PART 1 GENERAL

1.1 Section includes:
A. Chlorine analyzer for monitoring of free or total residual chlorine

1.2 Measurement Procedures
A. The method of measuring free or total chlorine will be colorimetric. Instrument chemistry will employ N, N-diethyl-p-phenylenediamine (DPD) method.

1.3 Alternates
A. Other methods of chlorine measurement such as amperometric, potentiometric, and iodometric that employ electrodes or other electrochemical techniques are not acceptable.

1.4 System Description
A. Performance Requirements
1. Measurement range:
a. 0 to 5 mg/L (ppm) free or total residual chlorine
2. Accuracy
a. ± 5% of reading or ±0.03 mg/L (ppm), whichever is greater
3. Precision
a. 5% of reading or 0.01 mg/L (ppm), whichever is greater
4. Minimum detection limit
a. 0.03 mg/L (ppm)
5. Resolution
a. 0.01 mg/L (ppm)
6. Repeatability
a. 0.05 mg/L (ppm)
7. Cycle Time
a. 2.5 minutes

1.5 Certifications
A. CE compliant for conducted and radiated emissions CISPR 11 (Class A limits), EMC Immunity EN 61326-1 (Industrial limits), and EN 61010-1
B. General Purpose UL/CSA 61010-1 with cETLus safety mark
C. IP62 dust and water ingress protection rating
D. Australian CTICK and Korean KC Marking

1.6 Environmental Requirements
A. Operational Criteria
1. Sample flow rate
a. 200 to 500 mL/minute
2. Sample pressure (without conditioning kit)
a. 1 to 5 psi (0.07 to 0.34 bar)
3. Sample pressure (with conditioning kit)
a. 120 psi (8.27 bar)
4. Sample temperature
a. 41 to 104 °F (5 to 40 °C)
5. Operating temperature
a. 41 to 104 °F (5 to 40 °C)
6. Operating humidity

a. 90% at 40 °C maximum

1.7 Warranty
A. The product includes a one-year warranty from the date of shipment

1.8 Maintenance Service
A. Scheduled Maintenance
1. Monthly
a. Reagent replacement
2. Annually
a. Analyzer tubing replacement
B. Unscheduled Maintenance
1. Pump tubing replacement is operating temperature dependent
a. Operating temperature below 80 °F: six-month intervals
b. Operating temperature above 80 °F: three-month intervals

PART 2 PRODUCTS

2.1 Manufacturer
A. Hach Company, Loveland, CO
1. Model Cl17 Chlorine Analyzer, Free Chlorine Residual
2. Model Cl17 Chlorine Analyzer, Total Chlorine Residual

2.2 Manufactured Unit
A. The Cl17 Chlorine analyzer consists of a sample and reagent valve and pump, measurement cell, controller, and is shipped with buffer and indicator solutions.

2.3 Equipment
A. The analyzer must be housed in a NEMA 12 enclosure that is IP62 rated with the gasketed door latched.
B. The analyzer shall be capable of measuring free or total residual chlorine by changing the tubing and indicator and buffer solutions.
C. A measurement shall be taken every 2.5 minutes and results displayed by a three digit LCD readout in the range of 0 to 5 mg/L.
D. The analyzer must operate using 115V or 230V selectable AC power.
E. The analyzer must perform a self-test and auto-blanking between analysis points to compensate for sample color, turbidity, and changes in light intensity due to voltage fluctuations or light source aging.
F. The analyzer shall operate with an LED light source at a peak wavelength of 510nm.
G. The analyzer must be able to operate unattended for 30 days between chemical reagent changes and measurement cell cleaning.
H. The analyzer has two feed control (relay) operation modes to operate chemical feed pumps. Available control options are:
1. On/off control where the concentration alarm outputs activate or deactivate a pump when chlorine levels fall below or exceed acceptable levels.
2. Proportional control where the 4-20mA output current is scaled to pace a feed pump proportional to output.
I. The analyzer has standard optically isolated analog outputs, selectable as 0/4 to 20mA, field programmable over any portion of the analyzer range

J. The analyzer has two standard SPDT relay alarms, with contacts rated for 5 amp resistive loads at 230V AC power. Alarm options include concentration set point, analyzer system warning, and analyzer system shut down.

2.4 Components

A. Standard Equipment
   1. Cl17 Free or Total Chlorine analyzer
   2. One-Month Supply of reagents
   3. Installation kit
   4. Maintenance kit
   5. Sample conditioning kit
      a. Pressure regulator, strainer, and shut off valve
   6. Wall mount kit
   7. User manual
B. Dimensions: 13.5 x 17.9 x 7 inches (343 x 455 x 178 mm)
C. Shipping weight: 16 lbs (7.3 kg)

2.5 Optional Accessories

A. Power Cord
B. Maintenance kit with preassembled tubing
C. Pocket Colorimeter II for free and total chlorine (high and low range combination)

PART 3 EXECUTION

3.1 Preparation

1. Mounting
   a. The Cl17 Free or Total Chlorine analyzer can be wall mounted only.
2. Required Clearances
   a. Horizontal: 15.2 in (386 mm), 26 inches (686 mm) ideal
   b. Vertical: 19 inches (483 mm)
   c. Depth: 20 inches (508 mm)
3. Sample inlet
   a. 0.25 inch OD polyethylene tubing
4. Sample outlet
   a. 0.50 inch ID flexible tubing
5. Overflow drain
   a. 0.50 inch ID flexible tubing
6. Air purge quick connect
   a. 0.25 inch OD polyethylene tubing (optional)

3.2 Installation

A. Contractor will install the analyzer in strict accordance with the manufacturer’s instructions and recommendation.
B. 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 start-up procedure.
   a. General contractor
   b. Electrical contractor
   c. Hach Company factory trained representative
   d. Owner's personnel
   e. Engineer

3.3 Manufacturer's Service and Start-Up

A. 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.
B. 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.
C. 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.
D. Use of manufacturer's service parts and reagents is required. Third-party parts and reagents are not approved for use.

END OF SECTION