. Updated acceptable manufacturers (CPD PMO, OMM) (AV) |
| 13 | March 1, 2017 | Updated with addition of reference to NSF 372. (AV) |
| 14 | January 12, 2022 | Updated for pump testing project (Q-18-300) (BM) |

NOTE:

This is a CONTROLLED Document. Any documents appearing in paper form are not controlled and should be checked against the on-line file version prior to use.

**Notice:** This Document hardcopy must be used for reference purpose only.

**The on-line copy is the current version of the document.**

# GENERAL

## Scope of Work

### The work of this Section consists of supplying, testing, delivering and commissioning the installation of vertical turbine pump units designed for continuous unattended operation as described herein and shown on the Contract Drawings.

### Unit Responsibility: The work requires that the vertical turbine pumps, complete with all accessories, be the end Product of one system manufacturer or system supplier. Unless otherwise indicated in the Contract Documents, the Contractor shall obtain each system from the supplier of the equipment, which supplier shall furnish all components and accessories of the system to enhance compatibility, ease of operation and maintenance, and as necessary to place the equipment into operation in conformance with the specified performance requirements, features and functions without altering or modifying the Contractor’s responsibilities under the Contract Documents. The Contractor is responsible to the Region for providing the equipment systems as specified in this Section.

### All equipment data, maintenance records, spare parts and tools lists, system curves, maintenance requirements and other essential asset information shall be in accordance with the requirements of Section 01430 – Operation and Maintenance Data. All equipment information shall be in an electronic format suitable for upload to the Region’s CMMS (Maximo). Refer to Section 01425 – Computerized Maintenance Management System Data Requirements.

## Related Sections

### *[Under "Related Sections", identify other Sections that are related to, and/or dependent on, the work results or information specified elsewhere. The list should be limited to Sections with specific information that the reader might expect to find in this Section, but is specified elsewhere. For example, if hardware for aluminum entrances is specified in the aluminum entrance Section, a cross-reference would be appropriate in the finish hardware Section. The purpose of this cross-referencing is for information only, to aid in finding those other requirements—not to define the scope of the Section.*

### *Cross-referencing here may also be used to coordinate assemblies or systems whose components may span multiple Sections and which must meet certain performance requirements as an assembly or system.*

### *This Section is to be completed/updated during the design development by the Consultant. If it is not applicable to the section for the specific project it may be deleted.]*

### *[List Sections specifying installation of products supplied but not installed under this Section and indicate specific items.]*

### Section [\_\_\_\_\_\_ – \_\_\_\_\_\_\_\_\_\_\_\_]: Execution requirements for ...[item]... specified under this Section.

### 

### *[List Sections specifying products installed but not supplied under this Section and indicate specific items.]*

### Section [\_\_\_\_\_\_ – \_\_\_\_\_\_\_\_\_\_\_\_]: Product requirements for ...[item]... for installation under this Section.

### Section [\_\_\_\_\_\_ – \_\_\_\_\_\_\_\_\_\_\_\_]: [Optional short phrase indicating relationship].

#### Section 01250 – Substitutions

#### Section 01300 – Submittals

#### Section 01425 – Computerized Maintenance Management System Data Requirements

#### Section 01430 – Operation and Maintenance Data

#### Section 01810 – Equipment Testing and Facility Commissioning

#### Section 01820 – Demonstration and Training

#### Section 11010 – Equipment General Requirements

#### [Division 13 SCADA and Instrumentation – insert applicable specifications]

## References

### Comply with the latest edition of the following codes and standards, and all amendments thereto:

#### American Water Works Association (AWWA)

##### ANSI/AWWA E102-17, Submersible Vertical Turbine Pumps

##### ANSI/AWWA D102-17, Coating Steel-Water Storage Tanks

##### ANSI/AWWA C203-15, Coal-Tar Protective Coatings and Linings for Steel Water Pipe

#### American Society of Mechanical Engineers (ASME)

##### ANSI/ASME B16.1-2015 Gray Iron Pipe Flanges and Flanged Fittings Classes: 25, 125, and 250

#### American Society for Testing and Materials (ASTM)

##### ANSI/ASTM A53/A53M-20, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless

#### Hydraulic Institute (HI)

##### ANSI/HI 14.6-2016, American National Standard for Rotodynamic Pumps for Hydraulic Performance Acceptance Tests

#### National Electrical Manufacturer’s Association (NEMA)

##### [Consultant to replace with equivalent NEMA designation for the following: EEMAC (Design B Class B Insulation)]

#### American Iron and Steel Institute (AISI)

##### Stainless Steel, AISI 416

#### Society for Protective Coatings (SSPC)

##### SSPC-SP6/NACE No.3, Commercial Blast Cleaning

#### NSF International (NSF)

##### NSF/ ANSI Standard 60: Drinking Water Treatment Chemicals- Health Effects

##### NSF/ ANSI Standard 61: Drinking Water System Components- Health Effects

##### NSF/ANSI Standard 372-2011: Drinking Water System Components – Lead Content

## Pump Requirements

### The pump units shall conform in general to the requirements of the AWWA E102-17 Submersible Vertical Turbine Pumps and the requirements specified in this Section.

### The work includes the following pumps:

### [Consultant to provide schedule of vertical turbine pumps]

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Pump Number | Location | Capacity L/S | Total Dynamic Head (TDH) | Minimum Efficiency | Discharge |
|  |  |  |  |  |  |

### All the pumps supplied under this Section shall be from the same manufacturer.

## Submittals

### Shop Drawings:

#### Make, model, weight, and kilowatts of each equipment assembly.

#### Dimensional drawings showing the proposed layout and sections together with motor and anchor bolt base plans.

#### Pump curves illustrated in metric units including NPSHR, efficiency, RPM and brake horsepower data for all pumps.

#### A graphical plot showing speed torque curves for each motor at 70%, 80% 90% and 100% rated voltage, together with the respective pump load curve.

#### A precise list of all electrical requirements for the equipment including controls, monitoring equipment and instruments shall be given, including all power characteristics and materials of construction. A schematic of wiring of the listed electrical equipment assembled together must also be included in the submittal.

### Informational Submittals:

#### Factory Functional Test Report. Test Reports shall be submitted to the Consultant and the Region for approval and shall be in an electronic format suitable for upload to the Region’s CMMS (Maximo).

#### Manufacturer’s Certification of Compliance that the factory finish system is identical to the requirements specified in the Contract Documents.

#### Special shipping, storage and protection, and handling instructions.

#### Manufacturer’s printed installation instructions.

#### Manufacturer’s Certificate of Proper Installation.

#### Operation and Maintenance Data: As specified in Section 01430 – Operation and Maintenance Data. Refer to Section 01425 – Computerized Maintenance Management System Data Requirements for additional requirements.

#### A list of suggested spare parts required to maintain the equipment in service for a period of five years. Include a list of any special tools required for checking, testing, parts replacement, and maintenance with current price information. Provide a list of any special tools required with details for use or cross-reference to O&M manuals in an electronic format suitable for upload to the Region’s CMMS (Maximo).

#### List any special tools, materials, and supplies furnished with equipment for use prior to and during startup and for future maintenance.

#### All other required information as detailed in the equipment information template. Submit the information in an electronic format suitable for upload to the Region’s CMMS (Maximo) as defined by Section 01430 – Operation and Maintenance Data. Refer to Section 01425 – Computerized Maintenance Management System Data Requirements for additional requirements.

#### Contractor shall provide an Affidavit of Compliance in accordance with AWWA E102-17 subsections 4.3 and 6.3.

#### Characteristic curves for variable speed pumps for maximum pump speed and for speeds required to obtain minimum pump flow and head conditions specified and indicated. Identify curves by speed and provide all curves on one sheet. Provide NPSH curve for each speed.

#### Certified setting plans, with tolerances, for anchor bolts.

#### Certified results of hydrostatic testing.

#### Certified results of dynamic balancing.

#### Bearing temperature operating range for the service conditions specified.

#### Resonant frequency analysis.

### Prior to submitting shop drawings for the pumps, the Contractor shall complete the Table 2 Data Form, attached as a supplement to this Specification Section, for the proposed pumps and submit the completed the Table 2 Data Form to the Consultant for review.

### Shop and field testing procedures, pump and piping set up, equipment to be used and ANSI/HI testing tolerances to be followed.

## Warranty

### The Contractor warrants that all equipment covered by or supplied under this Contract shall:

#### Comply with the Specification Sections for the said equipment.

#### Be free from defects in design, manufacture, workmanship or materials.

#### Perform efficiently and without unwanted interruption for a period of 24 months after the date of the Total Performance of the Work. The date of Total Performance of the Work shall be established by the Consultant and is as defined in the General Conditions of the Contract.

#### Repair, at the Contractor’s own expense, any breakage, damage, defects or deterioration that is reported to the Contractor during the warranty period.

## Data Forms

### The following two data forms are attached as supplements to this Specification Section:

#### Table 1 - "Data Form for High Lift Vertical Turbine Pumps (Line Shaft Type)". This form has been completed by the Consultant for use by the relevant suppliers.

#### Table 2 - "Data Forms for Vertical Turbine Pumps (Line Shaft Type)”. This form shall be completed by the Contractor as required by this Section.

## Quality Assurance

### Pumps shall be the product of one manufacturer.

### Pumps shall be manufacturer’s standard cataloged product and modified to provide compliance with the drawings, specifications and the service conditions specified and indicated.

### The Contractor shall obtain the pumps, motors, discharge columns, discharge heads, suction cans and appurtenances from the pump manufacturer, as a complete and integrated package to insure proper coordination and compatibility and operation of the system.

### Variable frequency motor controllers can be supplied by the Contractor or the pump manufacturer at the Contractor’s option. The pumping system shall be a complete and integrated package to insure proper coordination and compatibility and operation of the system.

#### The Contractor shall coordinate the variable frequency motor controllers with the pump and motor manufacturer and submit as part of the shop drawings a written statement signed by the Contractor, pump manufacturer, motor manufacturer and variable frequency motor controller manufacturer that the variable frequency motor controller manufacturer has received the required information from the pump and motor manufacturers and that all parties have reviewed the system and coordinated the equipment selection. Also include all motor data and information that has been used for the coordination.

### If equipment proposed is heavier or taller, than specified and indicated; provide all structural, architectural, mechanical, electrical and plumbing revisions at no additional cost to the Region.

### If equipment is heavier than specified, the Contractor shall provide all hoisting equipment sized to maintain the minimum safety factor between the specified maximum equipment weight and the lifting capacity of the hoisting equipment indicated and specified.

### For variable speed pump systems the pump manufacturer must perform an analysis of the combined motor and pump assembly for resonant frequency or their harmonics independent of a structure.

#### Submit a copy of these calculations to the Consultant for the record.

#### Should calculations indicate the probability of encountering such frequencies within the speed range required, provide all additional supporting devices necessary to affect the unit mass, and raise or lower resonant point within the speed range required.

#### Provide and install such additional devices at no additional cost to the Region.

## Measurement and Payment

*[Choose one of the following payment language provisions that best suits the individual project.*

*If this Section is not specifically referenced by an item in the Bid Form, please use the following language:*

.1 The work of this Section will not be measured separately for payment. All costs associated with the work of this Section shall be included in the Contract Price.

*OR If this Section is specifically referenced in the Bid Form, use the following language and identify the relevant item in the Bid Form:*

.1 All costs associated with the work of this Section shall be included in the price(s) for Item No(s). \_\_\_ in the Bid Form.

*If the work of this Section is to be measured and paid for by several different methods, please amend the standard wording given above to reflect the different methods of measurement and payment.*]

# PRODUCTS

## Detail Pump Specification

### The pumps shall be of the open line shaft type with the features described below. *[Consultant to describe duty of pumps]*

### The pumps shall be provided with a surface discharge head having the discharge opening fitted with a flange sized to ANSI B16.1-2015 Class 125. The discharge head shall be of ASTM A53/A53M-12, Grade B fabricated steel or cast iron arranged to discharge above the floor level and perpendicular to the pump shaft. The top diameter of the discharge head shall match the motor base to distribute the load uniformly and result in an assembly of discharge head and driver which shall create a smooth and pleasing appearance. The discharge head shall include cast iron housing complete with water flush, bronze gland, bronze bushing, packed type stuffing box with relief port external fitting for grease lubrication. The design shall permit the shaft to be coupled above the stuffing box. A steel or cast iron foundation plate (bedplate) shall also be supplied complete with cadmium plated anchor bolts. Each pump shall have a dedicated magnetic flow meter installed on the discharge piping in accordance with flow meter specifications for optimum measurement accuracy. Meter telemetry to the PAC and SCADA systems with all appropriate programming and graphical interfaces provided (as defined in Division 13 - SCADA and Instrumentation and the Process Narratives/Process Control Narratives included in the SCADA appendices). Provide an accessible auxiliary opening in the discharge head casing [(18 mm IPS with plug)]. Locate the hole close to the discharge column so that a draw down level test sensor can be lowered between the column and well casing. *[Consultant to omit above clause if suction column is not in a well casing].*

### Pre-lubrication Provisions shall be made by the manufacturer to pre-lubricate lift shaft bearings adequately before the pump is started, on installations with a setting of more than 15 m.

### Pump Bowls The suction case, intermediate bowls and discharge bowl shall be of cast iron, free of foundry imperfections and other detrimental defects. Bowls shall be equipped with replaceable seal rings on the suction side of the impellers. Pump bowls shall be porcelain lined.

### Impellers The impellers shall be bronze, of the enclosed type dynamically and statically balanced. They shall be securely fastened to the impeller shaft with keys, tapered split collets or lock nuts. They shall be adjustable vertically by means of an adjusting nut located at the top of the motor.

### Pump Shaft The pump shaft is to be turned and ground stainless steel type AISI 416 or an approved equivalent. It shall be supported by bearings above and below each impeller. The suction case bearing shall be bronze, grease packed and protected against the entrance of sand or other abrasives. Intermediate bowl bearings are to be lubricated by the water being pumped and may be made of bronze, cut less rubber or a combination of bronze and rubber. The size of the shaft shall be sufficiently ample to transmit the kW horsepower required by the pump. The minimum shaft diameter shall be 25 mm. For potable water applications, NSF 60 and 61 and NSF 372 requirements will apply to chemical and equipment in contact with process water.

### Line Shafts The line shafts shall be ground and polished stainless steel Type 416, of a size that conforms to the requirements of The American National Standard for Vertical Turbine Pumps ANSI/AWWA E102-17. The line shaft shall be made up of interchangeable sections having a nominal length not exceeding 3 m. The butting faces shall be machined square to the axis of the shaft. The line shafts shall be coupled with steel couplings and shall have a left hand thread to tighten during pump operation. The shaft shall be provided with a non-corrosive sleeve of stainless steel at the location of each guide bearing. The minimum shaft diameter shall be 25 mm. *[Consultant to consider height restrictions of buildings in determining maximum shaft lengths.]*

### Line shaft Bearings The bearings shall be designed for vertical turbine pump service and be lubricated by the liquid being pumped. They shall be of the flip-over design and mounted in bearing retainers which shall be held in position in the column couplings by means of the butted ends of the column pipes. The retainers shall be equipped with the snap-in cutlass type rubber bearings. The bearings shall be spaced at intervals of not more than 3 m (1.5 m if pump operating speed is in excess of 1800 rpm).

### Discharge Column Pipe The pipe size shall be such that the friction loss will not exceed 1.5 m per 30 m of column based upon the rated capacity of the pump. The pipe shall be made up of interchangeable sections having a nominal length not exceeding 3 m; shall be of standard weight conforming to the specifications set out in Section 4.10 of ANSI Standard for Vertical Turbine Pumps, AWWA E102-17 and shall be connected by threaded sleeve type couplings. The discharge column pipe shall be painted with a suitable corrosion resistant finish approved for use with potable water.

### Suction Strainer (if required) For wet well pumps, a bronze or galvanized basket type suction strainer having a net inlet area of at least four times the suction case area shall be supplied.

### Motor

#### The motor for driving the pump shall be a vertical hollow shaft, squirrel cage induction type. The motor shall be of the proper size to drive the pump continuously at any point of the pump performance curve without the load exceeding 90% of the nameplate rating of the motor. The motor shall be [*Consultant to replace with equivalent NEMA designation for the following: EEMAC Design B with Class "B" insulation*], suitable for an ambient temperature of [     ] degrees Celsius, with 1.15 service factor, and must have a drip-proof enclosure. A thrust bearing of ample capacity to carry the weight of all rotating parts plus the hydraulic thrust shall be incorporated into the motor as an integral part of it. The bearings shall be provided with a B10 life rating, under operating conditions, of not less than 100,000 hours. The motor shall be equipped with a non-reverse ratchet feature. The operating speed of the pump shall be in accordance with Table 1 – Data Form for High Lift Vertical Turbine Pumps. Over [     ] kW, the speed should be limited to [     ] rpm.

#### The motors shall have 3 thermistors. One thermistor shall be embedded in the end turn of each phase of the stator winding. The thermistors shall be wired to a terminal box with stator windings identified. Resistance variation shall be such that the approved tripping unit operates at [     ]C.

#### The motors for variable speed use shall have the windings epoxy potted.

#### The motors shall be equipment with lifting eyes capable of supporting the entire weight of the pump and motor.

#### The motor shafts shall be of stainless steel where pumps and motor are a common unit.

#### Each motor shall be fitted with terminal boxes on the side. All leads shall be of sufficient length and supplied with solder-less lugs for external cable connections.

### Pump Accessories The pump units shall be provided with the lugs and eye bolts necessary for installation, maintenance and removal. The supplier shall provide the following accessories:

#### A suitable length of 6 mm copper or clear vinyl tube complete with hand pump, direct reading gauge, air valve and fittings, extending from the discharge head to the top bowl.

#### Vibration transducers to be installed in accordance with the Contract Drawings with functionality as defined in the Process Narrative (Division 13).

*[Note: This equipment is required for water well applications only].*

#### A suitable pressure gauge, mounted on each pump discharge, calibrated in kPa, complete with stop cock and snubber.

### Vibration The pump assembly shall be properly balanced and mounted so that the vibrations do not exceed 0.13 mm per metre of distance above the mounting flange, in the operating speed range.

### Protective Coating

#### Surface preparation prior to painting of the inside of pump discharge column and pump head shall be by commercial type blasting in accordance with SSPC-SP6/NACE No. 3.

#### Protective coating of the above mentioned surfaces shall be performed in the shop by applying two coats of a tasteless and odourless, non- toxic, coal-tar primer that is approved by the Consultant and compliant with NSF 60, 61 and 372 requirements (as applicable), followed by an application of coal-tar enamel (minimum of two coats) to a total dry film thickness of six to eight millimetres in accordance with the requirements of AWWA Standard D102-17 and AWWA C203-15. The coating shall be continuous throughout and shall extend to the outside of all flanges with a neat finish around the bolt holes.

#### Enameled surfaces of the pump bowl shall not be coated.

#### Equipment including motors shall be shop primed and enameled in accordance with the manufacturer's standards.

#### Machined or working surfaces shall be greased prior to shipment.

### Acceptable Manufacturers:

#### Xylem (Goulds)

#### Pentair, Inc. (Layne).

#### Grundfos Canada Inc.

#### Or Equivalent.

# EXECUTION

## Shop Testing

### Test pump bowls, column and discharge head under a hydrostatic head of at least 75 psi (500 kPa) or 150 percent of rated shutoff head, whichever is greater. Test pump assembled.

### Run pump at full speed rating point for 60 minutes prior to start of any testing.

### The standard non-witnessed performance test of the pump unit(s) shall be performed at the factory by taking readings at a minimum of seven capacity points, including one point at the design capacity specified in accordance with the American Standard for Vertical Turbine Pumps ASA B58.1 (AWWA E102-17), Section 5 Verification (Factory Performance Testing). All test reports are to be approved by the Consultant and signed-off by the Region.

### Take readings to determine flow, differential pressure, rpm, horsepower, and efficiency.

### Operate each pump for not less than one hour and take readings to determine that the pump will operate as specified and indicated without cavitation at the specified minimum head condition with not more than the specified NPSH available. Test with the job submergence as indicated.

### Variable speed tests:

#### Conduct tests as specified above for full speed and reduced speeds except that tests for cavitation at run out are not required.

#### Run one speed test at speed required to discharge the minimum rating point specified and indicated with one point of test at the minimum rating point.

#### Run a second test at a speed approximately midway between full and minimum speed.

#### Run addition tests for each reduced speed operating condition specified and indicated.

### At the conclusion of the test, the original and two certified copies of the test data sheet and the anticipated field performance curve shall be supplied to the Consultant before the equipment is delivered to the Site. The acceptance of the pump unit(s) will be based on the achievement of test results satisfactory to the Consultant. In the event the efficiencies of the pump or drive are more than 3% below performance guarantees, the Region reserves the right to reject the equipment.

### Pump testing shall also comply with the requirements of the Hydraulic Institute, Standard for Rotodynamic Pumps for Hydraulic Performance Acceptance Tests (ANSI/HI 14.6-2016) Acceptance Grade: 1U, particularly as far as test tolerances and energy efficiency are concerned.

### The Contractor shall notify the Consultant a minimum of 15 Working Days in advance of factory testing and confirm the date and time a minimum of three Working Days in advance.

## Field Testing

### Test piping connections to prove the discharge nozzles are installed with the pipe in a free supported state and without need to apply vertical or horizontal pressure to align piping with pump nozzles. This must be performed and the piping acceptable prior to any field performance testing.

### Field testing will not be conducted without an accepted procedure, calibration certificates for all testing equipment, gauges and flow meters and a completed and signed pretesting check list. The Contractor shall be responsible for preparing, the check list as indicated in Division 01.

### After installation of pumping equipment, and after inspection, operation, testing and adjustment have been completed by the manufacturer’s field service technician, conduct running test for each pump in presence of the Consultant to determine its ability to operate within the vibration and temperature limits specified, and to deliver its rated capacity under specified conditions.

### During tests, observe and record head, capacity, pump bearing housings and motor bearing temperature, noise and vibration and motor inputs.

### Provide vibration signature test data for each pump and drive assembly.

#### Vibration Limits: 50% of the limits provided in ANSI/HI 9.6.4.

### Bearing Temperature: Bearing temperature not to exceed 180 degrees F.

### Test Duration: Determined by the Consultant, but not less than three hours of continuous operation at each condition specified and indicated.

### Run each pump for minimum of one hour prior to taking temperature readings of the pumps, motors, and shafting.

### Immediately correct or replace all defects or defective equipment revealed by or noted during tests at no additional cost to the Region.

### Repeat tests until specified results are obtained.

### The Region reserves the right to perform independent vibration testing to verify the Contractors test results prior to acceptance of the pumping unit.

### Contractor to provide all water, labor, piping, equipment, flow meters and test gauges for conducting tests.

#### Contractor shall provide calibrated test gauges for all permanently installed gauges and portable calibrated flow meters for all pumping systems even in those cases where permanent flow meters are installed.

#### All calibrations shall be within 30 days of the field testing.

#### The testing will not be started and will not be accepted until the calibrated testing equipment stated above is operational and all certifications have been submitted.

#### Contractor is responsible for delivery and disposal of water used for testing.

### Make all adjustments necessary to place equipment in specified working order at time of above tests.

### Test pump on product only. If product is not available, test with water. Water for testing furnished by Contractor.

### Remove and replace equipment at no additional cost to the Region with equipment that will meet all requirements specified and indicated if unable to demonstrate to the satisfaction of the Consultant that equipment will perform the service specified, indicated and as submitted.

## Installation

### Install pumps and accessories in accordance with the manufacturer’s recommendations and Section 11010 – Equipment General Requirements.

### Employ skilled mechanics to supervise the installation.

### Ensure that the outlet of the discharge header is perfectly aligned with the discharge piping before making the connections.

## Commission and Certification

### Perform testing and commissioning in accordance with Section 01810 – Equipment Testing and Facility Commissioning.

### Obtain a certificate from the supplier stating that its qualified representative has found the installation to be satisfactory before commencing initial start-up. The certificate shall include the detailed condition description of the equipment/instillation found ready for start-up.

## Demonstration and Training

### Perform demonstration and training in accordance with Section 01820 – Demonstration and Training.

## Supplements

### The supplements listed below, attached following “End of Section”, form part of this Section:

#### Table 1 Data Form for High Lift Vertical Turbine Pumps (Line Shaft Type).

#### Table 2 Data Form for Vertical Turbine Pumps (Line Shaft Type).

**END OF SECTION**

**YORK REGION**

**ENVIRONMENTAL SERVICES**

**TABLE 1 DATA FORM**

**for**

**HIGH LIFT**

**VERTICAL TURBINE PUMPS (Line Shaft Type)**

for

York Region [Project title] Project No.

Location

T1. 1.0 NOTES

.1 This table covers the specific requirements of the equipment for the above project.

.2 Quotations must be in accordance with this Data Form.

.3 Suppliers must complete Table 2 Data Form prior to submitting shop drawings.

.4 The Consultant is to complete the relevant items of the following applying Metric Measurement Units.

T1. 2.0 PUMPS GENERAL

.1 Number of Pumps Required

.2 Pump reference

.3 Pump type

.4 Pump application

.5 Water pumped (raw, clear, well) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

.6 Water Temp. (C)

All data shall be in an electronic format suitable for upload to the Region’s CMMS (Maximo).

**TABLE 1 CONTINUED... 2**

T1. 3.0 PUMP MECHANICAL FEATURES

.1 Max. permissible O/D of pump

.2 Max. speed (synch)

.3 Service (Cont/Intermittent)

.4 Suction reqd. (bell/strainer,

basket, or cone)

.5 Approx. total length of

discharge column pipe,

pump and suction, m.

.6 Aux. opening in discharge

head reqd.

.7 Pump accessories reqd.

.8 Line shaft of

(Carbon/SS)

T1. 4.0 PUMP MOTOR FEATURES

.1 Power supply V/PH/Hz

.2 Calculated motor size, kW

.3 Non-reverse running

ratchet reqd.

T1. 5.0 PUMP GUARANTEED PERFORMANCE

.1 Design Point Capacity (L/s)

.2 Design Point Total Head

(m) (Internal pump losses

NOT incl.)

All data shall be in electronic format suitable for upload to the Region’s CMMS (Maximo).

**TABLE 1 CONTINUED... 3**

T1. 6.0 PUMP OPERATING CONDITIONS

.1 Discharge Head (m) min.

(at flange) max.

.2 Shut off Head (m) min.

max.

.3 Submergence (m) min.

(at suction) max.

.4 System Head Curve included

T1. 7.0 SPECIAL REQUIREMENTS

The pump/motor combination shall be suitable for operating at flow ranges between 50% and 150% of the design flow rate.

Pumps shall comply with Hydraulic Institute Standards.

**All data shall be in an electronic format suitable for upload to the Region’s CMMS (Maximo).**

**Refer to Section 01425 – Computerized Maintenance Management System Data Requirements.**

**REGION OF YORK - ENVIRONMENTAL SERVICES**

**TABLE 2 DATA FORM**

**for**

**VERTICAL TURBINE PUMPS (Line shaft Type)**

**for**

York Region [Project Title] Project No.

Location

Supplier’s Name, address and phone no.

**T2. 1.0 PUMP MECHANICAL DETAILS**

.1 Pump Ref.

.2 Pump Make

.3 Model No.

.4 Speed (RPM)

.5 Bowls No./Size (mm)

.6 Impeller Size (mm)

.7 Maximum Impeller Size (mm)

.8 Impeller Type

.9 Discharge Column diameter (mm)

.10 Discharge Diameter (mm)

.11 Pump Weight (kg)

.12 Motor Weight (kg)

.13 NPSH Required (m)

.14 Shaft Size (mm)

**All data shall be in an electronic format suitable for upload to the Region’s CMMS (Maximo). Refer to Section 01425 – Computerized Maintenance Management System Data Requirements.TABLE 2 CONTINUED... 2**

**T2. 2.0 PUMP MOTOR DETAILS**

.1 Motor kW/RPM

.2 Motor Make & Type

.3 Starting KVA (FV)

.4 1/2 Load Efficiency

.5 3/4 Load Efficiency

.6 Full Load Efficiency

.7 Power Factor

.8 Starting in rush Current (Amps)

.9 Maximum Current Draw (Amps)

.10 Current Draw at Design Point (Amps)

.11 Current Draw at Run out (Amps)

**T2. 3.0 PUMP OPERATING CHARACTERISTICS**

Pump Capacity L/s

.1 Pump-Design-Guaranteed Capacity

.2 Operating min.

.3 Operating max.

.4 Run-Out

Total Head m

.5 Total-Shut-Off Head

.6 Total Design-Guaranteed

.7 Total Operating min.

**All data shall be in an electronic format suitable for upload to the Region’s CMMS (Maximo). Refer to Section 01425 – Computerized Maintenance Management System Data Requirements.TABLE 2 CONTINUED... 3**

.8 Total Operating max.

.9 Total Run-Out

Efficiency at Design Point %

.10 Efficiency Pump

.11 Efficiency Total

kW Required \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

.12 kW at Shut-Off

.13 kW at Design Point

Guaranteed kW at Design Point \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

.14 kW at Run-Out

.15 Max. Hydraulic Thrust at Design Point (kg)

.16 Min. Submergence (m)

.17 Performance Curves Included

T2. 4.0 DEVIATIONS: List all exceptions to the Specification on a separate sheet. Say "REFER TO ATTACHED SHEET" or if none say "NO DEVIATIONS".

T2. 5.0 ALTERNATIVES: Submit in covering letter or separately. If none say "NONE PROPOSED".

Submitted by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Signature

Date

**All data shall be in an electronic format suitable for upload to the Region’s CMMS (Maximo). Refer to Section 01425 – Computerized Maintenance Management System Data Requirements.**

**Special Notes:**