**PLEASE NOTE: The following specification contains areas, highlighted in yellow and with the [ ] symbol. In these areas, the engineer has to make a selection, add specific, project related information and has to delete what is not applicable for the specific project.**

GENERAL

* 1. Section includes:
     1. Instrument for semi-continuous, online monitoring of Cadmium in water using stripping voltammetry technology. The determination of Cadmium shall be for:

[ ] Cadmium, dissolved Cd(II)

[ ] Cadmium, dissolved Cd(II) and Copper, dissolved Cu(II)

[ ] Cadmium, dissolved Cd(II) and Lead, dissolved Pb(II)

[ ] Cadmium, dissolved Cd(II) and Zinc, dissolved Zn(II)

[ ] Cadmium, dissolved Cd(II) and Lead, dissolved Pb(II) and Copper, dissolved Cu(II)

[ ] Cadmium, dissolved Cd(II) and Lead, dissolved Pb(II) and Zinc, dissolved Zn(II)

[ ] Cadmium, total

[ ] Cadmium, total and Copper, total

[ ] Cadmium, total and Lead, total

[ ] Cadmium, total and Zinc, total

[ ] Cadmium, total and Lead, total and Copper, total

[ ] Cadmium, total and Lead, total and Zinc, total

* 1. Measurement Procedures

The analyzer is used with an integrated industrial panel PC to measure trace Cadmium in water. The analytical method is stripping voltammetry with a carbon electrode. For the determination of Total Cadmium a hot acid digestion is used.

* 1. Alternates
     1. Methods of Cadmium measurement that do not use stripping voltammetric measurement are not acceptable.
     2. Analyzers without standard automatic procedures for calibration, validation and cleaning are not acceptable.
     3. Analyzers without option to measure up to 3 parameters in parallel are not acceptable.
     4. Analyzers without the ability for single sample ("grab sample") measurement are not acceptable.
     5. Analyzers without option for up to 6 sample streams are not acceptable.
     6. Analyzers without option for internal sample dilution are not acceptable.
     7. Analyzers without analog and digital output options are not acceptable.
     8. Analyzers without an integrated industrial panel PC are not acceptable.
  2. System Description
     1. Performance Requirements
        1. Measuring Range (parts per billion)

Cadmium, Lead: 1 to 100 µg/L | Copper, Zinc: 10 to 100 µg/L

* + - 1. Limit of detection
         1. Cadmium, Lead: ≤1 μg/L | Copper, Zinc: ≤10 μg/L
      2. Precision / Repeatability
         1. Better than 5% full scale range for standard test solutions
    1. Other Specifications
       1. Cycle Time
          1. Cadmium, dissolved: 10 minutes (dilution +5 min.)
          2. Cadmium, total: 20 minutes (dilution + 5 min.)
       2. Cleaning
          1. Automatic; frequency freely programmable
       3. Calibration
          1. Automatic; 2-point; frequency freely programmable
       4. Validation
          1. Automatic; frequency freely programmable
       5. Alarm
          1. 1x malfunctioning, 4x user-configurable, max. 24 VDC/0.5 A, potential free contacts
       6. Protection class
          1. Analyzer cabinet: IP55
          2. Panel PC: IP65
       7. Material
          1. Hinged part: Thermoform ABS, door: plexiglass
          2. Wall section: Galvanized steel, powder coated
  1. Certifications
     1. CE compliant
     2. UL certified
  2. Environmental Requirements
     1. Operational Criteria
        1. Operating temperature: 10 to 30 °C ±4 °C deviation (50 to 86 °F ±7.2 °F deviation)
        2. Reagent temperature: keep between 10 to 30 °C (50 to 86 °F)
        3. Relative humidity: 5 to 95 %, non-condensing
  3. Warranty
     1. Warranted from manufacturer defects for two years (Europe) or one year (all other geographies) from date of shipment.
  4. Maintenance and Service
     1. Unscheduled Maintenance
        1. Check and clean analyzer components and electrodes, depending on cleanliness of the sample
     2. Scheduled Maintenance / preventative
        1. Monthly
           1. Reagents refill, electrodes validation and / or calibration
        2. Quarterly
           1. Pump tubing replacement
        3. Annually
           1. Calibration
           2. Replacement of all tubing
           3. Replacement of electrodes (if applicable)
           4. Replacement of valves and pistons

1. PRODUCTS
   1. Manufacturer
      1. Hach
      2. EZ6000 Series Cadmium Analyzer
   2. Manufactured Unit
      1. The Cadmium trace-metal analyzer consists of a microprocessor controlled voltammetric analyzer designed to monitor Cadmium semi-continuously in a sample stream. Automatic cleaning, calibration and validation are available.
   3. Equipment
      1. Online Analyzer
         1. Utilizes stripping voltammetric analysis with a carbon electrode.
         2. For the determination of Total Cadmium a hot acid digestion is used.
         3. Electrochemical flow cell for three electrodes, plus integrated magnetic stirrer with easy plugging of electrodes for inspection or maintenance
         4. Plug-and-play airtight fittings for connecting reagent tubing
         5. High precision micropumps for reagent dosing and dilution
         6. Automatic calibration, validation, priming and cleaning
         7. If chosen, includes capability to monitor up to six sample streams.
      2. Controller
         1. Industrial panel PC with 5.7” TFT color display, compact flash memory, modular compact I/O system
         2. User interface with different user levels (Automatic, User Level 1, User Level 2, Administrator)
         3. If chosen, includes capability to communicate measurements via 4-20 mA outputs, Modbus TCP/IP, Modbus RS485 or RS232
      3. Reagents and Standards
         1. The analyzer shall use quick connect reagent containers with pre-installed tubing.
         2. Reagents and standards shall be prepared according instructions on the Method + Reagent sheet.
   4. Components
      1. Analytical instrument  
         To deliver:
         1. Cadmium Analyzer as selected in section 1.1.A.
         2. Wall-mount bracket
         3. Reagent containers
         4. User Manual
         5. Method + Reagent Sheet
      2. Dimensions: refer to analyzer drawings
      3. Weight: 25 kg (55 lb)
   5. Instrument Options,

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Must be added to instrument at time of order.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Number of sample streams (fill in, select from 1 to 6):

[ ] sample streams

Outputs (select / fill in one)

[ ]x 4-20 mA Outputs (fill in, select up to 6)

[ ]x 4-20 mA Outputs and Modbus RS485 (fill in, select up to 4)

[ ]x 4-20 mA Outputs and Modbus TC/IP (fill in, select up to 4)

[ ] Modbus RS485

[ ] Modbus TCP/IP

[ ] RS232

* 1. Instrument Accessories

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Select as many as required

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

[ ] External dilution unit

[ ] Universal Filtration System, pore size 50 µm

[ ] Universal Filtration System, pore size 100 µm

[ ] Heavy-Duty Filtration System, pore size 50 µm

[ ] Heavy-Duty Filtration System, pore size 100 µm

[ ] Table Stand

[ ] Floor Stand

1. EXECUTION
   1. Preparation
      * 1. Mounting
           1. As shown on the drawings
        2. Inlet and outlet connection sizes
           1. As shown on the drawings
        3. Sample Flow Rate
           1. 100 to 300 mL/minute
        4. Sample Pressure
           1. By external overflow vessel
        5. Sample Temperature
           1. 10 to 30 °C ±4 °C deviation (50 to 86 °F ±7.2 °F deviation)
        6. Other sample requirements
           1. Maximum particle size 100 µm, <0.1 g/L suspended solids, turbidity <50 NTU
        7. Instrument air
           1. Dry and oil free according to ISA-S7.0.01-1996 quality standard for instrument air
        8. Demineralized water
           1. For rinsing and/or dilution
        9. Cooling water (only for Total Cadmium)
           1. Flow rate approx. 5L/h
           2. Temperature max. 30 °C (86 °F)
           3. Pressure max. 0.5 bar
        10. Drain
            1. Atmospheric pressure, vented, min. ø 64 mm
        11. Earth connection
            1. Dry and clean earth pole with low impedance (> 1 Ohm) using an earth cable of > 2.5 mm2
            2. Power supply
   2. Installation
      1. Install analyzer following transmittal drawings and instrument user manual.
   3. 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, regularly scheduled calibration 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 manufacturer’s factory-trained service personnel. Field service and factory repair by personnel not employed by the manufacturer is not allowed.
      4. Use of manufacturer’s service parts is required. Third-party parts are not approved for use.

END OF SECTION

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