1. GENERAL
   1. Section includes:
      1. Bioelectrochemical Sensor system to monitor organic compounds in waste treatment processes using attached biofilm.
      2. Includes the capability to remotely monitor Sensors on any browser-enabled device and present in an easy-to-understand graphical user interface, which minimizes off-line laboratory analyses.
   2. Measurement Procedures
      1. The method of measuring organic compounds will be a Sensor using bioelectrochemical Sensor technology.
         1. Bacteria inoculated onto the electrode pair generate a small electrical current proportional to the rate that readily biodegradable compounds are oxidized by the naturally occurring biology present in waste treatment processes.
         2. Rising signals mean more consumable organic matter is present. Falling signal shows biological inhibition due to less organic matter or the presence of inhibitory compounds.
   3. Alternates
      1. Other methods of organic matter measurement such as ultraviolet (UV) spectroscopy or ultraviolet–visible (UV–VIS) spectrophotometry are not acceptable.
      2. Other Sensors that require membranes, electrolytes, or electrodes are not acceptable.
   4. System Description
      1. Model: SENTRY™ Sensor
      2. Sensor Type: Bioelectrochemical
      3. Performance Requirements
         1. Measurement performance range: 0.1 to 25,000 mg/L rbCOD.
         2. Response Time:
            1. Organic carbon signal generated each minute (1,440 values per day)
            2. Applied voltage signal generated each minute (1,440 values per day)

PART 2 DOCUMENTATION

* 1. Certifications
     1. UL 61010/CSA 61010: General Purpose CSA/CSANRTL and FM (UL Pending) when used with an approved controller.
     2. CE Compliant
     3. EN61326-1, EN55011, EN61000 communication compliance.
     4. Panel is NEMA 4X rated.
     5. Upon official request only (pertaining to intrinsically safe sensor in Accessories). Nameplate marking is:

AEx [ia] IIA T6

(That is Class I Zone 0, Explosion Protection, Method of protection - Intrinsic Safety (Zone 0), Groups IIA, Temperature Class T6 =< 85 °C)

* 1. Environmental Requirements
     1. Operational Criteria
        1. Operating temperature: 0 to 50 °C
        2. Relative humidity: 95%, non-condensing.
        3. Immersion depth: 25 feet (7.6 meters.), maximum
        4. Immersion pressure: 75 kPa (10.8 psi), maximum
        5. Sample pH range: 5.0 to 9.0 Standard Units
        6. Distance, Sensor to control panel: 150 feet (45 meters), maximum.
  2. Warranty
     1. The Sensor is warranted for 2 years from date of installation (unless otherwise specified in Service Agreement)
     2. Control panel is warranted for 2 years from date of installation (unless otherwise specified in Service Agreement)
  3. Maintenance Service
     1. Scheduled maintenance:
        1. Sensor cleaning: 90 days or depending on conditions.
        2. Sensor and Sensor cable inspection: 90 days
        3. Calibration: no calibration required
     2. Unscheduled maintenance
        1. Replace Sensor if recommended by SENTRY™ personnel.
        2. Clean control panel (enclosure)
        3. Replace control panel components if recommended by SENTRY™ personnel.

PART 3 PRODUCTS

* 1. Manufacturer
     1. SENTRY™ Water Monitoring and Control, Charlottetown, PE, Canada
        1. SENTRY™ System
  2. Manufactured Unit
     1. The SENTRY™ System consists of:
        1. Submersible Sensor with PVC body, 25-foot (7.6 meter) integral cable, bayonet-style connector
        2. Extension cables in lengths of 125 feet (38 meters), 75 feet (22.8 meters), or 25 feet (7.6 meters)
        3. Control Panel, which includes power supply, PLC, modem, Ethernet module, and connection hub
  3. Equipment
     1. The SENTRY™ Sensor is made of PVC and 316 stainless steel.
     2. The Sensor is entirely corrosion-resistant and fully immersible.
     3. The Sensor utilizes a 1.5” NPT external thread for mounting hardware connections.
     4. The Sensor does not require sample conditioning or electrolyte solutions.
     5. The Sensor interface to the controller is MODBUS® RS485.
     6. The operation of the Sensor is affected by: pH, Al3+, Fe2+, Fe3+
     7. The Sensor(s) are factory inoculated and need no calibration prior to use.
  4. Components
     1. Standard equipment:
        1. Sensor(s), Standard includes two (2) Sensors.
        2. Extension cables
        3. Control Panel
        4. User Manual
        5. Access to Cloud-based dashboard
     2. Dimensions
        1. Sensor
           1. Length: 8.5 inches (235 mm)
           2. Diameter: 1.94 in. (49.3 mm) Diameter measured at widest point
        2. Integral cable: 25 feet (7.6 meters) with connector
        3. Extension Cables, Available lengths: 125 feet (38 meters), 75 feet (22.8 meters), or 25 feet (7.6 meters)
        4. Control Panel:
           1. Dimensions: 12.1 inches x 5.2 inches X 15.9 inches (40.4 cm x 13.2 cm x 30.6 cm)

(H x D x W)

* + - * 1. Weight: 7.3 pounds (3320 g)

* 1. Accessories
     1. Custom-length extension cables to extend the distance between the Sensor and Control Panel.
     2. Cartridge control panel for Intrinsically Safe Sensors
     3. Intrinsically Safe Sensors
     4. Anti-bridging Sensors
     5. Cartridge-style Sensors for extreme conditions that require frequent Sensor replacement.
     6. Plastic cleaning devices to remove hard debris caught between electrode pair.

PART 4 EXECUTION

* 1. Preparation
     1. Mounting:
        1. The Sensor must have rigid mounting using CPVC pipe and fittings with adequate submersion in the monitored fluid so the Sensor is constantly wetted.
        2. Control Panel will be mounted to wall, handrails, or similar, suitable location.
     2. Distance from Control Panel to Sensor: 150 feet (45 meters), maximum.
  2. Installation

Contractor will install the Sensors and control panel according to the manufacturer’s instructions and recommendation.

* + 1. Manufacturer’s representative will include a half-day of start-up service by a factory-trained technician, if requested.
       1. Contractor will schedule a date and time for start-up.
       2. Contractor will require the following people to be present during the installation and start-up procedure.
          1. General contractor
          2. Electrical contractor
          3. SENTRY factory-trained representative
          4. Owner’s personnel
          5. Engineer

3.4 Manufacturer’s Service and Start-Up

* + 1. Contractor will include the manufacturer’s services to perform start-up on instrument to include basic operational training and certification of performance of the instrument.
    2. Contractor will include a manufacturer’s Service Agreement that covers all the manufacturer’s recommended preventative maintenance and any necessary repairs beginning from the time of equipment startup through to end user acceptance / plant turnover and the first 12 months of end-user operation post turnover.
    3. Items A and B are to be performed by the manufacturer’s factory-trained service personnel. Field service and factory repair by personnel not employed by the manufacturer is not allowed.
    4. Use of the manufacturer’s service parts and reagents is required. Third-party parts are not approved for use.

END OF SECTION