Part 1 General

1.1 DESCRIPTION

.1 The work shall consist of the supply of all labour, materials, consumables and equipment necessary for the supply, installation, training, start up and commissioning of a fully operational anaerobic digester mixing system and necessary accessories, as specified herein and as indicated on the drawings. Include everything requisite and necessary for proper functioning of the entire mixing system, associated equipment and interconnections, notwithstanding that every item may not be mentioned.

.2 The Contractor is responsible for coordinating with the manufacturer to determine the materials and fittings that are included in the scope of supply and identify additional equipment services and accessories necessary for a complete functional system.

.3 The Contractor shall refer to the Mixing System RFP (www.winnipeg.ca/MatMgt/FolderContent.asp?FOLDER_NAME=187-2012&YEAR=2012) and Appendix B – Mixing System Shop Drawings for details on the manufacturer supplied equipment and its requirements.

.4 The Contractor shall coordinate with the manufacturer of the anaerobic digester mixing system and assume full responsibility for the supply, progress payment, bonding, and shall include in his tender price all costs (inclusive of all royalties, patent, license fees, custom duties or excise duties) to purchase, supply, deliver, install, start-up, commissioning and operator training of these materials associated with the anaerobic mixing system.

.5 The Contractor shall handle, off-load and provide safe storage of the equipment at the job site as per manufacturer's instructions. Provide qualified personnel during unloading.

.6 The manufacturer shall be responsible for the design, fabrication and assembly of the equipment to ensure that a reliable and efficient operation is produced.

.7 The manufacturer shall conduct a site visit to provide start-up and training services.

.8 The Contractor shall coordinate the work with other divisions regarding piping, electrical and controls, concrete and mechanical works.

1.2 RELATED SECTIONS

.1 All Sections – Division 01

.2 Section 40 05 23 – Process Valves

.3 Section 40 05 30 – Miscellaneous Process Mechanical

.4 Section 40 20 00 – Liquid Process Piping

.5 Appendix B – Mixing System Shop Drawings

1.3 SUBMITTALS

.1 The Contractor shall submit shop drawings and product data in accordance with Section 01 33 00 – Submittals and as follows:

.1 Assembly drawings and material list.

.2 Details of all parts and principal dimensions.

.3 Submit installation manuals before shipment of any equipment.

.4 Submit operation and maintenance manuals 30 days prior to start up.

1.4 MEASUREMENT AND PAYMENT

.1 All costs for the work and materials specified in this section shall be included in the lump sum price bid for the Project.

Part 2 Products

2.1 DESIGN PERFORMANCE CRITERIA

.1 The anaerobic digester mixing system shall be capable of meeting the following requirements at maximum operating conditions of 511 L/s (8100 USGPM) @ 12.2 m (40 ft) Total Dynamic Head with a 93 kW (125 HP) motor:

.1 Achieve an active liquid volume within Digester No. 11 of not less than 90% of the actual liquid volume.

.2 Achieve the aforementioned active liquid volume within 30 minutes of start-up of each mixing system from a settled state.

.3 With the mean total solids concentration in Digester No. 11 between 2.0 and 6.0 percent dry solids by weight, achieve variation in the sludge total solids concentration at any point in the tank that is not more than ±10% from the mean total solids concentration.

.4 Maintain a sludge temperature at any point in Digester No. 11 such that it does not vary more than ±1.0ºC from the mean temperature of the digester.

2.2 STANDARD OF ACCEPTANCE

.1 The design has been preselected by the City of Winnipeg as the Rotamix Mixing System as manufactured by Vaughan Co., Inc. Contact Vaughan Co. Inc., Montesano, WA, Tel: (360) 249-4042, Fax: (360) 249-6155.

2.3 GUARANTEES

.1 See Division 01 – General Requirements

.2 The Contractor shall provide a twelve (12) month non-prorated warranty, which will apply after acceptance of the anaerobic mixing system equipment following successful start-up and commissioning.

.3 The mixing equipment supplier shall provide a warranty for all pump and pump parts for a period of twelve (12) months from date of start-up and commissioning, or eighteen (18) months from date of shipment, whichever occurs first.

.4 The mixing equipment supplier shall provide a non-prorated warranty for the mixing nozzle assemblies for a period of ten (10) years from successful start-up and commissioning, not to exceed eighteen (18) months from date of shipment.

2.4 MIXING SYSTEM

.1 Floor-Mounted Mixing Nozzles

.1 Mixing equipment supplier shall supply four (4) dual nozzle assemblies and four (4) single nozzle assemblies.

.2 Nozzles shall be ASTM A536 glass-lined cast ductile iron, with 25.4 mm nominal wall thickness, and a long straight taper length of at least 300 mm.

.3 Assembly fittings shall be ASTM A536 glass-lined cast ductile iron with 150 lb. flanged connections.

.4 Glass lining shall have a minimum thickness of 0.25 mm and a minimum hardness of 73 C Rockwell. It shall be resistant to corrosion in solutions between pH-3 and pH-10 at 125ºF.

.5 Anchor bolts shall be Type 316 stainless steel, 5/8" diameter, and of sufficient length to support thrust loads from the nozzles.

.6 Piping, fittings, and supports shall be provided by the Contractor.

.2 Foam Suppression Nozzles

.1 Mixing equipment supplier shall supply one (1) dual nozzle foam and scum suppression system.

.2 Top nozzle shall be located above liquid level c/w Type 316 stainless steel deflector.

.3 Bottom nozzle shall be located below the liquid level in the tank.

.4 Nozzles shall be ASTM A536 glass-lined cast ductile iron, with 25.4 mm nominal wall thickness, and a long straight taper length of at least 300 mm.

.5 Piping, fittings, and supports shall be provided by the Contractor.

.3 Pumps

.1 Mixing equipment supplier shall supply two (2) horizontal centrifugal chopper pumps c/w motors and appurtenances.

.2 Duty point: 511 L/s @ 120 kPa TDH (8100 USGPM @ 17.3 psi TDH)

.3 Pumps shall agitate waste solids at heavy consistencies; materials shall be macerated and conditioned by the pump as an integral part of the pumping action.

.4 150 lb. flanged suction and discharge, with a 450ø suction and 300ø discharge.

.5 Semi-open, cast steel and heat treated impeller (minimum 60 Rockwell C Hardness) with pump-out vanes. Maximum clearance between the impeller and cutter bar shall be 0.015". Impeller shall be threaded to shaft with no axial adjustments or set screws.

.6 Bearings shall have site glass indication. A ball bearing shall take up shaft thrust in both directions. B10 bearing life shall be minimum 100,000 hours.

.7 Back pull-out bearing housing shall incorporate jacking bolts for accurate adjustment of impeller-to-cutter bar and impeller-to-upper cutter clearances, and shall allow removal of pump components without requiring disconnection of housing from inlet or discharge piping.

.8 Mechanical seal shall be flushless, cartridge type with silicon carbide or tungsten carbide seal faces. All seal components shall be 316SS except for the sleeve, which shall be heat-treated 17-4 PH. Seal shall be positively driven by set screws. The seal spring shall be protected from the pumpage. Elastomers shall be Viton.

.9 Drive motor shall be 93 kW (125 hp), 1750 RPM, 575 V, 3 phase, 60 Hz, with a 1.15 service factor. It shall be rated Class 1, Division 2 for severe duty, and be high efficiency TEFC.

.10 Piping, fittings, and supports shall be provided by the Contractor.

.4 Field painting:

.1 All exposed surfaces of mixing system shall be inspected after installation and paint touch ups applied as required; refer to Division 09.

Part 3 Execution

3.1 GENERAL

.1 Obtain approved manufacturer's drawings and instructions prior to the installation of the equipment.

.2 Assemble and install supplied equipment and components and fittings as required as per manufacturer's instructions.

3.2 DELIVERY

.1 Provide for unloading and storage of the mixing system on the site of the Work.

3.3 INSTALLATION OF EQUIPMENT

.1 Install all equipment in accordance with manufacturer's instructions. Coordinate with the manufacturer, and assist the manufacturer in installing and aiming the mixing nozzles and foam buster nozzles. Coordinate with the manufacturer to provide the services to inspect and certify that the installation of equipment is satisfactory.

.2 Following installation of the mixing equipment, the Contractor shall provide to the Contract Administrator a "Certificate of Satisfactory Installation" signed by the Supplier to verify that the equipment has been installed in accordance to the Supplier's requirements. Any deficiencies in the installation at the time of issuance of this Certificate shall be noted by the Supplier.

3.4 INSPECTION

.1 The work shall at all times be available for inspection by the Contract Administrator. All work shall be in accordance with and shall be inspected to meet the requirements of the specifications.

.2 All start up and testing shall be performed in the presence of the Contract Administrator or his authorized representative.

.3 Written notice of the date of when commissioning and tests shall be made must be received by the Contract Administrator at least two weeks in advance.

3.5 START-UP AND COMMISSIONING

.1 The Contractor shall be overall responsible for the start-up and commissioning of the equipment associated with the mixing system. The Supplier shall provide the required services on-site to assist the Contractor for start-up and commissioning of their equipment to ensure proper operation.

.2 The Contractor shall coordinate with the Supplier with respect to providing a fully functional mixing system and its associated components.

.3 Provide commissioning services to include as a minimum the following:

.1 Automatic operation of the mixing pumps, air release valves, and isolation valves

.2 Emergency stops

.3 Test alarm systems

.4 Pump performance throughout the entire design operating range

.5 Achievement of performance parameters as specified in Design Performance Criteria, above

.6 Provide written report of tests conducted, test results and certification that the mixing system is 100% operational

.7 Cooperate with City of Winnipeg's operation staff that will participate as observers during this period. This time is not included as a part of the training time

.4 The Supplier is responsible to determine the time required for proper start-up and commissioning. As a minimum allow two (2) trips to cover installation inspection and works associated with start-up/commissioning/acceptance testing and operator training.

3.6 ACCEPTANCE TESTING

.1 After the Contractor/Supplier and the Contract Administrator are satisfied in general with the initial operation of the mixing equipment (but not before a successful start-up and commissioning), an Acceptance Testing for a consecutive 2 day period over an 8 hour basis shall be conducted to determine that the equipment meets the warranted performance criteria.

.2 During this period the Contractor will be overall responsible for the mixing system operation but will be assisted by the Supplier in an advisory role. All materials utilized during this period shall be supplied by the Contractor. Prior to this acceptance testing, the Contract Administrator and the Supplier will agree in writing on the specific details of conducting these acceptance tests including complete sampling and analytical procedures.

3.7 TRAINING

.1 Training must be provided by a factory certified trainer.

.2 Provide one (1) training seminar for the plant operators and plant maintenance personnel.

.3 The seminar shall be minimum one (1) day duration on-site provided immediately after completion of the acceptance testing. The training seminar shall cover all aspects of the anaerobic digester mixing system equipment and control systems as it applies to this project. During this period the operations staff shall operate the facility under the guidance of the Supplier/Contractor. The Supplier shall demonstrate preventive maintenance procedures during this period.

END OF SECTION

Part 1 General

1.1 DESCRIPTION

.1 This section specifies the supply, delivery and installation of digester number 11 gas safety equipment and specialties.

.2 Include the following as a minimum:

- .1 Digester equipment as shown on the drawings
- .2 Pressure testing rehabilitated digester number 11
- .3 Testing, commissioning, and operator training by the gas equipment supplier.

1.2 SUMMARY

.1 Section includes:

- .1 Supply and installation of a new roof gas draw off pipe with insulation, heat tracing, aluminum jacket, and pipe supports.
- .2 Supply and installation of four emergency pressure relief manholes, 1 manhole cover, and four sampling ports.
- .3 Reinstallation of the roof dome pressure relief pipe, three way valve, dual flame arrestors and dual pressure/vacuum relief valves and digester view port.
- .4 Supply and installation of new Gallery 5 gas draw off pipe from roof to main waste gas burner pipe with stainless steel pipe, valves, sediment/condensate trap, flow conditioner, mass flow meter, pipe supports, and miscellaneous ancillary equipment.
- .5 Re-calibration of the combination conservation valve (roof pressure/vacuum relief)

.2 Related Sections:

- .1 Section 01 33 00 – Shop Drawings.
- .2 Section 01 78 00 Closeout Submittals
- .3 Section 01 79 00 – Training
- .4 Section 01 98 13 - Commissioning
- .5 Section 46 73 21 – Sludge Holding Tanks Safety Equipment and Specialties
- .6 Section 03 10 00 – Concrete Forming and Accessories.
- .7 Section 03 30 00 – Cast-in-Place Concrete
- .8 Section 03 90 00 – Concrete Tank Testing
- .9 Division 26 - Electrical

1.3 REFERENCES (Use latest version)

.1 Canadian Standards Association B149.6 “Code for digester gas and landfill gas installations.”

.2 Canadian Standards Association B149.1 “Natural gas and propane code.”

.3 Canadian Standards Association B149.2 “Propane Storage and Handling Code”

.4 Manitoba Workplace Safety & Health Division “Guideline for Working with Asbestos”

.5 Canadian Electrical Code, Part I

.6 American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME).

.1 ANSI/ASME B16.5, Pipe Flanges and Flanged Fittings.

.2 ANSI/ASME B16.102, Face-to-Face and End-to-End Dimensions Valves.

.3 ANSI/ASME B16.25, Butt-welding Ends.

.4 ANSI/ASME B16.34, Valves - Flanged, Threaded and Welding End.

.7 American Petroleum Institute (API).

.1 API 598, Valve Inspection and Testing.

.8 American Society for Testing and Materials International, (ASTM).

.1 ASTM A49, Specification for Heat-Treated Carbon Steel Joint Bars.

.2 ASTM A193/A193M, Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.

.3 ASTM B85, Specification for Aluminum-Alloy Die Castings.

.9 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS).

.1 MSS SP-25, Standard Marking System for Valves, Fittings, Flanges and Unions.

.2 MSS SP-61, Pressure Testing of Steel Valves.

1.4 GENERAL REQUIREMENT

.1 The supplier shall be responsible for the design, fabrication, assembly in factory and testing of the equipment. The 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 system including controls.

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 The equipment shall 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 the local Electrical Authority.

1.7 DEFINITIONS

.1 Digester Gas (Biogas)

.1 An explosive and flammable gas when in the presence of oxygen; created from the anaerobic digestion of sludge; a mixture of constituent molecules whose properties depend on the type of sludge and conditions during the biological reaction; typical composition is 68 percent CH_4, 32 percent CO_2, up to 5000 ppm of H_2S, and trace quantities of N_2 and H_2, saturated with water vapour; specific gravity approximately 0.90 (air = 1.0)

1.8 SERVICE CONDITIONS

.1 Material Handled: Municipal digester gas consisting of approximately 61 percent methane, 33 percent carbon dioxide, 5 percent water vapor, and 1 percent hydrogen sulfide. Specific gravity of the gas is approximately 0.86.

1.9 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 Submittals:

.2 Refer to Part 3 Execution 3.1 Shop Drawings Submittals, below, for additional requirements.

1.10 PERFORMANCE

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

1.11 QUALITY ASSURANCE

.1 The equipment supplier/manufacturer shall check the system and the intended service conditions.

.2 If the equipment supplier/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.

1.12 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.

1.13 MAINTENANCE

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

1.14 TRAINING

.1 Refer to Section 01 79 00 for training requirements.

1.15 COMMISSIONING

.1 Refer to Section 01 98 13 for system commissioning.

1.16 CLEANING

.1 Refer to Section 01 74 11 for cleaning.

Part 2 Products

2.1 GAS PIPE

.1 Service: Digester 11 methane biogas withdrawal pipe
.2 Material: ASTM A 312/A 312M Type 316L Schedule 10 seamless stainless steel pipe
.3 Tolerances: ASTM A778

2.2 FLANGES

.1 Service: Digester 11 methane biogas withdrawal pipe
.2 Material: ASTM A 312/A 312M Type 316L Schedule 10 seamless stainless steel
.3 Specification: ANSI B16.5 Class 150 weld neck style flange

2.3 PIPE FITTINGS

.1 Service: Digester 11 methane biogas withdrawal pipe
.2 Material: ASTM A 774/A 774M Type 316L Schedule 10 seamless stainless steel pipe
.3 Tolerances: ASTM A774

2.4 BOLTS, WASHERS, NUTS

.1 Service: Digester 11 methane biogas withdrawal pipe
.2 Material: Type 316L stainless steel
.3 Bolt grade: ASTM A193 Grade 8BM,
.4 Nut and Washer grade: ASTM A194 Grade 8/8M

2.5 WELDOLETS, SOCKETOLETS, THREADEDOLETS, OLETS

.1 Service: Digester 11 methane biogas withdrawal pipe
.2 Material: Type 316L stainless steel

2.6 GASKETS

.1 Service: Digester 11 methane biogas withdrawal pipe
.2 Material: Neoprene rubber
.3 Thickness: 3.2 mm minimum
.4 Type: full face
.5 Durometer hardness Shore A±5: 40

.6 Specification: ASTM D - 2000 – SAE J200
.7 Elongation: 350%
.8 Tensile Strength: 800 PSI
.9 Finish: Smooth
.10 Color: black
.11 Operating Temperature: -28.9°C to 76.6°C (-20°F to +170°F)

2.7 ANTI-GALLING COMPOUND

.1 Lubricate threads of stainless steel nuts and bolts with an anti-galling compound.

.2 Lubricant to be a stainless steel, graphite, aluminum based anti-seize compound formulated to protect up to 2,200°F against seizure and galling, galvanic and severe environmental corrosion.

.3 Standard of Acceptance: Bostik Never Seez® High Temperature Stainless Anti-Seize or approved equal in accordance with B7.

2.8 WELD PICKLING PASTE

.1 Use a high adhesion stainless steel pickling gel on all welds to remove the black oxide marks and heat tint left during welding of stainless steel.

.2 Thixotropic Pickling Paste for Stainless Steel

.3 Conforms to ASTM A380-06 for the standard practice for cleaning, descaling & passivation of stainless steel parts, equipment & systems.

.4 Standard of Acceptance: Callington Weldbrite Code 1105 or approved equal in accordance with B7

2.9 WELD PASSIVATOR GEL

.1 Use a passivation gel to positively promote the formation of an oxide film, the oxide film shall grow evenly over the surface.

.2 Standard of acceptances: Callington S-Weld Passivator Gel or approved equal in accordance with B7

2.10 TWO WAY PLUG VALVE

.1 Provide two way plug valve as follows:

.1 Material: Cast iron valve rated for 200 lb WOG

.2 ASME/ANSI Class 150 Flanges

.3 Valve conforms to Canadian Gas Association CGA 3.11 “Gear Operated Pressure Lubricated Plug Type Gas Shut-Off Valves” and Canadian Standards Association B149.6-11 requirements.

.4 Lubricated two-port plug valve with 100% port area, stop rings to limit plug travel to 90°.

.5 Standard button-head fitting and lubricant screw

.6 Positioner: mechanical position to indicate valve open and close position.

.7 Operation: gear operated.

.8 Standard of acceptance: Homestead Fig. 612G or approved equal in accordance with B7.

2.11 EXPANSION JOINT

.1 Provide stainless steel metal expansion joint with stainless steel bellows, bonded silicone smooth bore liner, and stainless steel limit bolts.
.2 Operating pressure of 50 psi
.3 Operating temperature -40°C to 50°C
.4 Compression of 0.5" to 3".
.5 Standard of Acceptance: Flexicraft Industries Model S Sanitary bellows or approved equal in accordance with B7.

2.12 DIGESTER SAMPLING PORT COVERS

.1 Provide digester sampling port covers as follows:
  .1 Type: 150 mm (6 inch) non-sparking sampling gauging hatch cover
  .2 Materials: 356HT aluminum body and cover with Buna-N insert
  .3 Ends: ANSI 861kPa flanged
  .4 Ratings: Working pressure of 20.7 kPa (3 psi)
  .5 Number required: 4 (refer to drawing 1-0101D-S0003-001 for locations)
  .6 Standards of Acceptance: Varec Model No.42 Series or approved equal in accordance with B7

.2 Provide 6mm thick x 200 mm diameter Type 316L stainless steel sleeve with 100 mm wide puddle flange, and mounting flange for sampling port covers.
  .1 Provide a neoprene gasket
  .2 Use stainless steel bolts, nuts, and washers for the connection.
  .3 Refer to drawing 1-0101D-M0010-001 Detail 6

2.13 BACK PRESSURE CHECK VALVE

.1 Provide back pressure check valves as follows:
  .1 The back pressure check valve on digester 11 gas draw off pipe
  .2 Cast 356 HT Aluminum body
  .3 Removable/Replaceable seat ring
  .4 ANSI 861 kPa flanged ends
  .5 Standard of Acceptance: Varec 211 Series or approved equal in accordance with B7

2.14 HORIZONTAL FLAME ARRESTER

.1 For horizontal installation, provide flame arrester as follows:
  .1 Type: 100 mm (4 inch) flame arrester for air release vent
  .2 Materials: 356HT Cast Aluminum
  .3 Ends: ANSI 861 kPa flange
  .4 Rating: 35 kPa
  .5 Other: Removable Cover Plate with Internal Extensible Frame and Individual Sheets, for Ease of Maintenance & Cleaning

.6 Standard of Acceptance: Varec Model No. 5010 Series or approved equal in accordance with B7

.2 Provide manual drip trap and connect to flame arrestor. Refer to section 2.24 below.

.3 Provide 50 mm diameter SS drain pipe from drip trap to floor drain

2.15 EMERGENCY PRESSURE RELIEF COVER

.1 Provide emergency pressure relief cover as follows:

.1 Type: 600 mm (24") Hinged Pressure Relief Cover with Automatic Re-Seating
.2 Materials: Aluminum Base & Cover
.3 Pressure relief setting range: 0.5 kPa to 15 kPa (2" to 60" WC)
.4 Pressure relief setting: 5.0 kPa
.5 Ends: ANSI 861 kPa flange
.6 Number required: 4 (refer to drawing 1-0101D-S0003-001 for locations)
.7 Standard of Acceptance: Varec Model No. 400W Series or approved equal in accordance with B7

.2 Provide 6 mm thick x 600 mm diameter Type 316L stainless steel sleeve with 100 mm wide puddle flange and mounting flange for emergency pressure relief cover.

.1 Provide a neoprene gasket
.2 Use stainless steel bolts, nuts, and washers for the connection.
.3 Refer to drawing 1-0101D-M0010-001 Detail 8

2.16 ROOF MANHOLE COVER

.1 Provide roof manhole cover as follows:

.1 Type: 1,890 mm diameter (48") hinged roof manhole cover with self-locking pedal, spring loaded open cover latch mechanism and manual safety pin to prevent accidental closure of the cover.
.2 Material: cast aluminum 713 Tenzaloy base and 5086 aluminum cover
.3 Cover is held in place by eight to ten bronze hinged wing nuts.
.4 Mounting base: aluminum casting 713 Tenzaloy with AWWA Class B flange
.5 Hinge pin, cotter pin, and bolts: stainless steel
.6 Interior surface coating: coal tar epoxy
.7 Tested pressure: (30" WC)
.8 Seal: Reusable Buna-N cover 0-ring
.9 Spare part: provide one spare Buna-N cover 0-ring seal
.10 Handles: three aluminum lifting handles
.11 Number required: 1 (refer to drawing 1-0101D-S0003-001 for location)
.12 Standard of Acceptance manufacturer: Varec Biogas 220 w series Model Number 220 48 11 or approved equal in accordance with B7

.2 Provide 9mm thick x 1,890 mm diameter Type 316L stainless steel sleeve with 100 mm wide puddle flange and mounting flange for roof manhole cover.

.1 Provide a neoprene gasket.

.2 Use stainless steel bolts, nuts, and washers for the connection.

.3 Refer to drawing 1-0101D-M0010-001 Detail 7

2.17 MASS FLOW METER PIPE CONNECTION

.1 Provide Threadolet and 19 mm threaded process connection for mass flow meter.

.2 Coordinate work with electrical

2.18 FLOW CONDITIONER

.1 Provide flow conditioner ahead of the insertion mass flow meter as follows:

.1 Service: The digester gas mass flow meter shall measure the flow of digester gas consisting of approximately 61 percent methane, 33 percent carbon dioxide, 5 percent water vapor, and 1 percent hydrogen sulfide. The dry gas specific gravity is approximately 0.86.

.2 Design: Insertion panel style with orientation handle

.3 Flow rate: 505 ft^3/min

.4 Material: 316L stainless steel

.5 Mounting: Capture flange mounted (sandwiched between flange faces)

.6 Gaskets: see item 2.4 above

.7 Standard of acceptance: Vortab Company Model VIP or approved equal in accordance with B7.

2.19 BACK PRESSURE RELIEF CONTROL VALVE

.1 Provide back pressure relief valves as follows:

.1 The back pressure relief control valve controls digester gas flow to waste gas burner.

.2 Single port spring loading back pressure relief valve/regulator

.3 Cast aluminum body with 304 stainless steel stem and bushings, and molded Buna-N rubber nylon reinforced diaphragm, spring cadmium plated

.4 ANSI 861 kPa flanged ends

.5 A Class 150 Flanges - outside and inside diameters, bolt circles, numbers and diameters of bolts for Weld neck, Threaded, Slip-on, Lap joint, Socket weld and Blind flanges.

.5 Adjustable setting range of 50-400 mm WC (2”-16” WC)

.6 Set-point: 2.5 kPa

.7 Standard of acceptance: Varec 386 Series or approved equal in accordance with B7

2.20 MANOMETER

.1 Provide one digester 11 gas direct-reading, single-tube type pressure gauge manometer as follows:

.1 System operating range: ± 6 kPa-
.2 Instrument range: 0-24" WC/0-11.5PSIG
.3 External scale adjustment
.4 Indoor/outdoor installation
.5 Pressure, Vacuum or Differential Pressure can be gauge
.6 Provide metric scale
.7 Stainless steel mounts for panel mounting
.8 Stainless mounting panel
.9 Standard red oil fluid at a specific gravity of 1.0 between temperature range of 30°F and 100°F
.10 Standard of acceptance: Varec 217 Series Well Manometer or approved equal in accordance with B7

.2 Provide 12 mm diameter SS pipe threadolet and 12 mm isolation plug valve.

.3 Provide 50 mm diameter stainless steel pipe support with base plate and ss anchor bolts.

2.21 PRESSURE GAUGE

.1 Provide one hermetically sealed pressure gauge as follows:

.1 Dial size: 114mm (4.5”)
.2 System operating range: ±6kPa
.3 Dial range: to 6 kPa
.4 Gauge accuracy: ½% of full scale (Grade 2a, ASME B40.100)
.5 Movement: rotary, 400 SS. Teflon coated pinion gear and segment.
.6 Bourdon tube and socket: 316L SS / 316L SS
.7 Connection and location: 12 mm (1/2” NPT), lower
.8 Window: shatter proof glass
.9 Case material: black phenolic
.10 Weather protection: IP65
.11 Dial: Aluminum, white background, black figured and intervals
.12 Option required: Plus performance option to reduce vibration and pulsations
.13 Standard of acceptance: Ashcroft Duragauge model 1279 or approved equal in accordance with B7

.2 Provide 12 mm diameter SS pipe threadolet and 12 mm isolation plug valve.

2.22 DIAPHRAGM SEAL

.1 Provide diaphragm seal with flushing connection for each pressure gauge as follows:

.1 Process material: biogas (methane, CO_2, H_2S)
.2 Diaphragm pressure range: 0 to 6 kPa
.3 Instrument connection: 12 mm (1/2” NPT)
.4 Process connection: 25.4 mm (1” NPT)

.5 Diaphragm material: 316L SS

.6 Housing material: 316L SS

.7 Filling fluid: silicone

.8 Standard of Acceptance: Ashcroft Type 100 or approved equal in accordance with B7

2.23 MOISTURE AND SEDIMENT TRAP

.1 Provide one digester 11 gas moisture and sediment trap as follows:

.1 Flow rate: 776 cubic meters per hour

.2 Maximum Pressure drop: (0.5 inches of water)

.3 Construction material: Type 316 stainless steel

.4 Inlet and outlet size: 300 mm diameter IPS (12" IPS)

.5 Flanges: ANSI 861 kPa flange

.6 Maximum working pressure: 84 kPa (35 psig)

.7 Gross volume: 0.439 m^3 (15.492 ft^3)

.8 Inspection tube: 19 mm diameter (3/4")

.9 Drain connection: 25 mm diameter NPT (1" NPT)

.10 Sight glass connections: 12 mm diameter NPT (½" NPT)

.11 Blow-out connection: 50 mm diameter NPT (2" NPT)

.12 Standard of acceptance: Varec Biogas Model 233-08-F-S or approved equal in accordance with B7

.2 Install sight glass and drip trap on moisture and condensate trap. Refer to 2.23 and 2.24

2.24 MOISTURE AND SEDIMENT TRAP SIGHT GLASS

.1 Provide one moisture and sediment trap fluid level sight glass as follows:

.1 Connections: 12 mm diameter NPT (½" NPT)

.2 Valve material: Type 316 stainless steel

.3 Guard rod: Type 316 stainless steel

.4 Drain cock: Type 316 stainless steel

.5 Sight glass material: Pyrex glass

.6 Standard of acceptance: Varec Biogas Model 218-1 or approved equal in accordance with B7

2.25 LOW PRESSURE DRIP TRAP

.1 Provide manually operated low pressure drip traps as follows:

.1 Service: the collection and safe removal of condensate from digester biogas sediment/condensate trap.

.2 Install at low points in gas piping.

.3 The disc, ports, and "O;' ring seals are designed to block the biogas before opening the drain outlet, ensuring a positive seal against gas escape regardless of disc position.

.4 Reservoir Capacity: 6 quart (22.6 litres) reservoir capacity

.5 Marking embossed on the drain body showing the drain handle open and closed position

.6 Working pressure: 5 psig

.7 Standard of Acceptance: Varec 246 Series manually operated drip traps or approved equal in accordance with B7.

.2 Provide 38 mm diameter stainless steel drain pipe between drip trap and floor drain.

2.26 PURGE VALVES

.1 Provide stainless ball purge valve with the following:

.1 Valve pressure rating 2000 psi 138 bar non-shock cold working pressure

.2 Max temperature rating 400°F

.3 Conventional port

.4 Enclosed bolt design

.5 Reinforced PTFE seats

.6 Stainless steel ball and stem

.7 Blowout-proof stem

.8 Cast ISO mounting pad

.9 Vented ball

.10 Locking lever handle

.11 Butt weld end connections

.12 Conforms to MSS SP-110

.13 API-607 Fourth Edition Fire Safe

.14 API-608 Anti-Static

.15 Size range: 12 mm (½")

.16 Standard of acceptance: Nibco BM-590-S6-R-66-FS-LL or approved equal in accordance with B7.

.2 Provide 12 mm diameter SS pipe threadolet

2.27 DIGESTER 11 PRESSURE RELIEF VALVE UPGRADE

.1 Provide new pressure relief balancing plates for digester 11 150 mm diameter Varec pressure/vacuum relief vents (2 units).

.2 Manufacturer’s representative shall calibrate and verified that the pressure relief is set for 3.5 kPa.

.3 Standard of acceptance: Westech Industrial Limited - Varec, Mr. Jerry D'Ortenzio ph. 1 (905) 812-3993.

2.28 EXISTING VIEW PORT

.1 Re-install digester viewport that was removed during construction.

.2 Provide 6 mm thick Type 316L stainless steel roof sleeve with puddle flange and mounting flange for existing view port. Install sleeve into existing and new concrete roof deck.

.3 Use stainless steel bolts, nuts and washers for connection.

.4 Refer to drawing 1-0101D-M0010-001 Detail 9

2.29 CONDENSATE DRIP TRAP DRAIN PIPE

.1 Material: Schedule 5 stainless steel IPS pipe

.2 Size: 50 mm diameter

.3 Funnels: stainless steel

.4 Provide stainless steel pipe supports for drain pipe.

Part 3 Execution

3.1 SHOP DRAWING SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 Submittals **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 shop drawing information and options that are not relevant to the product being installed. Cross-out paragraphs that are not relevant to the product being installed. Failure to redline or cross-out non-relevant information will results in the rejection of the shop drawing submission.

.2 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 discharge fittings

.2 accessories

.4 Performance characteristic curves showing efficiency, flow rate, power requirements, etc.

.3 Data as follows:

.1 Inlet and outlet size

.2 Total mass of equipment

.3 Level controls

.4 Installation details

.5 Closeout Submittals:

.1 Submit equipment maintenance data for each piece of equipment with its ancillary equipment 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.

3.2 DIGESTER 11 TANK PRESSURE TESTING

.1 Perform an air pressure test on digester 11 according to CSA Standards *Code for Digester Gas and Landfill Gas Installations* B149.6-11 section11.2 and 11.4.

.2 Provide all equipment to pressurize the digester tank.

.3 Provide calibrated instrumentation with calibration certificates to measure tank internal pressure, tank internal air temperature, and ambient air temperature.

3.3 PIPE and FITTING INSTALLATION

.1 Install pipe and fitting in with tolerances that are less than the tolerances of ASTM A 778, Fittings ASTM 774 – I.D. and I.P.S.

3.4 PRESSURE TEST GAS PIPE and DIGESTER TANK

.1 Perform pressure test on Digester 11 gas collection system according to CSA Standards *Code for Digester Gas and Landfill Gas Installations* B149.6-11 section11.2, 11.4 and 11.5.

3.5 PURGE POINTS

.1 Install 12.7 mm ID purge points upstream and downstream of each manual valve and at equipment.

.2 Purge point shall be accessible.

3.6 BOLTS, WASHERS, NUTS

.1 Apply anti-galling compound to the mating threads of the bolts and nuts.

.2 Use American Petroleum (API) bolt torque criss-cross sequence pattern for torqueing bolts.

.3 After flange assembly and all nuts have been run down by hand, start wrench tightening following the sequence of the numbers indicated (marking the number on the flange with a crayon aids in keeping track of the tightening process).

.1 First time around just snug the nuts with a hand wrench.

.2 Second time around tighten the nuts firmly with the same wrench.

.3 Third time around apply approximately 25% recommended torque.

.4 Fourth time apply approximately 75% of recommended torque.

.5 Fifth time around, apply 100% of recommended torque.

.6 Repeat this process until nuts do not move under 100% recommended torque.

.7 Re-torque after 24 hours. Most of any bolt preload loss occurs within 24.

.4 Verify the torque of all bolts and nuts with a calibrated torque wrench.

3.7 STAINLESS STEEL PICKLING and PASSIVATION

.1 Chemical clean the stainless steel weld area with “Pickling and Passivation” chemicals.

.2 Use the pickling chemical to removes the inherent oxide film, which has been thickened by welding, and to remove metallic contamination. Pickling puts the stainless steel in an ideal situation to grow a new fully effective inherent oxide film.

.3 Use a passivation chemical to positively promote the formation of that oxide film that grows evenly and fast. Prepare steel before acid passivation treatment is done by:

.1 clean surface of any oxide scale (descale)
.2 have metal surface denuded in chromium from the formation of oxide or until the heat layers removed by pickling
.3 clean surface of organic contamination, machining lubricant, oil and grease

.4 Apply products according to manufacturer’s recommendations.

3.8 PLUG VALVE

.1 Remove valve packing material.
.2 Clean dirt from face of flanges.
.3 Torque bolts in a diagonal criss-cross pattern to apply even pressure to the flange faces
.4 Position valve handle position for easy operation.
.5 Lubricate plug valve with a lubricant according to manufactures recommendation for methane gas serviced.

3.9 DIGESTER SAMPLING PORT COVERS

.1 Coordinate digester sampling port cover with concrete roof slab repair work.
.2 Install port cover vertically plumb and brace port so it does not move during pouring of the concrete roof deck.

3.10 MASS FLOW METER

.1 Coordinate work with the Electrical Division
.2 Provide 19 mm process connection for
.3 Install mass flow meter with recommended straight run pipe diameters ahead of the sensor and after the sensor as per manufacturer’s recommendation.
.4 Orientate sensor element as per manufacturer’s recommendation
.5 Position insertion depth of sensor into pipe as per manufacturer’s recommendation.
.6 Coordinate power and communication wiring with electrical division.
.7 Setup instrument parameters for site conditions.
.8 Verify all input and output signal wiring prior to start-up.

3.11 MANOMETER

.1 Provide SS stand for mounting manometer.

.2 Mount manometer in vertically plumb position.

.3 Provide 25 mm isolation valve.

.4 Fill manometer with red unity oil with a specific gravity of 1.0

3.12 FLOW CONDITIONER

.1 Install flow conditioner insertion panel with the recommended number of straight run pipe diameters ahead of the mass flow meter as per manufacturer's recommendation.

.2 Orientate insertion panel in pipe as per manufacturer's recommendation.

3.13 SEDIMENT/CONDENSATE TRAP

.1 Install sediment/condensate trap on stainless steel stand. Level tank and platform.

.2 Install sight glass

.3 Install low pressure drip on drain line an extend drain line to floor drain with stainless steel tubing.

.4 Install 50 mm plug valve on 50 mm diameter NPT blow-out connection and pipe to drain with 50 mm diameter stainless steel pipe.

3.14 DRIP TRAP DRAIN PIPE

.1 Install drain pipe for each drip trap

.2 Slope pipe towards floor drain

.3 Anchor pipe to floor with stainless steel pipe supports.

3.15 ROOF MANHOLE COVER

.1 Install roof sleeve with puddle flange into new roof construction

.2 Co-ordinate work with Division 03 – Concrete.

3.16 EMERGENCY PRESSURE RELIEF COVER

.1 Install roof sleeve with puddle flange into new roof construction

.2 Co-ordinate work with Division 03 – Concrete.

3.17 DIGESTER SAMPLING PORT COVERS

.1 Install roof sleeve with puddle flange into new roof construction

.2 Co-ordinate work with Division 03 – Concrete.

3.18 EXISTING VIEW PORT

.1 Install roof sleeve with puddle flange into new roof construction.

.2 Co-ordinate work with Division 03 – Concrete.

3.19 PIPE TESTING

.1 Test all pipe in accordance with Canadian Standards Association (CSA) standard CSA B149.6-11 "Code for digester gas and landfill gas installations", Sections 11.5.

3.20 TANK TESTING

.1 Digester tank is to be pressure/vacuum tested in accordance with Canadian Standards Association (CSA) standard CSA B149.6-11 "Code for digester gas and landfill gas installations", Sections 11.2, 11.3, and 11.4

.2 Co-ordinate work with Division 03 – Concrete.

3.21 TRAINING

.1 Refer to Section 01 79 00 Training for training requirements.

.2 Provide operator training.

3.22 COMMISSIONING

.1 Refer to Section 01 98 13 Commissioning for system commissioning requirement.

3.23 OPERATION AND MANTEMANCE MANUALS

.1 Refer to Section 01 78 00 Closeout Submittals for operation and maintenance manual requirements.

.2 Provide operation and maintenance manuals as required by Section 01 78 00.

.3 Total project performance will not be achieved until the final O&M submission is received.

3.24 CLOSE-OUT SUBMITTALS

.1 Refer to Section 01 78 00 for close-out requirements.

.2 Provide documents as required by Section 01 78 00

3.25 CLEANING

.1 Refer to Section 01 74 11 Cleaning for cleaning requirements

END OF SECTION

Part 1 General

1.1 DESCRIPTION

.1 This section specifies the supply, delivery, installation, replacement and repair of Sludge Holding Tanks 5, 6, 7, and 8 gas safety equipment and specialties.

.2 Reconditioning and re-commissioning of the gas flare system

.3 Include the following as a minimum:

.1 The gas equipment supplier is to provide a minimum of two (3) trips, each one (1) working day on-site (excluding travel time) to cover inspection of installation and testing.

1.2 SUMMARY

.1 Section Includes:

.1 Repairing equipment on the existing waste gas flare system

.2 Replacing heat tracing

.3 Calibration of the combination conservation and flame arrestor

.4

.2 Related Sections:

.1 Section 01 33 00 – Shop Drawings.

.2 Section 01 78 00 - Closeout Submittals

.3 Section 01 79 00 – Training

.4 Section 01 98 13 – Commissioning

.5 Section 03 39 00 – Concrete Tank Pressure Testing

.6 Section 09 97 19 – Exterior Painting

.7 Section 46 73 20 – Digester Gas Safety Equipment and Specialties

.8 Division 26 Electrical

1.3 REFERENCES

.1 Canadian Standards Association B149.6-11 "*Code for digester gas and landfill gas installations.*"

.2 Canadian Standards Association B149.1-10 "*Natural gas and propane code*."

.3 Canadian Standards Association B149.2-10 "*Propane Storage and Handling Code*"

.4 Manitoba Workplace Safety & Health Division "*Guideline for Working with Asbestos*"

.5 Canadian Electrical Code, Part I

.6 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.

.5 •Carbon and Stainless Steel Flanges - ASME/ANSI Class 150 - ASME/ANSI B16.5-1996 Pipe Flanges and Flanged Fittings - Class 150 Flanges - outside and inside diameters, bolt circles, numbers and diameters of bolts

.7 American Petroleum Institute (API).

.1 API 598-1996, Valve Inspection and Testing.

.8 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.

.9 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 gas equipment supplier shall be responsible for the design, fabrication, assembly in-factory and testing of the equipment. The gas equipment 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 waste gas system including controls.

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 The equipment shall 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 the local Electrical Authority.

1.7 SERVICE CONDITIONS

.1 Material Handled: Digester gas consisting of approximately 61 percent methane, 33 percent carbon dioxide, 5 percent water vapor, and 1 percent hydrogen sulfide. Specific gravity of dry gas is approximately 0.86.

1.8 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 (strike out) information and options on the shop drawing items that are not relevant to the product. Do not include information for non-relevant product models.

.2 The gas equipment 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 Equipment clearances required for installation and servicing
- .4 Equipment weight
- .5 Minimum flow requirement for equipment to operate
- .6 Descriptions and specifications of various components including:
  - .1 discharge fittings
  - .2 accessories
- .7 Performance characteristics at designated operating parameters

.4 Data as follows:

- .1 Power requirements, voltage, motor power output
- .2 Controls.

.5 Installation details

.6 Closeout Submittals:

- .1 Submit operation and maintenance instructions for incorporation into manual specified in Section 01 78 00 - Closeout Submittals. Shop drawings do no constitute operation and maintenance data.
- .2 The Contractor shall submit the required copies of bound indexed operation and maintenance manuals.

1.9 PERFORMANCE

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

1.10 QUALITY ASSURANCE

.1 The biogas equipment manufacturer shall check the waste gas flare system and the intended conditions.

.2 If the biogas equipment 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.

1.11 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.

1.12 MAINTENANCE

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

1.13 TRAINING

.1 Refer to Section 01 79 00 for training requirements.

1.14 COMMISSIONING

.1 Refer to Section 01 98 13 for system commissioning.

1.15 CLEANING

.1 Refer to Section 01 74 11 for cleaning.

Part 2 Products

2.1 PIPE MATERIAL

.1 Refer to specification Section 46 73 20 Digester Gas Safety Equipment and Specialties Part 2 items 2.1 to 2.9 for pipe material and Part 3 for Execution.

2.2 VERTICAL FLAME TRAP ASSEMBLY

.1 Provide flame arrester as follows:
.1 Type: 100 mm (4 inch) Flame Arrester
.2 Materials: 356HT Cast Aluminum
.3 Ends: ANSI 861 kPa flange

.4 Rating: 35 kPa
.5 Other: Removable Cover Plate with Internal Extensible Frame and Individual Sheets, for Ease of Maintenance & Cleaning
.6 Installation position: Vertical
.7 Standard of Acceptance: Varec Model No. 5000 Series or approved equal in accordance with B7

.2 Provide a fusible element released, spring operated pallet type thermal operated shut off valve as follows:
.1 Type: 100 mm (4 inch) thermal
.2 Material: 356HT Cast Aluminum
.3 Ends: ANSI 861 kPa flange
.4 Sight glass: Acrylic isolated by BUNA-N gaskets
.5 Standard of acceptance: Varec Model 430 4 1

.3 Standard of Acceptance: Varec Model 450 04 02 2 S

2.3 TWO WAY PLUG VALVE

.1 Provide two way plug valve as follows:

.1 Material: Cast iron valve rated for 200 lb WOG
.2 ASME/ANSI Class 150 Flanges
.3 Valve conforms to Canadian Gas Association and Canadian Standards Association B149.6-11 requirements.
.4 Lubricated three-port plug valve with 100% port area, stop rings to limit plug travel to 90°.
.5 Standard button-head fitting and lubricant screw
.6 Wrench operated complete with wrench
.7 Locations:
.1 50 mm diameter flare drip isolation valve
.2 150 mm diameter flare isolation valve
3. 12 mm diameter manometer isolation valve
.4 Two – 12mmm diameter pressure switch isolation valves
.5 12 mm diameter sediment/moisture trap valve
.8 Standard of acceptance: Homestead Fig. 606 or approved equal in accordance with B7.

2.4 NATURAL GAS PILOT PANEL

.1 Provide one low pressure natural gas pilot supply panel as follows:

.1 Blower complete with 120/208 single phase explosion proof motor to pre-mix air with the pilot natural gas
.2 Mixing chambers for air and natural gas
.3 Pressure regulator to regulate natural gas pressure
.4 Explosion proof gas solenoid valve to control the natural gas flow into the natural gas pilot panel

.5 Explosion proof gas solenoid valve to control the natural gas flow into the flame retention nozzle

.6 Pressure gauge on natural gas supply pipe, mixing chamber gas inlet, and flame retention outlet.

.7 50 mm diameter air/gas mixing chamber

.8 50 mm diameter (2" NPT) continuous flame

.9 12 mm diameter (½"NPT) natural gas supply inlet connection

.10 12 mm diameter (1/2" NPT) natural gas outlet flame retention outlet connection

.11 Stainless steel NEMA 4X panel enclosure complete with vents, mounting brackets, continuous hinge, door clamping brackets, and clasp for a lock.

.12 Standard of Acceptance: Westech Varec Biogas series 244WG or approved equal in accordance with B7

2.5 BACK PRESSURE RELIEF CONTROL VALVE

.1 Provide one back pressure relief valves as follows:

.1 The back pressure relief control valve controls digester gas flow to waste gas burner.

.2 Single port spring loading back pressure relief valve/regulator

.3 Cast aluminum body with 304 stainless steel stem and bushings, and molded Buna-N rubber nylon reinforced diaphragm, spring cadmium plated

.4 ANSI 861 kPa flanged ends

.5 A Class 150 Flanges - outside and inside diameters, bolt circles, numbers and diameters of bolts for Weld neck, Threaded, Slip-on, Lap joint, Socket weld and Blind flanges.

.5 Adjustable setting range of 50-400 mm WC (2"-16" WC) [

.6 Acceptable manufacturer: Varec 386 Series

2.6 PRESSURE REGULATING CONTROL VALVE

.1 Provide two back pressure regulating valves as follows:

.1 The pressure regulating control valve regulates the pressure between the high pressure gas to the medium pressure gas padding supply pressure in gallery 5.

.2 Single port spring loading back pressure relief valve/regulator

.3 Cast aluminum body with 304 stainless steel stem and bushings, and molded Buna-N rubber nylon reinforced diaphragm, spring cadmium plated.

.4 ANSI 861 kPa flanged ends

.5 Adjustable setting range of 50-400 mm WC (2"-16" WC)

.6 Acceptable manufacturer: Fisher

2.7 FLAME CHECK

.1 Provide flame check for small diameter pipe of 6 mm (0.25") through50 mm (2") sizes:

.1 Maximum working pressure of 172 kPa (25 psig)

.2 NPT pipe connection union type housing for easy disassembly

.3 Housing to be constructed of low copper cast aluminum which is non-corrosive in hydrocarbon gases and resistant to H2S and other corrosive elements.

.4 Flame arresting element is 316 stainless steel compressed woven wire element design to maximizes fire protection.

.5 Standard of acceptance: Varec 52OO Series Flame Check

2.8 SHT PRESSURE RELIEF VALVE

.1 Provide new pressure relief balancing plates for digester 5, 6, 7, and 8

.2 Manufacturer's representative shall calibrate and verified that the pressure relief pressure

.3 Acceptable Manufacturer: Westech Industrial Limited, Mr. Jerry D'Ortenzio ph. 1 (905) 812-3993.

2.9 SPARE PARTS

1. Provide one internal bank assembly for each size of specified flame arrester.

Part 3 Execution

3.1 INSTALLATION

.1 Follow manufacturer's guidelines for equipment installation.

.2 Pressure test existing system according to Canadian Standards Association B149.6-11 "Code for digester gas and landfill gas installations" and check for leaks. Retest until zero leakage is obtained.

3.2 SLUDGE HOLDING TANK 5 and 7 PRESSURE TESTING

.1 Perform an air pressure test on digester 11 according to CSA Standards *Code for Digester Gas and Landfill Gas Installations* B149.6-11 section11.2 and 11.4.

.2 Provide all equipment to pressurize the digester tank.

.3 Provide calibrated instrumentation with calibration certificates to measure tank internal pressure, tank internal air temperature, and ambient air temperature.

3.3 PRESSURE TEST GAS PIPE

.1 Perform pressure test on SHT 5, 6, 7 and 8 waste gas burner gas collection system according to CSA Standards *Code for Digester Gas and Landfill Gas Installations* B149.6-11 section11.2, 11.4 and 11.5.

.2 Perform pressure test on SHT 5, 6, 7 and 8 gas padding system according to CSA Standards Code for Digester Gas and Landfill Gas Installations B149.6-11 section11.2, 11.4 and 11.5.

3.4 PRESSURE SWITCHES

.1 Co-ordinate work with Division 26

.2 Remove and replace the waste gas burner pressure switches.

.3 Set pressure switches at set points.

3.5 TRAINING

.1 Refer to Section 01 79 00 for training requirements.

.2 Provide operator training

3.6 COMMISSIONING

.1 Refer to Section 01 98 13 Commissioning for system commissioning requirement.

3.7 OPERATION AND MANTEMANCE MANUALS

.1 Refer to Section 01 78 00 Closeout Submittals for operation and maintenance manual requirements.

.2 Provide operation and maintenance manuals as required by Section 01 78 00.

.3 Provide operation and maintenance manuals as required by Section 01 78 00.

3.8 CLOSE-OUT SUBMITTALS

.1 Refer to Section 01 78 00 for close-out requirements.

.2 Provide all documents as required by Section 01 78 00

END OF SECTION