

Part 1 General

1.1 DESCRIPTION

- .1 Supply and installation of pneumatic modulating process control valve as shown on the drawing.

1.2 SUMMARY

- .1 Section Includes:
 - .1 Pneumatic operated control pinch valve
 - .2 Supply of plant air to the control valve
 - .3 Commissioning
 - .4 Operator training
- .2 Related Sections:
 - .1 Section 01 33 00 - Submittal Procedures.
 - .2 Section 01 78 00 - Closeout Submittals.

1.3 REFERENCES

- .1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME).
 - .1 ANSI/ASME B16.5 - 2003, Pipe Flanges and Flanged Fittings.
 - .2 ANSI/ASME B16.10 - 992, Face-to-Face and End-to-End Dimensions Valves.
 - .3 ANSI/ASME B16.34 - 1996 Valves - Flanged, Threaded and Welding End.
- .2 American Society of Testing and Materials (ASTM):
 - .1 ASTM A216 / A216M - 08 Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding, for High-Temperature Service.
- .3 American Petroleum Institute (API).
 - .1 API 598-[1996], Valve Inspection and Testing.
- .4 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS).
 - .1 MSS SP-25-1998, Standard Marking System for Valves, Fittings, Flanges and Unions.
 - .2 MSS SP-61-2003, Pressure Testing of Steel Valves.

1.4 SUBMITTALS

- .1 Submittals in accordance with E4.
- .2 Clearly reference each shop drawing item to the respective specification section and/or drawing number detail.

- .3 Highlight information and options relative to the shop drawing item.
- .4 Redline information and options on the shop drawing items that are not relevant to the product supplied.
- .5 Closeout Submittals:
 - .1 Submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.5 QUALITY ASSURANCE

- .1 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with the Manitoba Department of Labour guidelines.

1.6 DELIVERY STORAGE AND DISPOSAL

- .1 Waste Management and Disposal:
 - .1 Separate and recycle waste materials.

1.7 MAINTENANCE

- .1 Furnish following spare parts:
 - .1 Sleeve : one for each valve, minimum 2.
 - .2 One spare pressure gauge.

1.8 COMMISSIONING

- .1 As part of commissioning activities, develop schedule of valves and record thereon identifier, location, service, purchase order number and date, manufacturer, identification data specified above.
- .2 Incorporate the City of Winnipeg equipment identification into the document. Obtain numbering system from Contract Administrator.
- .3 Manufacturer/supplier of valve operators is to provide assistance to the Contractor during commissioning to set up actuators.

1.9 TRAINING

- .1 Provide operator classroom training for operators.
- .2 Training to include items such as preventative maintenance, adjusting, set up and repairs. Provide training manuals for each operator. Trainer to use actual model in classroom for demonstrations purposes.
- .3 Refer to Section 01 91 94 Commissioning Training for additional requirements.

Part 2 Products

2.1 MATERIAL

- .1 Valves:
 - .1 Valves to be individually tested by manufacturer prior to shipping.
- .2 Requirements common to valves, unless specified otherwise:
 - .1 Pressure-temperature ratings: to ANSI B16.34.
 - .2 Inspections and tests: to API 598.
 - .3 Pressure Testing: to MSS SP-61.
 - .4 Flanged valves:
 - .1 Face-to-face dimensions: to ANSI B16.10.
 - .2 Flange dimensions: to ANSI B16.5 with 1.6 mm raised face.
 - .5 Markings: to MSS SP-25.
 - .6 Identification:
 - .1 Plate showing catalogue number, size, material of body disc, stem seat, fluid, pressure-temperature rating.
 - .2 Body markings: manufacturer, size, primary service rating, material symbol.
 - .7 CRN registration number required for all products.

2.2 PNEUMATIC FLOW CONTROL PINCH VALVES

- .1 Two pneumatic operated mechanical pinch type valve with the following features or characteristics:
 - .1 Line size: 150 mm (6")
 - .2 Flow rate: maximum 530 US gpm, normal 400 US gpm and minimum flow rate: 100 US gpm
 - .3 Inlet temperature: 5°C (40°F) to 10°C (50°F).
 - .4 Specific gravity of liquid: 1.0
 - .5 Body: ductile iron.
 - .6 Body Length shall be given in ISA S75.08.
 - .7 Pinch sleeve trim: one piece construction with integral flanges drilled to be retained by the flange bolts.
 - .8 Pinch sleeve material: viton reinforced with calendared polyester. Provide spare sleeve for each valve.
 - .9 Sleeve type: variable orifice cone sleeve design.
 - .10 Actuator function: throttling.
 - .11 Flange joint ends: mate with ANSI B16.1, Class 125/ ANSI B16.5, Class 150
 - .12 Pneumatic operation: air to open with fail open spring.
 - .13 Air failure mode: spring open with spring fully enclosed in the cylinder housing
 - .14 Input signal: 4 to 20 mA.
 - .15 Pneumatic cylinder maximum working pressure of 150 psig.

- .16 Facility air supply: (570 kPa)82 PSIG.
 - .17 Pneumatic cylinder mounting: On valve body by means of an open yoke.
 - .18 Limit switches: open and closed limit switches.
 - .19 Valve positioner: valve position switch.
 - .20 Stem position indicator: switch to indicate stem position.
 - .21 Solenoid valve: 3 way solenoid valve ASCO Model #8320.
 - .22 Manual over ride: perpendicular to pipe.
 - .23 Regulator: Fisher filter regulator #67AFR
 - .24 Acceptable manufacturer: Red Valve Co. Series 5200D or approved equal.
- .2 All accessories shall be factory set and field adjusted.
 - .3 Install copper air lines from the new air reservoir to the pneumatic operator.

2.3 PNEUMATIC AIR RESERVOIR

- .1 Provide one ASME Code Section VIII, Division 1 and CSA B.51 certified steel air reservoir complete with the following:
 - .1 Tank rating: maximum allowable working pressure of 200 PSIG
 - .2 Tank Capacity: 226 litre (60 US gal)
 - .3 Orientation: vertical tank with pressed steel feet
 - .4 Tank CRN number assigned for use in Canada
 - .5 Factory applied tank exterior paint: 2 coats of ICI Devoe Epoxy Lining, 3-5 mil per coat
 - .6 Factory Applied tank interior paint: 2 coats of ICI Devoe Epoxy Lining, 3-5 mil per coat.
 - .7 Acceptable manufacturer: Ingersoll Rand
- .2 Accessories:
 - .1 Air regulator with pressure gauge for a range of 0 to 1,034 kPa (0 to 150 PSI). Operating point 138 kPa (20 PSI)
 - .2 Tank mounted pressure regulating valve.
 - .3 Bronze check valve mounted on inlet of air reservoir.
 - .4

2.4 PNEUMATIC BALL VALVES

- .1 Provide ball valves on the air supply branch line from the City's existing air compressor to the new air reservoir in gallery number 3. Refer to schematic drawing. Valves to have the following features:
 - .1 Service: compressed air
 - .2 Rating: 600 psig WOG
 - .3 Body: bronze
 - .4 Ball: 316 stainless steel
 - .5 Stem: 316 stainless steel
 - .6 Lever and nut: Stainless steel

- .7 Seat and stem packing: Reinforced Poly Tetra Fluoro Ethylene (RPTFE)
- .7 Acceptable manufacturer: Apollo 70-100 Series or approved equal.

2.5 PROCESS CONTROL BALL VALVES

- .1 Pneumatic operated mechanical ball valve with the following features or characteristics:
 - .1 Size: 10mm, 150 mm, 300mm
 - .2 Rating: Class 150
 - .3 Design: full bore, split body, side entry, flanged
 - .4 Body: ASTM A351 stainless steel
 - .5 Ball: ASTM A276 Type 316 stainless steel
 - .6 Stem: ASTM A276 Type 316 stainless steel
 - .7 Ball seat: Super-TEK TFM
 - .8 Stem packing: Super-TEK TFM
 - .9 Adaptor mount: as required
 - .10 Acceptable manufacturer: Flo-Tite Inc. Model F150 or approved equal.
- .2 Pneumatic Operator
 - .1 Service: on – off service
 - .2 Air Supply: 80 psig
 - .3 Function: double acting
 - .4 Environment: NEMA 4X , corrosion resistant
 - .5 Air filter / pressure regulator to set valve pressure
 - .6 Acceptable manufacturer: Flowserve Super Nova Model B175B.
- .3 Electric Operator for 150 mm valves
 - .1 Valve size: 150 mm
 - .2 Service: quarter turn on – off service
 - .3 Environment: NEMA 4X , corrosion resistant
 - .4 Certification: CSA certified
 - .5 Voltage: 600V 60 Hz 3Ph
 - .6 Manual hand wheel over ride with declutch lever.
 - .7 Local/stop/remote selector switch
 - .8 Open/close selector switch
 - .9 LCD display
 - .10 Overload: Torque sensing overload.
 - .11 Acceptable manufacturer: Flowserve Limitorque Accutronix QX-4 or approved equal.
- .4 Electric Operator for 300 mm valves
 - .1 Valve size: 300 mm
 - .2 Service: quarter turn on – off service
 - .3 Environment: NEMA 4X , corrosion resistant
 - .4 Certification: CSA certified

- .5 Voltage: 600V 60 Hz 3Ph
- .6 Manual hand wheel over ride with declutch lever.
- .7 Local/stop/remote selector switch
- .8 Open/close selector switch
- .9 LCD display
- .10 Overload: Torque sensing overload.
- .11 Control system: distributed control system
- .12 Acceptable manufacturer: Flowserve Limitorque Accutronix MXa or approved equal.

.5 Integrated Valve Controller for pneumatic operators with the following features

- .1 Controller environment: NEMA 4X and corrosion resistant.
- .2 Housing: Aluminium with dichromate and powder coat
- .3 Shaft: stainless steel
- .4 Cam/splines: nylon
- .5 Dome: polycarbonate.
- .6 Terminal block: PCB screw terminals.
- .7 Mechanical switches: SPDT
- .8 Electrical connection: 12 mm NPT conduit
- .9 Electrical voltage: 120VAC
- .10 Certifications: CSA
- .11 Solenoid: internal pilot
- .12 Acceptable manufacturer: Flowserve Aviator

.6 Manual operator

- .1 Worm gear operation.

2.6 PROCESS CONTROL LEACHATE CHECK VALVES

.1 Check valve with an ANSI Class 125 rating shall be a full body type, with a domed access cover and only two moving parts, the flexible Buna-N disc and type 302 stainless steel disc accelerator conforming to American Water Works Association Standards ANSI/AWWA C508. Provide the following:

- .1 Valve body material to be ASTM A-351 Grade CF8M, stainless steel.
- .2 A mechanical indicator to provide disc position indication on valves. The indicator shall have continuous contact with the disc under all operating conditions to assure accurate disc position.

.2 Acceptable Manufacturer: Valmatic Surgebuster

2.7 PROCESS CONTROL SAMPLER AIR LINES

.1 Sampler air lines to be Type K Hard Copper.

2.8 PROCESS CONTROL AIR LINE CHECK VALVE

- .1 Bronze check valve rated for 400 psig WOG with tight shut off, RPTFE ball-cone check and straight flow through, stainless steel spring.
- .2 Provide check valve on air supply line from City's existing air compressors.

Part 3 Execution

3.1 INSTALLATION

- .1 Valve shall be installed in accordance with manufacturer's written Installation and Operation Manual.

3.2 PNEUMATIC CONTROL PINCH VALVES

- .1 Pipe air from COW facility air supply pipe line to valve.

3.3 COMMISSIONING

- .1 As part of commissioning activities, develop schedule of valves and record thereon identifier, location, service, purchase order number and date, manufacturer, identification data specified above.
- .2 Use the City of Winnipeg Identification Numbering system to identify valves.

3.4 TRAINING

- .1 Provide training to the City of Winnipeg employees at a time convenient on the operation, set up, adjusting and maintenance of the valves and operators. The date and time to be convenient to the City of Winnipeg.
- .2 Provide specific manufacturer training manuals for each operator.

3.5 OPERATION AND MAINTENANCE MANUALS

- .1 Pump supplier to provide operation and maintenance information to the Contractor for inclusion in the operation and maintenance manual.
- .2 Provide operation and maintenance (O&M) manual to the Contract Administrator for review at least one month before substantial completion. Incorporate Contract Administrator's comments into final submission. Total project performance will not be achieved until the final O&M submission is received.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 44 20 01 - Installation of Process Piping
- .2 Section 44 30 01 - Sampling Equipment

1.2 REFERENCES

- .1 American National Standards Institute/American Society of Mechanical Engineers (ANSI/ASME)
 - .1 ANSI/ASME B31.3-2006, Process Piping.
- .2 American National Standards Institute/American Water Works Association (ANSI/AWWA)
 - .1 ANSI/AWWA C206-03, Field Welding of Steel Water Pipe.
- .3 American Welding Society (AWS)
 - .1 AWS C1.1M/C1.1-R2006, Recommended Practices for Resistance Welding.
 - .2 AWS Z49.1-2005, Safety in Welding, Cutting and Allied Process.
 - .3 AWS W1-2000, Welding Inspection Handbook.
- .4 Canadian Standards Association (CSA International)
 - .1 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding.
 - .2 CSA-W117.2-2006, Safety in Welding, Cutting and Allied Processes.
 - .3 CSA W178.1-2008, Certification of Welding Inspection Organizations.
 - .4 CSA W178.2-2008, Certification of Welding Inspectors.
- .5 Manitoba Department of Labour.
- .6 Submittals: E4.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 At least one week prior to commencing any welding work, the Contractor is to provide the Contract Administrator with a copy of each welders' certificates showing that the welders have Manitoba Provincial qualifications for the welding procedures that will be undertaken on the project.

1.4 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Welders:
 - .1 Welding qualifications in accordance with CSA B51.

- .2 Use qualified and licensed welders possessing certificate for each procedure performed from authority having jurisdiction.
- .3 Submit welder's qualifications to the Contract Administrator.
- .4 Each welder to possess identification symbol issued by authority having jurisdiction.
- .2 Inspectors:
 - .1 Inspectors qualified to CSA W178.2.
- .3 Certifications:
 - .1 Registration of welding procedures in accordance with CSA B51.
 - .2 Copy of welding procedures available for inspection.
 - .3 Safety in welding, cutting and allied processes in accordance with CSA-W117.2.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle material in order not to cause damage from vibration, dust, water, cold, heat, etc..
- .2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .3 Waste Management: remove waste material for reuse and recycling to the maximum.

Part 2 Products

2.1 ELECTRODES

- .1 Electrodes: in accordance with CSA W48 Series.

Part 3 Execution

3.1 APPLICATION

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 QUALITY OF WORK

- .1 Welding: in accordance with ANSI/ASME B31.1, ANSI/ASME Boiler and Pressure Vessel Code, Sections I and IX and ANSI/AWWA C206, using procedures conforming to AWS B3.0, AWS C1.1, and applicable requirements of provincial authority having jurisdiction.

3.3 INSTALLATION REQUIREMENTS

- .1 Identify each weld with welder's identification symbol.
- .2 Backing rings:

- .1 Where used, fit to minimize gaps between ring and pipe bore.
- .2 Do not install at orifice flanges.
- .3 Fittings:
 - .1 Branch connections: install welding tees or forged branch outlet fittings.

3.4 INSPECTION AND TESTS - GENERAL REQUIREMENTS

- .1 Review weld quality requirements and defect limits of applicable codes and standards with Contract Administrator before work is started.
- .2 Formulate "Inspection and Test Plan" in co-operation with Contract Administrator.
- .3 Do not conceal welds until they have been inspected, tested and approved by inspector.
- .4 Provide for inspector to visually inspect welds during early stages of welding procedures in accordance with Welding Inspection Handbook. Repair or replace defects as required by codes and as specified.

3.5 SPECIALIST EXAMINATIONS AND TESTS

- .1 General:
 - .1 Perform examinations and tests by specialist qualified to CSA W178.1 and CSA W178.2 and approved by Contract Administrator.
 - .2 Inspect and test 15 % of welds in accordance with "Inspection and Test Plan" by non-destructive visual examination.
- .2 Hydrostatically test welds to ANSI/ASME B31.1.
- .3 Visual examinations: include entire circumference of weld externally and wherever possible internally.
- .4 Failure of visual examinations:
 - .1 Upon failure of welds by visual examination, perform additional testing as directed by Contract Administrator by radiographic tests.
 - .2 Spot radiography:
 - .1 Conduct spot radiographic tests of up to 10% of welds, selected at random by Contract Administrator from welds which would be most difficult to repair in event of failure after system is operational.
 - .3 Radiographic film:
 - .1 Identify each radiographic film with date, location, name of welder, and submit to Contract Administrator. Replace film if rejected because of poor quality.
 - .4 Interpretation of radiographic films:
 - .1 By qualified radiographer.
 - .5 Failure of radiographic tests:
 - .1 Extend tests to all welds by welder responsible when those welds fail tests.

3.6 DEFECTS CAUSING REJECTION

- .1 As described in ANSI/ASME B31.1 and ANSI/ASME Boiler and Pressure Vessels Code.

3.7 REPAIR OF WELDS WHICH FAILED TESTS

- .1 Re-inspect and re-test repaired or re-worked welds at Contractor's expense.
- .2 A contract time extension for repair work will not be considered.

3.8 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials for reuse and recycling.

END OF SECTION

Part 1 General

1.1 DESCRIPTION

- .1 This section specifies the supply, delivery and installation of submersible coupled end suction centrifugal pumping units complete with motors identified DP-51 and DP-52 as shown on the drawings.
- .2 Include the following as a minimum with each pump:
 - .1 Pump and motor
 - .2 A minimum of two (2) trips, each one (1) working day on-site (excluding travel time) to cover inspection of installation, testing, commissioning and operator training by the pump supplier
 - .3 Pumps shall be delivered in complete, assembled units.
- .3 The replacement of two end suction belt driven centrifugal sludge pumps SP-1 and Sp-2 and accessories, located in gallery #5, with dry pit screw centrifugal pumps to pump digested sludge into the digester.

1.2 SUMMARY

- .1 Section Includes:
 - .1 Dry pit application of submersible centrifugal pumps in the leachate dumping / receiving building
 - .2 Horizontal coupled centrifugal pumps in Digester Gallery Number 2
 - .3 General requirements relating to commissioning of project's components and systems, specifying general requirements to performance verification of components, equipment, sub-systems, systems, and integrated systems.
- .2 Related Sections:
 - .1 Section 44 05 01 – Process Valves
 - .2 Part E4 – Shop Drawings.
 - .3 Section 01 78 00 - Closeout Submittals.
 - .4 Section 44 20 01 - Installation of Pipework.
 - .5 Section 26 Electrical

1.3 REFERENCES

- .1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME).
 - .1 ANSI/ASME B16.5-2003, Pipe Flanges and Flanged Fittings.
 - .2 ANSI/ASME B16.10-1992, Face-to-Face and End-to-End Dimensions Valves.
 - .3 ANSI/ASME B16.25-1997, Buttwelding Ends.
 - .4 ANSI/ASME B16.34-1996, Valves - Flanged, Threaded and Welding End.
- .2 American Petroleum Institute (API).

- .1 API 598-1996, Valve Inspection and Testing.
- .3 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM A49-01, Specification for Heat-Treated Carbon Steel Joint Bars.
 - .2 ASTM A193/A193M-[04], Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
 - .3 ASTM B85-03, Specification for Aluminum-Alloy Die Castings.
- .4 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS).
 - .1 MSS SP-25-1998, Standard Marking System for Valves, Fittings, Flanges and Unions.
 - .2 MSS SP-61-2003, Pressure Testing of Steel Valves.

1.4 GENERAL REQUIREMENT

- .1 The Sub-contractor shall be responsible for the design, fabrication, assembly in factory and testing of the equipment. The pump supplier shall supply all necessary shop drawings and installation and maintenance manuals for the Contractor. The Contractor shall be responsible for taking the delivery of the equipment and assembly (as required) and installation of the equipment to produce an operational pumping system including pump controls.
- .2 For supply and installation of the pump control panel, c/w VFD controls refer to Section 26 - Electrical.

1.5 STANDARDS

- .1 Products provided under this specification must comply with all regulations and codes in effect in Manitoba.
- .2 Electrical work shall be in accordance with the Canadian Electrical Code and with applicable standards of the Electrical and Electronic Manufacturers Association of Canada (EEMAC) and the Canadian Standards Association (CSA).
- .3 Hydraulic Efficiency and Pump Impeller tolerances shall conform to the Standards of the Hydraulic Institute.
- .4 The pump / motor assembly shall have CSA approval as one unit, per CSA standard C22.2-108. Proof of this approval shall be submitted by the pump manufacturer with the approval drawings. An approval of the motor unit only will not be acceptable.
- .5 The pump / motor shall also be approved by CSA for service in Class1, Division II, Groups A, B, C or D hazardous locations.

1.6 PERMITS

- .1 The Contractor shall obtain permits and coordinate inspections and power connection with Manitoba Hydro.

1.7 SUBMITTALS

- .1 Submittals in accordance with Part E4 including the following:
 - .1 Clearly reference each shop drawing item to the respective specification section and/or drawing number detail.
 - .2 Highlight information and options relative to the shop drawing item.
 - .3 Redline information and options on the shop drawing items that are not relevant to the product.
- .2 The pump supplier shall submit all shop drawings and maintenance and installation manuals to the Contractor.
- .3 Submittals shall include:
 - .1 Type, manufacturer and general description
 - .2 General outline drawings showing clearly all general and essential dimensions
 - .3 Descriptions and specifications of various components including:
 - .1 pump impeller
 - .2 pump casing
 - .3 wearing rings
 - .4 discharge fittings
 - .5 accessories
 - .4 Pump characteristics curves showing efficiency, power requirements, pump capacities at various heads, curve number, impeller diameter, rated speed.
- .4 Data as follows:
 - .1 power requirements, voltage, motor power output
 - .2 maximum solids size
 - .3 total mass of pump and motor
 - .4 level controls
 - .5 pump controls.
- .5 Installation details
- .6 Closeout Submittals:
 - .1 Submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
 - .2 The Contractor shall submit the required copies of bound indexed operation and maintenance manuals.

1.8 PERFORMANCE

- .1 The pumps shall be designed for continuous operation and will be operated continuously under normal service.

1.9 QUALITY ASSURANCE

- .1 The pump manufacturer shall check the pump system and the intended pump conditions.
- .2 If the pump manufacturer has concerns regarding the satisfactory operation of his equipment under the required conditions, the concerns shall be submitted in writing to the Contract Administrator.
- .3 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Manitoba Department of Labour guidelines.

1.10 DELIVERY STORAGE AND DISPOSAL

- .1 Waste Management and Disposal:
 - .1 Separate and recycle waste materials.
 - .2 Provide dry storage areas and follow the manufacturer's recommendations for storage and handling. Rotate moving parts monthly during storage.
 - .3

1.11 MAINTENANCE

- .1 Deliver products to the site, and handle and store them to avoid damage to any components.

1.12 TRAINING

- .1 Provide operator classroom training for operators.
- .2 Training to include items such as preventative maintenance, adjusting, set up and repairs. Provide training manuals for each operator. The training is to include a field trip to provide additional information.
- .3 Submit to the Contract Administrator at least one month prior to the training, a copy of the proposed training manual for review.
- .4 Time allowance:
 - .1 Pumps – 3.0 hours for each type of pump.

1.13 COMMISSIONING

- .1 Commissioning (Cx) is a planned program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished Project. Cx is performed after systems and integrated systems are completely installed, functional and Contractor's Performance Verification responsibilities have been completed and approved. Objectives:
 - .1 Verify installed equipment, systems and integrated systems operate in accordance with contract documents and design criteria and intent.
 - .2 Ensure appropriate documentation is compiled into the BMM.
 - .3 Effectively train O&M staff.

- .2 Contractor assists in Cx process, operating equipment and systems, troubleshooting and making adjustments as required.
 - .1 Systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems to be interactively with each other as intended in accordance with Contract Documents and design criteria.
 - .2 During these checks, adjustments to be made to enhance performance to meet environmental or user requirements.
- .3 Design Criteria: as per client's requirements or determined by Contract Administrator. To meet Project functional and operational requirements.

Part 2 Products

2.1 LEACHATE SUBMERSIBLE CENTRIFUGAL - DRY PIT APPLICATION, LP-1, LP-2

- .1 Provide two (2) submersible centrifugal pumps for dry pit horizontal mounting in the leachate receiving / dumping building. The pump shall have the following characteristics:
 - .1 Impeller: The impeller shall be of 329 SS and shall be of the semi-open, non-clogging single vane design capable of passing 3.1" diameter spherical solids. The impeller shall have a slip fit into the motor shaft and drive key, and shall be fastened to the shaft by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly.
 - .2 Self Cleaning Wear Plate: The pump shall be equipped with a self-cleaning wear plate constructed from 316 SS. The wear plate shall be easily adjustable by the use of adjusting screws without requiring any disassembly of the pump.
 - .3 Pump Volute: The pump volute shall be a single piece 316 SS non-concentric design with 4" (100 mm) ANSI Flanged centerline discharge.
 - .4 Shaft: The pump shaft and motor shaft shall be an integral unit. The shaft shall be of 316 SS.
 - .5 Mechanical Seals: Each pump shall be equipped with a tandem mechanical seal. Both faces of the lower (primary) seal shall be industrial grade silicon carbide. The upper (secondary) seal faces shall be carbon and high chrome steel. Seal elastomers shall be of Viton. Each pump shall be equipped with a lubricant chamber for the shaft sealing system, which allows the pump to run dry without damage.
 - .6 Seal Failure Early warning system: An electrical probe shall be provided in a moisture-sensing chamber for detecting the presence of water. A "Seal Minder" relay will sense moisture in the seal chamber and provide an alarm in the control panel or shut the pump down.
 - .7 Cooling System: Each pump shall be equipped with a closed loop cooling system to provide adequate heat transfer to allow the motor to run continuously under full load while in an unnumbered condition. Pumps using pumped liquid, oil or other toxic materials shall not be considered equal.

- .8 Motor Construction: Motor shall be air filled squirrel cage induction shell type (NEMA Design B) with class H insulation rated at 180 degrees C. Motor shall be capable of 12 equally spaced starts per hour.
- .9 Hydraulic Performance: The design flow shall range between 1961 L/min at 18 m TDH (519 usgpm at 59 ft. TDH) and 2967 L/min at 11.6 m TDH (785 usgpm at 38 ft. TDH). NPSH required shall not exceed 7.6m (25 ft) at maximum flow.
- .10 Acceptable manufacturer product: ABS Model AFPD 1049 M90/4D or approved equal.

2.2 LEACHATE COUPLED END SUCTION CENTRIFUGAL PUMP, LP3, LP-4, LP-5

- .1 Provide three (3) coupled end suction centrifugal pumps for mounting in digester Gallery No. 2. The pumps shall have the following features and characteristics:
 - .1 Service: landfill leachate
 - .2 Capacity: 530 litres per minute at a head of 46.7 metres W.G.
 - .3 Motor: 600 V 3 ph 60 Hz totally enclosed fan cooled with a service factor of 1.15.
 - .4 Pump design: ANSI standard
 - .5 Casing: class 150 stainless steel type 316
 - .6 Impeller: fully open stainless steel type 316
 - .7 Packing: SIL C-8201
 - .8 Packing gland: stainless steel type 316
 - .9 Shaft: stainless steel type 316
 - .10 Shaft sleeve:
 - .11 Bearing housing: cast iron
 - .12 Lock and washer: steel
 - .13 Inboard bearing: radial single row groove
 - .14 Stuffing box: stainless steel type 316
 - .15 Frame: cast iron
 - .16 Frame foot: cast iron
 - .17 Gland: stainless steel type 316
 - .18 Sight oil gauge: cadmium plated
 - .19 Labyrinth outboard oil seal: carbon filled Teflon
 - .20 Labyrinth inboard oil seal: carbon filled Teflon
 - .21 Casing gasket: aramid fiber with EDPM
 - .22 Gland stud: stainless steel type 316
 - .23 Gland nut: stainless steel type 304
 - .24 Hex nuts: stainless steel type 304
 - .25 Casing drain plug: stainless steel type 316
 - .26 Gasket frame to adapter: Vellumoid
 - .27 Gasket bearing to end cover: Vellumoid (811XL only)
 - .28 Bearing housing hex bolts: steel
 - .29 Casing jack screw: steel

- .30 Casing to frame dowel pin: steel
- .31 Bearing housing O-ring: Buna Rubber
- .32 Impeller O-ring: glass filled TFE
- .33 Acceptable manufacturer: Griswold 811 or approved equal.

2.3 DIGESTED SLUDGE CENTRIFUGAL PUMP, DP-51 and DP-52

- .1 Remove and replace two existing sludge pumps in Gallery Number 4 and install two new sludge pumps:
- .2 Turn old pumps over to the City. Move to a location on the NEWPCC site as directed by the City.
- .3 The pump shall have the following features and characteristics:
 - .1 Service: waste activated sludge with 5% solids.
 - .2 Pump design: The basic design shall be a single-passage, clog-free pump, utilizing a screw-centrifugal impeller. The overall pump design shall combine high efficiency, low required NPSH, a large solid passage, and the ability to handle rags or other fibrous material without plugging. The hydraulic design of the impeller shall combine the action of a positive displacement screw with the action of a single-vane centrifugal impeller to provide a single, non-bifurcated flow stream with only gradual changes in flow direction.
 - .3 Pump casing: The pump volute, backplate, and suction piece shall be of closed-grained cast iron, ASTM A 48-CL30.
 - .4 Impeller: Nodular Iron, ASTM A 536-60-06, and shall be both statically and dynamically balanced.
 - .5 The bearing housing shall be of cast iron, ASTM A 48CL-30 and shall be of the back pull out design so that the bearing housing and impeller can be removed without disconnecting the casing from the suction and discharge piping.
 - .6 The shaft shall be steel and provided with suitable bearings capable of taking all mechanical and hydraulic loads. Unless otherwise specified, bearings shall provide a minimum B10 bearing life of 50,000 hours without credit for hydraulic balancing by pump-out vanes, grooves, or wear rings.
 - .7 Tandem Mechanical Seal Arrangement Requiring No External Flush. Shaft sealing shall be by independently-mounted, tandem mechanical seals contained in an oil chamber that is formed as an intrinsic part of the bearing frame and allows the seals to be completely submerged in and lubricated by the oil bath. Externally-mounted oil reservoirs are not acceptable.
 - .8 Mounting: Pump mounting is to be a horizontal mounting with V-Belt Drives between Motor and Pump. The pump manufacturer shall provide a common pump and motor base constructed of a minimum 9 mm thick fabricated steel, suitably reinforced to support the full weight of pump and motor.
 - 1) The pump supplier shall furnish and mount a separate, adjustable motor base so that the motor can be easily moved for V-belt tensioning and adjustment.
 - 2) The pump supplier shall furnish and install belts and sheaves to drive the pump at the speed necessary to meet the rated conditions. The drive shall be of the

"stationary control" variable speed type that allows a speed change by means of an adjustment to the motor sheave when the drive is not in operation.

3) An approved fiberglass belt guard shall be provided to safely enclose the V-belt. If metal guards are furnished, they shall be of all 316 stainless steel construction with suitable lifting eyes and handles to aid in removal.

- .9 Paint: The pump, support frame, base, belt guard and motor are to be painted with a single epoxy paint colour.
- .10 Pump motor: 25 HP TEFC, 1800 RPM, 600V 3 Ph 60 Hz with service factor of 1.15
- .11 Provide one tool kit for seal and bearing replacement.
- .12 Acceptable manufacturer: WEMCO-HIDROSTAL Horizontal Screw Centrifugal Pumps Model 4 x 3 Model C.

2.4 PRESSURE GAUGES

- .1 Stainless steel 100 mm diameter Stainless steel Bourdon tube pressure / vacuum gauge with a range of 15 mm Hg to 100 kPa on suction and pressure gauge with a range of 0-700 kPa on discharge side of all pumps.
 - .1 Provide isolation valve with chrome plated ball and stainless steel lever arm.
 - .2 Provide stainless steel diaphragm valve

Part 3 Execution

3.1 INSTALLATION

- .1 Install pumps in accordance with manufacturer's guideline.

3.2 PUMP REPLACEMENT

- .1 Remove and replace two existing sludge pumps in Gallery Number 5 and install two new sludge pumps.
- .2 The 24 hours per day / seven days per week operation of hauling and off loading of sludge by sludge haulers into the NEWPCC digesters must not be disrupted. The sludge pumps are used to transfer sludge from the hauler tanks into the digesters. Sludge hauling is critical to the process and operation of both the West and South End Water Pollution Control Centres. One pump must remain in service at all times. Remove and replace one pump at a time. The first replaced pump is to be operational two weeks prior to replacement of second pump to prove reliability.
- .3 Turn old pumps over to the City. Move to a location on the NEWPCC site as directed by the City.
- .4 Replace old pressure gauges with new pressure gauges. Turn old gauges over to City.
- .5 Adjust piping to suit arrangement of new pumps.
- .6 Electrical contractor is to disconnect and reconnect power and pump controls.

- .7 Electrical Sub-contractor to provide new breaker and conductor from motor control centre (MCC) to pump for one new 25 HP pump. Conduit size is to be #8 AWG. In MCC replace existing breaker with to be 50A, 600V, 3Ph. Refer to electrical section for quality and manufacturer.
- .8 Commission units and provide training and O&M manuals.

3.3 TRAINING

- .1 Provide training to the City of Winnipeg employees at a time convenient on the operation, set up, adjusting and maintenance of the valves and operators. The date and time to be convenient to the City of Winnipeg.

3.4 COMMISSIONING

- .1 As part of commissioning activities, develop schedule of pumps and record thereon identifier, location, service, purchase order number and date, manufacturer, identification data specified above.
- .2 Incorporate the City of Winnipeg equipment identification into the document. Obtain numbering system from Contract Administrator.

3.5 OPERATION AND MAINTENANCE MANUALS

- .1 Pump supplier to provide operation and maintenance information to the Contractor for inclusion in the operation and maintenance manual.
- .2 Provide operation and maintenance (O&M) manuals to the Contract Administrator for review as list one month before substantial completion. Incorporate Contract Administrator's comments into final submission. Total project performance will not be achieved until the final O&M submission is received.

END OF SECTION

Part 1 General

1.1 DESCRIPTION

- .1 Supply and installation of piping and accessories as shown on the drawing.

1.2 RELATED REQUIREMENTS

- .1 Part E4 – Shop Drawings
- .2 Section 01 33 00 - Submittal Procedures.
- .3 Section 01 78 00 - Closeout Submittals.
- .4 Section 44 05 01 - Valves

1.3 REFERENCES

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.181-1999, Ready-Mixed Organic Zinc-Rich Coating.
- .2 Canadian Standards Association (CSA International)
- .3 American Society for Testing and Materials (ASTM)
 - .1 ASTM A312 Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipes
 - .2 Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings. A 403/ A 403M.
 - .3 Standard Specification for Seamless and Welded Ferritic / Austenitic Stainless Steel Pipe. A 709/ A 709M.

1.4 SUBMITTALS

- .1 Provide submittals in accordance with Part E4 including:
 - .2 Product Data:
 - .1 Provide manufacturer's printed product literature, specifications and datasheets for piping and equipment and include product characteristics, performance criteria, physical size, finish and limitations.

1.5 QUALITY ASSURANCE

- .1 Provide documentation that the seamless stainless steel pipe to be manufactured is Canada.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

1.7 MEASUREMENT AND PAYMENT

- .1 No measurement will be made for materials and quantities installed under this Section.
- .2 Payment for Work governed by Form "B" unit prices will be made on the basis of the actual work completed as determined by the Contract Administrator multiplied by the unit price.

Part 2 Products

2.1 PIPE MATERIAL

- .1 Leachate dumping station holding tank influent process piping
 - .1 Provide IPS Type 316L seamless schedule 10S stainless steel pipe
 - .2 Fittings: Standard Vitaulic coupling housings cast of ductile iron to ASTM A-536, Grade 65-45-12.
 - .3 Refer to drawings for sizes.
- .2 Leachate dumping station holding tank effluent process piping
 - .1 Provide IPS Type 316L seamless schedule 40S stainless steel pipe.
 - .2 Fittings: Standard Vitaulic coupling housings cast of ductile iron to ASTM A-536, Grade 65-45-12.
 - .3 Refer to drawings for sizes.
- .3 Leachate process piping in Gallery Number 3
 - .1 Provide IPS Type 316L seamless schedule 40S stainless steel pipe.
 - .2 Fittings: Standard Vitaulic coupling housings cast of ductile iron to ASTM A-536, Grade 65-45-12.
 - .3 Refer to drawings for sizes.
- .4 Liquid hauled wastewater dumping station holding tank influent process piping
 - .1 Provide IPS Type 316L seamless schedule 10S stainless steel pipe.
 - .2 Fittings: Standard Vitaulic coupling housings cast of ductile iron to ASTM A-536, Grade 65-45-12
 - .3 Refer to drawings for sizes.
- .5 Liquid hauled wastewater dumping station holding tank effluent process piping
 - .1 Provide IPS Type 316L seamless schedule 10S stainless steel pipe
 - .2 Fittings: Standard Vitaulic coupling housings cast of ductile iron to ASTM A-536, Grade 65-45-12
 - .3 Refer to drawings for sizes.
- .6 Process control air piping in dumping stations and galleries.
 - .1 Provide Type K hard copper pipe
 - .2 Refer to drawings for sizes.

2.2 PIPE SUPPORTS

- .1 Provide pipe supports as required to adequately support a full pipe under pressure.
- .2 Pipe supports are to be manufactured with corrosion resistant material.
- .3 Hangers with nuts and washers are to be Type 304 stainless steel
- .4 Fabricated pipe support material to be hot dip galvanized after fabrication. Galvanizing paint is not acceptable.

2.3 VACUUM BREAK / AIR VENTS

- .1 Install vacuum break on leachate piping in Gallery No. 2.
- .2 Acceptable manufacturer: Valmatic

2.4 WALL PIPE PENETRATIONS

- .1 Provide cored holes for wall penetrations for all pipes.
 - .1 Use link seal to seal opening between the cored wall penetration and the pipe.

2.5 FLOOR SLEEVES

- .1 Provide schedule 40 galvanized floor sleeves at wall penetrations
 - .1 Floor sleeve is to extend 100 mm above floor.
 - .2 Hot dip galvanize sleeve after fabrication

2.6 PIPE EXPANSION JOINT

- .1 Install pipe expansion joint on leachate piping between Gallery No. 2 and Gallery No. 3 at location of building expansion joint.

2.7 WALL PENETRATIONS SEALANT

- .1 Provide sealant at all wall penetrations.

2.8 FIRE STOPPING WALL PENETRATIONS

- .1 Provide fire stopping where required

2.9 FORCED BALANCED FLEXIBLE EXPANSION JOINT

- .1 Provide and install one 150 mm diameter forced balanced flexible expansion joint on the leachate pipeline between gallery number 3 and the SBR centrate pipeline approximately one metre from gallery basement wall.
- .2 Forced balanced flexible expansion joint shall be manufactured of ductile iron conforming to the material requirements of ASTM A536 and ANSI / AWWA C153/A21.53.
- .3 Rated pressure: 1.72MPa (250 PSI).
- .4 Acceptable manufacturer: EBAA Iron Inc Force Balanced Flex-Tend.

2.10 PIPE IDENTIFICATION

- .1 Paint exterior pipes with epoxy paint as per section 09 91 00.
- .2 Provide pipe identification and directional arrows.

Part 3 Execution

3.1 APPLICATION

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 CONNECTIONS TO EQUIPMENT

- .1 In accordance with manufacturer's instructions unless otherwise indicated.
- .2 Use valves and flanges for isolation and ease of maintenance and assembly.

3.3 PROCESS CONTROL AIR

- .1 Connect process air piping to pneumatic air system in the digester gallery.
- .2 Install air in a straight line parallel to wall.
- .3 Vertical piping to be installed vertically plumb.

3.4 CLEARANCES

- .1 Provide space for disassembly, removal of equipment and components as recommended by manufacturer without interrupting operation of other system, equipment, components.

3.5 DRAINS

- .1 Install piping with grade in direction of flow except as indicated.
- .2 Install drain valve at low points in piping systems, at equipment and at section isolating valves.
- .3 Pipe each drain valve discharge separately to above floor drain.
 - .1 Discharge to be visible.
- .4 Drain valves: NPS 50 mm ball valve, unless indicated otherwise, with hose end male thread, cap and chain.

3.6 VACUUM BREAK / AIR VENTS

- .1 Install automatic air vents to CSA B139 at high point in piping systems.
- .2 Install isolating valve at each automatic vacuum break /air vent valve.

- .3 Install drain piping to approved location, run to local floor drain and terminate where discharge is visible.

3.7 DIELECTRIC COUPLINGS

- .1 General: compatible with system, to suit pressure rating of system.
- .2 Locations: where dissimilar metals are joined.
- .3 NPS 2 and under: isolating unions or bronze valves.
- .4 Over NPS 2: isolating flanges.

3.8 PIPEWORK INSTALLATION

- .1 Install pipework to CSA B139
- .2 Protect openings against entry of foreign material.
- .3 Install to isolate equipment and allow removal without interrupting operation of other equipment or systems.
- .4 Assemble piping using fittings manufactured to ANSI standards.
- .5 Install exposed piping, equipment, parallel or perpendicular to building lines.
- .6 Slope piping, except where indicated, in direction of flow for positive drainage.
- .7 Ream pipes; remove scale and other foreign material before assembly.
- .8 Use eccentric reducers at pipe size changes to ensure positive drainage and venting.
- .9 Provide for thermal expansion as indicated.
- .10 Valves:
 - .1 Install in accessible locations.
 - .2 Install with stems above horizontal position unless indicated.
 - .3 Valves accessible for maintenance without removing adjacent piping.
 - .4 Install globe valves in bypass around control valves.
 - .5 Use ball valves at branch take-offs for isolating purposes except where specified.
- .11 Check Valves:
 - .1 Install swing check valves in horizontal lines on discharge of pumps and as indicated.

3.9 FORCED BALANCED FLEXIBLE EXPANSION JOINT

- .1 Install force balanced flexible expansion joint according to manufacturer's written guidelines.

3.10 SLEEVES

- .1 General: install where pipes pass through masonry, concrete structures, fire rated assemblies, and as indicated.
- .2 Construction: use annular fins continuously welded at mid-point at foundation walls and where sleeves extend above finished floors.
- .3 Sizes: 6 mm minimum clearance between sleeve and un-insulated pipe or between sleeve and insulation.
- .4 Installation:
 - .1 Concrete, masonry walls, concrete floors on grade: terminate flush with finished surface.
 - .2 Other floors: terminate 100 mm above finished floor.
- .5 Sealing:
 - .1 Foundation walls and below grade floors: fire retardant, waterproof non-hardening mastic.
 - .2 Elsewhere:
 - .1 Provide space for firestopping.
 - .2 Maintain fire rating integrity.
 - .3 Ensure no contact between copper pipe or tube and sleeve.

3.11 FIRE STOPPING

- .1 Install firestopping within annular space between pipes, ducts, insulation and adjacent fire separation where applicable.
- .2 Install firestopping according to manufacturers guidelines.

3.12 FLUSHING OUT OF PIPING SYSTEMS

- .1 Before start-up, clean interior of piping systems in accordance with requirements of Section 01 74 11 - Cleaning supplemented as specified in relevant mechanical sections.
- .2 Preparatory to acceptance, clean and refurbish equipment and leave in operating condition, including replacement of filters in piping systems.

3.13 PRESSURE TESTING OF EQUIPMENT AND PIPEWORK

- .1 Advise Contract Administrator 48 hours minimum prior to performance of pressure tests.
- .2 Piping: test as specified in relevant sections of heating, ventilating and air conditioning work.
- .3 Maintain specified test pressure without loss for 4 hours minimum unless specified for longer period of time in relevant mechanical sections.
- .4 Prior to tests, isolate equipment and other parts which are not designed to withstand test pressure or media.

- .5 Conduct tests in presence of Contract Administrator.
- .6 Pay costs for repairs or replacement, retesting, and making good. Contract Administrator to determine whether repair or replacement is appropriate.
- .7 Insulate or conceal work only after approval and certification of tests by Contract Administrator.

3.14 EXISTING SYSTEMS

- .1 Leachate piping is to be connected to the vacuum drain line located in Gallery No. 3 (Drawing P0007-001) and to the SBR Plant centrate supply line (Drawing C0005-001) located on the west side of the sludge dewatering facility.
- .2 Connect into existing piping systems at times approved by Contract Administrator.
- .3 Request written approval by Contract Administrator 10 days minimum, prior to commencement of work.
- .4 Be responsible for damage to existing plant by this work.

3.15 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Waste Management: separate waste materials for reuse and recycling

END OF SECTION

Part 1 General

1.1 DESCRIPTION

- .1 Supply and installation of sampling stations consisting of a sampling spool section, pneumatic sampler, sampler controller and refrigerator as shown on the drawing.
- .2 Sampler air compressor to be installed in the as shown on the drawings. The air compressor is electric-powered, and provides compressed air to operate the sampling device. The air compressor system shall be a unified package including compressor, air receiver tank, and internal pressure controls to automatically maintain sufficient supply of compressed air.
- .3 Supply and install air lines between the compressor and sample controller and between the sample controller and the sampler.

1.2 SUMMARY

- .1 Section Includes:
 - .1 Two sampling stations in the NEWPCC liquid hauled waste building.
 - .2 Two sampling stations in the SEWPCC liquid hauled waste building.
 - .3 Two sampling stations in the NEWPCC leachate receiving building
 - .4 Air supply lines from sampler to sampler controller.
 - .5 One compressor in the NEWPCC liquid hauled waste building,
 - .6 One compressor in the SEWPCC liquid hauled waste building.
 - .7 One compressor in the NEWPCC leachate receiving building.
- .2 Related Sections:
 - .1 Part E4 - Shop Drawings.
 - .2 Section 01 91 13 – General Commissioning Requirements
 - .3 Section 01 78 00 - Closeout Submittals.
 - .4 Section 44 20 01 - Installation of Process Pipework.

1.3 REFERENCES

- .1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME).
 - .1 ANSI/ASME B16.5-2003, Pipe Flanges and Flanged Fittings.
 - .2 ANSI/ASME B16.10-1992, Face-to-Face and End-to-End Dimensions Valves.
 - .3 ANSI/ASME B16.25-1997, Buttwelding Ends.
 - .4 ANSI/ASME B16.34-1996, Valves - Flanged, Threaded and Welding End.
- .2 American Society for Testing and Materials

- .1 ASTM A312 Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipes.
- .3 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS).
 - .1 MSS SP-25-1998, Standard Marking System for Valves, Fittings, Flanges and Unions.
 - .2 MSS SP-61-2003, Pressure Testing of Steel Valves.

1.4 SUBMITTALS

- .1 Submittals in accordance with Section E4 and the following:
 - .1 The Contractor shall submit all shop drawings in accordance with E4.
 - .2 Clearly reference each shop drawing item to the respective specification section and/or drawing number detail.
 - .3 Highlight information and options relative to the project requirements.
 - .4 Redline information and options on the shop drawing that are not relevant to the project product.
- .2 Closeout Submittals:
 - .1 Submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.5 QUALITY ASSURANCE

- .1 Sampler and Sampler Controller
 - .1 Provide factory performance test certification for the sampler and sampler controller.
- .2 Air compressor:
 - .1 Provide factory performance test certification for the compressor
- .3 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with the Manitoba Department of Labour guidelines.

1.6 DELIVERY STORAGE AND DISPOSAL

- .1 Waste Management and Disposal:
 - .1 Separate and recycle waste materials.

1.7 MAINTENANCE

- .1 Furnish following spare parts:
 - .1 Sampler plunger seats: one set of polyurethane seals for every sample.
 - .2 Sampler air cylinder piston seals: one set of seals for every sample.

- .3 Sampler static seals: one set of seals for every sample

1.8 MEASUREMENT AND PAYMENT

- .1 No measurement will be made for materials and quantities installed under this Section.
- .2 Payment for Work governed by Form "B" unit prices will be made on the basis of the actual work completed as determined by the Contract Administrator multiplied by the unit price.

Part 2 Products

2.1 SAMPLER SPOOL

- .1 Manufacturer of sampler spool section:
 - .1 Material: IPS Type 316L stainless steel schedule 10S to ASTM A312.
 - .2 Flanged connection meeting ANSI B16.5 requirements.
 - .3 Install manufacturer's line adapter to spool piece. Line adapter to match sampler body and clamp.

2.2 SAMPLER

- .1 Sampler to have the following characteristics and / or features:
 - .1 Sample volume withdrawn per cycle: 25cc.
 - .2 Maximum cycle range: 30 samples / minute.
 - .3 Minimum cycle range: 1 sample each 170 minutes.
 - .4 Plunger seals: polyurethane.
 - .5 Process line: 15 psig
 - .6 Body construction: type 316 stainless steel
 - .7 Plunger construction: type 316 stainless steel
 - .8 Air cylinder construction: type 316 stainless steel.
 - .9 Air cylinder seals: PTFE
 - .10 Static seals: fluoroelastomer.
 - .11 Ports: colour coded.
 - .12 Acceptable manufacturer: Sentry Equipment Corp. Isolok Series SAB-25.
- .2 Provide clear 38mm diameter polyethylene hose between the sampler and the refrigerator. Secure hose to sampler with stainless steel clamp

2.3 SAMPLER CONTROLLER

- .1 Controller to have the following characteristics and / or features:
 - .1 Sampler operation: flow proportional / time base cycle control
 - .2 Enclosure environmental rating: Nema 4X

- .3 Enclosure construction: fibreglass
- .4 Voltage: 120V / 1 Ph / 60 Hz.
- .5 Controlled by COW DCS system.
- .6 Control requirements:
 - .1 Dry contact closure for energizing controller from DCS.
 - .2 Dry contact closure for indicating power failure of controller.
 - .3 Dry contact closure for indicating that sampler solenoid is active..
- .7 Panel surface mounted three position Hand – Off – Auto switch for local operation of sampler mode.
- .8 Panel surface mounted computer interrupt switch
- .9 Panel surface mounted indication lights to indicate auto operation and cycling.
- .10 Legend plates to indicate light, button and switch function.
- .11 Surface mounted panel push button control to energize plunger operation.
- .12 Sampler inlet air pressure gauge
- .13 Adjustable air pressure filter regulator.
- .14 Sampler discharge air pressure gauge.
- .15 Acceptable manufacturer: Sentry Equipment Corp.P2-RC-T-AEDD-X2-CSAsampler controller or approved equal.

2.4 SAMPLE CAROUSEL

- .1 An Aqua cell carousel modified to accept a signal from the PLC. The PLC will activate and rotate the carousel to the next position in the carousel. The sampler carousel to have the following characteristics and / or features
 - .1 Power 120 V 1 Ph 60 Hz.
 - .2 4 – 20mA control capability from PLC
 - .3 six (6) 24 X 1 carousel with 24 – 1 litre high density polyethylene bottler
 - .4 Two (2) – 20 litre composite samples
- .2 Manufacturer: Aqua Cell as supplied by Cancoppas Ltd.

2.5 REFRIGERATOR

- .1 A custom made refrigerator is to be fabricated to accommodate the Aqua Cell sampling carousel of for taking individual samples (24 x 1 litre samples) or 1 x 20 litre composite sample. Refrigerator to have the following characteristics and / or features
 - .1 Power 120 V 1 Ph 60 Hz.
 - .2 Outer construction materials: Type 316 stainless steel.
 - .3 Inner construction materials: Type 316 stainless steel.
 - .4 Self contained evaporator and condenser.
 - .5 Provide 42 mm diameter hose port for 38 mm polyvinyl sample tubing. Center opening in both directions on refrigerator top.
- .2 Manufacturer: Cancoppas Ltd.

2.6 SAMPLER AIR COMPRESSOR

- .1 Air compressor is to have the following features or characteristics:
 - .1 Cast-iron twin stack air compressor
 - .2 4.5 gallon twin nominal air receiver tank volume
 - .3 Air tank orientation: horizontal
 - .4 Free air output: 4.3 cfm at 90 psi
 - .5 Motor: 2 hp
 - .6 Maximum pressure: 125 psi
 - .7 Adjustable pressure switch
 - .8 Voltage: 115 V
 - .9 Hard-wired to station electrical panel circuit
 - .10 Outlet: 3/8 inch NPTF
 - .11 Weight: 26 kg (58 lbs)
 - .12 Number required: three
 - .13 Manufacturer and Model:
 - .1 Ingersoll Rand Twinstack Model P1IU-A9
 - .14 Appurtenances:
 - .1 Air line moisture condensate trap with drain
 - .2 Air line extraction filter/dryer

2.7 SAMPLER AIR LINES

- .1 Sampler air lines to be Type K Hard Copper.

2.8 SAMPLER AIR LINE BALL VALVE

- .1 Bronze ball valve rated for 600 psig WOG with chromium plated ball, blow out proof stem, RPTFE seats, stuffing box and, ss lever and nut
- .2 Provide isolation valve at each sampler control panel.
- .3 Acceptable manufacturer: Apollo 70-200 Series or approved equal.

2.9 SAMPLER AIR LINE CHECK VALVE

- .1 Bronze check valve rated for 400 psig WOG with tight shut off, RPTFE ball-cone check and straight flow through, stainless steel spring.
- .2 Provide check valve on each branch to each sampler controller.
- .3 Acceptable manufacturer: Apollo 70-200 Series or approved equal

Part 3 Execution

3.1 INSTALLATION

- .1 Install in accordance with manufacturer's recommendations in upright position with stem above horizontal.

3.2 AIR COMPRESSOR

- .1 Delivery
 - .1 Provide for unloading and storage of the compressor on the site of the work.
 - .2 Verify that the lubrication oil level in the sump is at the full mark prior to starting the compressor. Use Mobil Rarus 827 oil or equivalent oil to fill to mark.
 - .3 After installation, thoroughly clean the compressor.
- .4 Testing
 - .1 Field test the compressor in presence of the Engineer to demonstrate the installation is correctly completed and the compressor is operating satisfactorily without vibration, and to the required operating performance.
 - .2 Test compressor as described in the mechanical equipment testing specification.
 - .3 Test the compressor in conjunction with testing of the sampling device and control system.

3.3 COMMISSIONING

- .1 Manufacturer/supplier of sampler is to provide assistance to the Contractor during commissioning to set up the sampling stations.
- .2 Coordinate the commissioning of the sampler with Contract Administrator.
- .3 Incorporate the City of Winnipeg equipment identification into the document. Obtain numbering system from Contract Administrator.

3.4 TRAINING

- .1 Provide training to the City of Winnipeg employees at a time convenient on the operation, set up, adjusting and maintenance of the sampling station including compressor. The date and time to be convenient to the City of Winnipeg.
- .2 Coordinate schedule with the Contract Administrator.
- .3 Provide specific manufacturer training manuals for the sampler and air compressors equipment.

3.5 OPERATION AND MAINTENANCE MANUALS

- .1 Sub-Contractor is to provide operation and maintenance information to the Contractor for inclusion in the operation and maintenance manual.

- .2 Provide operation and maintenance (O&M) manual to the Contract Administrator for review as list one month before substantial completion. Incorporate Engineer's comments into final submission. Total project performance will not be achieved until the final O&M submission is received.

END OF SECTION