Part 1 General

1.1 ADMINISTRATIVE

.1 Submit to Contract Administrator submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.2 Do not proceed with Work affected by submittal until review is complete.

.3 Present shop drawings, product data, samples, and mock-ups in SI Metric units.

.4 Notify Contract Administrator, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.5 Contractor's responsibility for errors and omissions in submission is not relieved by Contract Administrator review of submittals.

.6 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved Contract Administrator review.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data which are to be provided by Contractor to illustrate details of a portion of Work.

.2 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes, and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of the section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.3 Allow seven (7) days for Contract Administrator review of each submission.

.4 Adjustments made on shop drawings Contract Administrator are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Contract Administrator prior to proceeding with Work.

.5 Make changes in shop drawings as Contract Administrator may require, consistent with Contract Documents. When resubmitting, notify Contract Administrator in writing of revisions other than those requested.

.6 Accompany submissions with transmittal letter, containing:

.1 Date
.2 Project title and number
.3 Contractor's name and address

.4 Identification and quantity of each shop drawing, product data, and sample

.5 Other pertinent data

.7 Submissions include:

.1 Date and revision dates

.2 Project title and number

.3 Name and address of:

.1 Subcontractor

.2 Supplier

.3 Manufacturer

.4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements, and compliance with Contract Documents.

.5 Details of appropriate portions of Work as applicable:

.1 Fabrication

.2 Layout, showing dimensions, including identified field dimensions, and clearances

.3 Setting or erection details

.4 Capacities

.5 Performance characteristics

.6 Standards

.7 Operating weight

.8 Wiring diagrams

.9 Single line and schematic diagrams

.10 Relationship to adjacent work

.8 Submit electronic copy of shop drawings for each requirement requested in specification sections and as Contract Administrator may reasonably request.

.9 Submit electronic copies of product data sheets or brochures for requirements requested in specification sections and as requested by Contract Administrator where shop drawings will not be prepared due to standardized manufacture of product.

.10 Submit electronic copies of test reports for requirements requested in specification sections and as requested by Contract Administrator.

.11 Submit electronic copies of manufacturer’s instructions for requirements requested in specification sections and as requested by Contract Administrator.

.1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.12 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification sections and as requested by Contract Administrator. Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

.13 Submit six (6) hard copies and one (1) electronic copies of Operation and Maintenance Data for requirements requested in specification sections and as requested by Contract Administrator.

.14 Delete information not applicable to the Project.

.15 Supplement standard information to provide details applicable to project.

.16 If upon review by Contract Administrator, no errors or omissions are discovered or if only minor corrections are made electronic copy will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

.17 Contractor will be charged for Contract Administrator subsequent reviews of submittal packages exceeding two submissions.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

.2 Prepare instructions and data using personnel experienced in maintenance and operation of described products.

.3 Copy will be returned after final inspection, with Contract Administrator comments.

.4 Revise content of documents as required prior to final submittal.

.5 Two (2) weeks after equipment delivery provide six (6) final hard copies and one (1) electronic copy of operating and maintenance manuals in English.

.6 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.

.7 Furnish evidence, if requested, for type, source, and quality of products provided.

.8 Defective products will be rejected, regardless of previous inspections. Replace products at their own expense.

.9 Pay costs of transportation.

1.2 FORMAT

.1 Organize data as instructional manual.

.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.

.3 When multiple binders are used correlate data consistently in related groupings. Identify contents of each binder on spine.

.4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

.5 Arrange content by systems under section numbers and sequence of Table of Contents.

.6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

.7 Text: manufacturer's printed data, or typewritten data.

.8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

1.3 CONTENTS - EACH VOLUME

.1 Table of Contents: provide title of project; Date of submission; names.

.1 Addresses and telephone numbers of Contract Administrator and Contractor with name of responsible parties.

.2 Schedule of products and systems, indexed to content of volume.

.2 For each product or system:

.1 List names, addresses, and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.

.4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

.5 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

1.4 RECORDING ACTUAL SITE CONDITIONS

.1 Record information on set of Drawings.

.2 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.

.3 Contract Drawings and shop drawings: mark each item to record actual construction, including:

.1 Field changes of dimension and detail

.2 Changes made by Change Orders

.3 Details not on original Contract Drawings

.4 References to related shop drawings and modifications

.4 Specifications: mark each item to record actual construction, including:

.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.

.2 Changes made by Addenda and change orders.

.5 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

1.5 EQUIPMENT AND SYSTEMS

.1 Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.2 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

.3 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.4 Provide servicing and lubrication schedule, and list of lubricants required.

.5 Include manufacturer's printed operation and maintenance instructions.

.6 Include sequence of operation by controls manufacturer.

.7 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.8 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.9 Include test reports.

.10 Additional requirements: as specified in individual specification sections.

1.6 SPARE PARTS

.1 Provide spare parts, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to location as directed; place and store.

1.7 MAINTENANCE MATERIALS

.1 Provide maintenance and extra materials, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to location as directed; place and store.

1.8 SPECIAL TOOLS

.1 Provide special tools, in quantities specified in individual specification section.

.2 Provide items with tags identifying their associated function and equipment.

.3 Deliver to location as directed.

1.9 STORAGE, HANDLING AND PROTECTION

.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.

.2 Store in original and undamaged condition with manufacturer's seal and labels intact.

.3 Store components subject to damage from weather in weatherproof enclosures.

.4 Store paints and freezable materials in a heated and ventilated room.

.5 Remove and replace damaged products at own expense and to satisfaction of Contract Administrator

1.10 WARRANTIES

.1 Assemble approved information in binder and submit upon acceptance of work. Organize binder as follows:

.1 Separate each warranty with index tab sheets keyed to Table of Contents listing.

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.

.4 Verify that documents are in proper form, contain full information, and are notarized.

.5 Co-execute submittals when required.

.6 Retain warranties and bonds until time specified for submittal.

.2 Except for items put into use with City's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.

.3 Conduct joint eleven (11) month warranty inspection, measured from Date of Substantial Performance, by Contract Administrator.

.4 Respond in a timely manner to oral or written notification of required construction warranty repair work.

.5 Written verification will follow oral instructions. Failure to respond will be cause for the Contract Administrator to proceed with action against Contractor.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SCOPE

.1 This section refers to the supply, delivery, and testing of the following valves:

- .1 Three (3) 200 mm Iron Gate Valves – manually actuated
- .2 Three (3) 150 mm Iron Gate Valves – manually actuated
- .3 Three (3) 150 mm Process Check Valves
- .4 One (1) 275 mm Buried Gate Valve including stem, box, and appurtenances

.2 Have valves for all systems supplied by the same supplier.

.3 Supply all other materials, products, and services described in this specification.

1.2 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 30 00 – Submittal Procedures.

1.3 REFERENCES

.1 American Water Works Association (AWWA), American National Standards Institute (ANSI) / American society of Mechanical Engineers (ASME).

.2 ASNI/ASME Bl.20.1, Pipe Threads, General Purpose (Inch).

1.4 PRODUCT DATA

.1 Submit product data in accordance with Section 01 33 00 – Submittal Procedures

.2 Submit data for all valves specified in this section.

1.5 CLOSEOUT SUBMITTALS

.1 Submit maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.

1.6 EXTRA MATERIALS

.1 Furnish following spare parts:

- .1 Valve seats: one for every ten (10) valves each size. Minimum 1.
- .2 Discs: one for every ten (10) valves, each size. Minimum 1.
- .3 Stem packing: one (1) for every ten (10) valves, each size. Minimum 1.
- .4 Valve handles: two (2) of each size. If only one handle of certain size is supplied, provide one spare only. Do not provide spare chain wheels.
- .5 Gaskets for flanges: one for every ten (10) flanged joints. Minimum 1.

Part 2 Products

2.1 VALVE OPERATORS

.1 Supply valve operators or actuators for <u>all types</u> of valves specified as follows:

- .1 Supply removable lever handles (¼ turn type) or hand wheels (gate valves) for valves ≤150 mm diameter. Provide chain levers (¼ turn type) for valves mounted ≥1700 mm above the floor. Should space preclude the use of a chain lever, provide a chain operated geared handwheel operator. Provide a chain

operated hand-wheel operator for all gate valves mounted ≥ 1700 mm above the floor regardless of size.

.2 Provide gear actuated hand wheels for all valves ≥200 mm diameter regardless of type and mounting height. Manual operators are allowed for knife gate valves up to 600 mm diameter if space is sufficient and the allowable pull on the operator does not exceed 270N (60lb) as specified in Clause 2.1.6.

.3 Mount all valves, regardless of size, with operators orientated having due regard to the ease of access and operation. Electrical or pneumatic actuators are specified below.

.4 Ensure that each valve and operator is of suitable construction and rating for the long term service with the fluid or product being conveyed and at the pressure and operating frequencies required by the relevant service.

.5 The allowable pull on a manual operator to open or close the valve shall be ≤270 N (60 lb force). Manual operators shall operate in a clockwise motion to close the valve. Provide gate valves ≥ 400 mm diameter with a 50 mm manual by-pass valve arrangement to allow for the relief of excess pressure.

.6 Supply cast iron hand wheels clearly marked with a flow directional arrow and the word "open" cast in relief on the rim. Provide hand wheels >300 mm in diameter for all valves > 200 mm and 450 mm in diameter for larger valves as required to allow for manual operation. In confined areas, furnish smaller hand wheels with higher ratio gearing of the valve to compensate.

.7 Supply steel pipe Tee wrenches with socket to suit nut dimensions. In cases of valves in tanks requiring extension stems and Tee wrenches, the wrench shall be secured in place.

2.2 GENERAL VALVE REQUIREMENTS

.1 Where there is an applicable recommended standard for the design, construction, and testing of a valve and/or actuator, e.g., AWWA, CGA, CSA etc., equipment to be supplied under this section will refer to this standard. Comply with these requirements for all equipment supplied in all regards. Where specifically requested, provide certificates of compliance with the applicable standards.

.2 Where it is not intended to supply equipment or valves to a specific standard, the specification will indicate a reference product. Provide flanges as specified for all flanged valves for the line into which they are to be installed. As a minimum standard a Class 125 lb rating will be required.

.3 The Contractor shall ensure that the valve end connections are compatible with pipe material in which the valve is installed.

.4 Do not install valves dissimilar with piping to avoid galvanic corrosion.

.5 All packing, gaskets, seats, diaphragms, lubricants, etc., shall be suitable for the intended operating conditions.

.6 Supply all valves free of asphalt varnish or other non-potable protective coatings if it is intended for potable water service. Mark valves with size, pressure rating, and manufacturer on a corrosion resistant nameplate mounted on the body.

.7 Equip the valve with a disc position indicator and a direction of flow indicator where applicable.

2.3 IRON GATE VALVE SPECIFICATION (VGA2)

.1 This Specification covers Cast Iron and Ductile Iron Gate Valves in sizes 75 mm to 750 mm for above ground installation.

.2 The valves shall confirm to AWWA 509.

.3 Pressure-temperature ratings:

.1 75 mm to 300 mm: 1400 kPa @ 65ºC.

.2 350 mm to 750 mm: 1050 kPa @ 65ºC.

.4 Body material: cast iron to ASTM A 126, Class B or Ductile Iron to ASTM-525 or 526.

.5 Trim material: bronze.

.6 Stem: Rising stem type where space permits

.7 End connections: flanged to ANSI B16.1, Class 125.

.8 Packing and gaskets: non-asbestos.

.9 Fusion bonded epoxy coating on the interior and exterior including gland cover, body, and bonnet to AWWA C-550.

.10 All fasteners, nuts, and bolts shall be stainless steel.

.11 Acceptable manufacturers - one of the following:

.1 Crane

.2 Toyo Valve

.3 Jenkins Figure

.4 Milwaukee

.5 Clow (McAvity)

.6 Mueller

.7 American AVK

2.4 PROCESS CHECK VALVES

.1 ***Rubber disk (VSC2)*** - Swing Type For sizes ≥ 75 mm, Class 125, cast iron body swing check valve with a disc made of Buna-N or Viton. The disc shall be warranted for 25 years. A screw-type backflow actuator, mechanical indicator, and a pre-wired limit switch shall be provided where specified. The valve shall be one (1) of the following or approved equal:

.1 Val-Matic

.2 Crispin

2.5 BURIED GATE VALVE SPECIFICATION

.1 150 to 400 mm, direct bury, non-rising stem, wedge gate valve rated at 1 MPa in accordance with AT 4.1.1.80 of the Approved Products for Underground Use in the City of Winnipeg.

.2 Iron Gate Valves for buried application to be epoxy coated in accordance with AT 4.1.1.80 of the Approved Products for Underground Use in the City of Winnipeg.

.3 Valve ends to be push-on type with full depth insertion in accordance with AT 4.1.1.80 of the Approved Products for Underground Use in the City of Winnipeg.

.4 Direction of closing to be in accordance with SD-008.

.5 Valve boxes to be in accordance with AP-001 and AT 4.1.1.81 of the Approved Products for Underground Use in the City of Winnipeg. Hinged cover to be marked S.

.6 Body material: cast iron to ASTM A 126, Class B.

.7 Trim material: bronze.

.8 Construction: solid wedge discs, bolted bonnet, painted for buried application.

.9 Packing: non asbestos.

.10 All exposed bolts, nuts, etc. are to be wrapped with “Denso” paste and tape or approved equal.

2.6 VALVE ACCESSORIES

.1 General: the following accessories are to be used as required.

.2 Floor stands:

.1 Stand to be cast iron with flanged base and open and close indicator.

.2 Provide all anchor bolts required for complete installation.

.3 Handwheel to be 300 mm (12") in diameter.

.4 Lift nuts to be bronze.

.5 Manufactured by Flow Controls Division of Man-Lepper Inc., or approved equal.

Part 3 Execution

3.1 SHOP TESTING

.1 Test AWWA valves in the shop in accordance with AWWA requirements. A certified test report shall be submitted.

3.2 CERTIFICATES

.1 On completion of installation and testing, submit the manufacturer's certification of the correctness of the installation to the Contract Administrator.

END OF SECTION

Part 1 General

1.1 DESCRIPTION

.1 This section specifies the supply, delivery, testing, and commissioning of centrifugal vertical shaft pumps.

.2 Pumping equipment shall include motors, drives, anchor bolts, base plates, supporting frame, and all appurtenances required for an operating system.

.3 Co-ordinate with Division 16.

1.2 GUARANTEES

.1 In addition to the requirements of other Divisions, equipment shall be guaranteed to perform to the specified operating conditions.

1.3 REFERENCE STANDARDS

.1 Pumping units shall generally comply with the requirements of the Hydraulic Institute Standards.

.2 Pumping unit wiring shall conform to Division 16.

.3 Pumping unit shall be CSA approved.

1.4 SHOP PAINTING

.1 All equipment is to be painted with manufacturer's standard coatings.

1.5 STANDARDS

.1 Have equipment comply with the latest edition of the applicable codes and regulations including, but not limited to, the following:

.1 American Society of Mechanical Engineers (ASME)

.2 Canadian Standards Association (CSA)

.3 Canadian Electrical Manufacturers Association (CEMA)

.4 National Electrical Manufacturer's Association (NEMA)

.5 American Society for Testing and Materials (ASTM)

.6 American National Standard Institute (ANSI)

.7 Electrical Electronics Manufacturing Association of Canada (EEMAC).

.8 Electrical Safety Association (ESA).

.2 Have all electrical equipment comply in every respect with the rules and regulations of Manitoba Hydro and be acceptable to their local inspector.

.3 In cases of any conflict between these specifications and any of the above standards, the most stringent standard will have precedence.

1.6 SUBMITTALS

.1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.

.2 Shop drawings shall include details of the equipment stand, complete with instructions for attachment of the stand to the concrete base.

.3 Performance curves shall be submitted with the shop drawings. Performance curves shall include capacity, head, pump efficiency, BkW, and NPSH from shut-off through the rated point to run-out.

.4 Submit operation and maintenance manuals in accordance with Section 01 78 00 – Closeout Submittals.

.5 Attached Data Sheets must be completed and submitted as part of the shop drawings.

Part 2 Products

2.1 CENTRIFUGAL PUMPS

.1 General:

.1 Supply and three (3) close coupled centrifugal vertical shaft pumps as detailed in this specification

.2 The pump shall be supplied complete with:

.1 Motor

.2 Base (4 legged)

.3 Flanged suction and discharge piping connections

.4 Drives

.5 Couplings

.2 Operating requirements:

.1 Pump shall be sufficient to provide 38 L/s of flow at 7.4 m total head.

.2 Pump head/capacity curves shall be continuously rising toward shut-off.

.3 Select pump so that rated pump capacity point lies on the left-hand side of the best efficiency point on the pump curve.

.4 The required net positive suction head (NPSHR) shall not exceed the available NPSH at any point on the curve and cavitation-free performance shall be guaranteed.

.5 Motor shall be sized so that the pump is non-overloading throughout the pump performance curve from shut-off to run-out conditions.

.3 Mechanical requirements:

.1 Pumps to be 4” non-clog type, especially designed for use of mechanical seals

.2 Casing shall be rated for 1.5 times working pressure.

.3 Bearings:

.1 The upper bearing shall be free to move linearly with the thermal expansion of the shaft and shall carry only radial loads.

.2 Lower bearing (nearest to impeller) shall be adequate to carry all radial and axial thrusts developed by largest impeller that bowl can accommodate.

.3 Shaft bearing nearest the pump impeller shall be locked in place so that shaft end play is limited to the clearance within the bearing.

.4 A bearing cap shall be provided to hold the bottom motor bearing in a fixed position. Bearing housings shall be provided with fittings for lubrication as well as purging old lubricant.

.5 Shaft and sleeve:

.1 Shaft and shaft sleeve shall be designed for minimum deflection at maximum load. Shaft assembly shall be one (1) piece, ground and polished. Shaft sleeve shall be renewable, positively driven by impeller key.

.2 The shaft from the top of the impeller to the lower bearing supporting the impeller shall have a minimum diameter of 1 7/8". The dimension from the lowest bearing to the top of the impeller shall not exceed 6".

.3 Removable shaft sleeves will not be acceptable if the shaft under the sleeve does not meet the specified minimum diameter. O-ring shall be provided to prevent leakage under shaft sleeve.

.4 Shaft material shall be 316SS.

.5 Shaft runout limited to .003".

.6 Seals:

.1 The pump shaft shall be sealed against leakage by a double mechanical seal installed in a bronze seal housing constructed in two (2) sections with registered fit.

.2 The seal housing shall be recessed into the pump backhead and securely fastened thereto with stainless steel cap screws.

.3 The inside of the seal housing shall be tapered to facilitate the replacement of the seal parts.

.4 Seals material to be carbon ceramic with the mating surfaces lapped to a flatness tolerance of one (1) light band. The rotating ceramics shall be held in mating position with the stationary carbons by a stainless steel spring.

.5 The seal housing with assembled parts shall be so constructed as to be readily removable from the shaft as a unit and shall be provided with tapped jackscrew openings to assist in removing it from the backhead.

.6 The seal shall be pressurized and lubricated buy liquid taken directly from the pump backhead through a filter to the seal housing and introduced between the upper and lower sealing surfaces, the filter shall be of corrosion-resistant materials and shall screen out all solids larger than 50 microns. The seal system shall contain a brass valve connected near the top of the seal housing to permit the relief of any trapped air.

.7 Construction:

.1 The motor shall be attached to the pump volute by a one (1)-piece cast-iron adapter and backhead.

.2 The pump shall be arranged so that the rotating element can easily be removed from the volute without disconnecting the electrical wiring or disassembling the, impeller, backhead, or seal.

.3 The pump volute shall be free from projections that might cause clogging or interfere with flow through the pump.

.4 The motor shall be fitted with heavy lifting eyes or lugs, each capable of supporting the entire weight of the motor and pump.

.8 Motor:

.1 The motor shall be vertical solid shaft, Nema P-base, squirrel-cage induction type, suitable for 3 phase, 60 cycle, 575 volt electric current.

.2 Insulation: Class F

.3 NEMA Design: Class B

.4 Open drip proof with forced air circulation by integral fan. Openings for ventilation shall be uniformly spaced around the motor frame. Leads shall be terminated in cast connection box and shall be clearly identified.

.9 Impeller:

.1 Pump impeller to be enclosed two (2)-port type made of close-grained cast-iron and shall be balanced.

.2 3” solids handling capacity

.3 Impeller to be keyed with a stainless steel key and secured to the motor shaft by a stainless steel cap screw equipped with a Nylock or other suitable self-locking device and shall be readily removable without the use of special tools.

.4 Impeller to Shaft Fit: Tapered

.5 Impeller Shroud: Untrimmed – Full Diameter

.10 Provide 12 mm (1/2") tappings for suction and discharge pressure gauges on pump casing.

2.2 EQUIPMENT MOUNTING

.1 Pump and motor shall be supported by a heavy cast-iron base with four (4) legs. The height of the base shall be sufficient to permit the use of an increasing suction elbow, which shall be provided when the nominal pump size is smaller than the suction line. The suction and discharge openings shall be flanged faced and drilled 125-pound American Standard.

.2 The pump must be secured to base at the factory or in the field, with bolts and/or dowels such that the motor-pump shaft shall be centered, in relation to the motor base within .005”.

.3 Provide list of recommended spare parts for City's follow-up.

2.3 SPARE PARTS

.1 Provide list of recommended spare parts for City's follow-up.

2.4 ACCEPTABLE PRODUCTS

.1 The pump shall be Smith and Loveless model 4B2 or approved equal.

Part 3 Execution

3.1 PUMP TESTING

.1 Each manufacturer shall guarantee his pump(s) for the rated capacity and overall efficiency when installed and operating under the specified conditions of head and discharge.

.2 Submit results of factory performance tests to the Contract Administrator as Certified Pump Test Curves including capacity, head, pump efficiency, BkW and NPSH from shut-off through the rated point to run-out.

.3 Conduct factory performance tests in accordance with the Hydraulic Institute Standards.

3.2 LUBRICATION, GREASE, OIL AND FUEL

.1 Perform the complete initial lubrication of all equipment in accordance with the manufacturer's instructions. Provide all grease, oil, lubricants, etc., as required for the initial operation of the equipment.

3.3 COMMISSIONING

.1 Provide two (2) weeks' notice to the Contract Administrator prior to commencement of commissioning to witness the activities.

.2 The Equipment Manufacturer's Technical Representative or approved alternate shall inspect the pump installation to ensure that the equipment has been installed in accordance with the manufacturer's requirements. If the installation is not in order, Equipment Manufacturer's Technical Representative shall provide instruction for the installation Contractor. The equipment shall be started and run, and adjustments made at this time.

.3 The Manufacturer's Technical Representative, installation Contractor and Contract Administrator shall jointly commission the works in accordance with the written procedure for commissioning. The installation Contractor shall provide sufficient manpower for the duration of the commissioning period. The installation Contractor shall make necessary adjustments during commissioning to put the works into continuous operation.

.1 The Contract Administrator will request that the equipment be operated to demonstrate that it performs as specified. If the Contract Administrator notes deficiencies, the deficiency shall be corrected immediately by the installation Contractor. The installation Contractor shall advise the Contract Administrator, in writing, when the deficiencies have been corrected.

.2 Deficiencies of a serious nature, as determined by the Contract Administrator, shall be corrected by the Manufacturer's Representative.

3.4 TRAINING

.1 Commissioning and training shall be combined. Training sessions shall be documented and include the following as a minimum:

.1 Functional description of equipment operation.

.2 Identification of components and their purpose.

.3 Confirmation of operating parameters and machine limits.

.4 Review of routine maintenance procedures and maintenance supplies.

.5 Trouble shooting procedures, limits of operator, and maintenance competence.

.6 Long-term maintenance procedures, including anticipated overhaul frequencies

.2 No additional payment will be made by the City to an equipment supplier for the training. Cost to be included in the lump sum for the specific equipment.

END OF SECTION