**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.**

1. GENERAL
   1. Section includes:
      1. Instrument for continuous, online monitoring of Total Organic Carbon, Total Carbon, Total Inorganic Carbon, Total Nitrogen, Biological Oxygen Demand and/ or Chemical Oxygen Demand via correlation and Volatile Organic Carbon via calculation in water.
      2. The analyzer has internal sensors and utilizes self-diagnostics to monitor analyzer status and produces alerts when maintenance or service are required.
   2. Measurement Procedures

The method of measuring Total Organic Carbon will be by Two Stage Advanced Oxidation which utilizes the Hydroxyl radical and a manganese catalyst.

The method of measuring Total Nitrogen will be by direct photometric analysis of Nitrate after Two Stage Advanced Oxidation.

* 1. Alternates
     1. Other instruments that do not use the Two Stage Advanced Oxidation which utilizes the Hydroxyl radical and a manganese catalyst are not acceptable.
     2. Other instruments that do not have predictive diagnostic capabilities and don’t generate alerts when maintenance or service are required are unacceptable.
     3. Other instruments that do not use the direct photometric analysis of Nitrate for Total Nitrogen measurement.
  2. System Description
     1. Performance Requirements

Measurement ranges:

1. 0 – 50mgC/l, 0 – 250mgC/l,

0 – 19mgN/l, 0 – 30mgN/l,

1. 0 – 50mgC/l, 0 – 250mgC/l,

0 – 55mgN/l, 0 – 88mgN/l,

1. 0 – 100mgC/l, 0 – 500mgC/l,

0 – 21mgN/l, 0 – 68mgN/l,

1. 0 – 100mgC/l, 0 – 500mgC/l,

0 – 61mgN/l, 0 – 200mgN/l,

1. 0 – 250mgC/l, 0 – 500mgC/l, 0 – 2000mgC/l

0 – 30mgN/l, 0 – 68mgN/l, 0 – 200mgN/l,

1. 0 – 250mgC/l, 0 – 500mgC/l, 0 – 2000mgC/l

0 – 88mgN/l, 0 – 200mgN/l, 0 – 600mgN/l,

1. 0 – 250mgC/l, 0 – 1000mgC/l, 0 – 10000mgC/l

0 – 30mgN/l, 0 – 115mgN/l, 0 – 1200mgN/l,

1. 0 – 250mgC/l, 0 – 1000mgC/l, 0 – 10000mgC/l

0 – 88mgN/l, 0 – 350mgN/l, 0 – 3650mgN/l,

1. 0 – 500mgC/l, 0 – 2000mgC/l, 0 – 10000mgC/l

0 – 68mgN/l, 0 – 200mgN/l, 0 – 1200mgN/l,

1. 0 – 500mgC/l, 0 – 2000mgC/l, 0 – 10000mgC/l

0 – 200mgN/l, 0 – 600mgN/l, 0 – 3650mgN/l,

1. 0 – 500mgC/l, 0 – 2000mgC/l, 0 – 20000mgC/l

0 – 68mgN/l, 0 – 200mgN/l, 0 – 5000mgN/l,

1. 0 – 500mgC/l, 0 – 2000mgC/l, 0 – 20000mgC/l

0 – 200mgN/l, 0 – 600mgN/l, 0 – 15000mgN/l,

Detection Limit:

1. 0.6mgC/l, 0.4mgN/l,
2. 0.6mgC/l, 1.6mgN/l,
3. 0.6mgC/l, 0.4mgN/l,
4. 0.6mgC/l, 1.6mgN/l,
5. 0.9mgC/l, 0.4mgN/l,
6. 0.9mgC/l, 1.6mgN/l,
7. 0.9mgC/l, 0.4mgN/l,
8. 0.9mgC/l, 1.6mgN/l,
9. 1.2mgC/l, 1.2mgN/l,
10. 1.2mgC/l, 4.0mgN/l,
11. 1.2mgC/l, 1.2mgN/l,
12. 1.2mgC/l, 4.8mgN/l,

Repeatability:

1. ±3% of reading or ±0.3mgC/l whichever is greater in 0 – 50mgC/l range,
2. ±3% of reading or ±0.3mgC/l whichever is greater in 0 – 100mgC/l range,
3. ±3% of reading or ±0.45mgC/l whichever is greater in 0 – 250mgC/l range,
4. ±3% of reading or ±0.6mgC/l whichever is greater in 0 – 500mgC/l range,
5. ±3% of reading or ±1.5mgC/l whichever is greater in 0 – 1000mgC/l range,
6. ±3% of reading or ±6mgC/l whichever is greater in 0 – 2000mgC/l range,
7. ±3% of reading or ±30mgC/l whichever is greater in 0 – 10000mgC/l range,
8. ±3% of reading or ±30mgC/l whichever is greater in 0 – 20000mgC/l range,
9. ±3% of reading or ±0.2mgN/l whichever is greater in 0 – 19mgN/l range,
10. ±3% of reading or ±0.2mgN/l whichever is greater in 0 – 21mgN/l range,
11. ±3% of reading or ±0.2mgN/l whichever is greater in 0 – 30mgN/l range,
12. ±3% of reading or ±0.8mgN/l whichever is greater in 0 – 55mgN/l range,
13. ±3% of reading or ±0.8mgN/l whichever is greater in 0 – 61mgN/l range,
14. ±3% of reading or ±0.6mgN/l whichever is greater in 0 – 68mgN/l range,
15. ±3% of reading or ±0.8mgN/l whichever is greater in 0 – 88mgN/l range,
16. ±3% of reading or ±1mgN/l whichever is greater in 0 – 115mgN/l range,
17. ±3% of reading or ±2mgN/l whichever is greater in 0 – 200mgN/l range,
18. ±3% of reading or ±4mgN/l whichever is greater in 0 – 350mgN/l range,
19. ±3% of reading or ±8mgN/l whichever is greater in 0 – 600mgN/l range,
20. ±3% of reading or ±10mgN/l whichever is greater in 0 – 1200mgN/l range,
21. ±3% of reading or ±40mgN/l whichever is greater in 0 – 3650mgN/l range,
22. ±3% of reading or ±20mgN/l whichever is greater in 0 – 5000mgN/l range,
23. ±3% of reading or ±80mgN/l whichever is greater in 0 – 15000mgN/l range,

Cycle time: from 7 min, depending on range and application

Sample Flow: minimum 100ml per analysis

Sample Pressure: Ambient

Sample Temperature: 2 to 60 °C (36 to 140 °F)

* 1. Certifications
     1. CE Compliant
     2. KC (Korea Certification)
     3. ACMA (Australia & New Zealand EMC Compliance)
     4. China RoHS
  2. Environmental Requirements
     1. Operational Criteria
        1. Operating Temperature: 5 to 40 °C (32 to 113 °F)
        2. Relative Humidity: 5 to 85 %, non-condensing
  3. Maintenance Service
     1. Unscheduled Maintenance
        1. Replace chemicals as required
  4. Warranty
     1. Warranted for one year from date of shipment against manufacturer defects.

1. PRODUCTS
   1. Manufacturer
      1. Hach Ireland Ltd
      2. Model Hach BioTector B7000 Online TOC TN Analyzer
   2. Analyzer
      1. The online TOC TN analyzer consists of:
         1. Housing: Glass Reinforced Polyester
         2. Sampling system
         3. Ozone generator
         4. Oxidation reactor
         5. Non-dispersive Infrared (NDIR) analyzer
         6. Motherboard with processor
         7. Total Nitrogen module
   3. Equipment
      1. Online TOC TN analyzer
         1. To measure TOC of the sample it utilizes hydroxyl radicals as the oxidizing agent.
         2. The TOC TN analyzer automatically compensates for temperature and pressure utilizing an embedded temperature and pressure sensors.
         3. Includes capability to actively monitor internal components and present diagnostics on the overall health of the TOC TN analyzer and time to next required preventive maintenance.
         4. Includes capability to actively monitor reagents usage, displays current reagent volumes and present approximate time to the next reagents replacement.
         5. Data transmission is made with a SD card.
   4. Components
      1. Standard equipment:
         1. Analyzer
         2. Mounting brackets
         3. User Manual
         4. Reagent dip tubes
      2. Dimensions: Refer to TOC TN analyzer drawings
      3. Weight 198 – 265lbs (90 kg – 120kg) Enclosure weight may change depending on system optional features.
   5. Instrument Options,

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Must be selected at time of order. Choose one

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[ ] 1 channel Online TOC TN Analyzer

[ ] 1 channel Online TOC TN Analyzer, IP54 Purge Ready

[ ] 1 channel Online TOC TN Analyzer, ATEX Compliant, EExp Zone 2,

[ ] 1 channel Online TOC TN Analyzer, ETL Certified, EExp Class 1 Div 2,

[ ] 2 channel Online TOC TN Analyzer

[ ] 2 channel Online TOC TN Analyzer, IP54 Purge Ready

[ ] 2 channel Online TOC TN Analyzer, ATEX Compliant, EExp Zone 2,

[ ] 2 channel Online TOC TN Analyzer, ETL Certified, EExp Class 1 Div 2,

[ ] 3 channel Online TOC TN Analyzer

[ ] 3 channel Online TOC TN Analyzer, IP54 Purge Ready

[ ] 3 channel Online TOC TN Analyzer, ATEX Compliant, EExp Zone 2,

[ ] 3 channel Online TOC TN Analyzer, ETL Certified, EExp Class 1 Div 2,

[ ] 4 channel Online TOC TN Analyzer

[ ] 4 channel Online TOC TN Analyzer, IP54 Purge Ready

[ ] 4 channel Online TOC TN Analyzer, ATEX Compliant, EExp Zone 2,

[ ] 4 channel Online TOC TN Analyzer, ETL Certified, EExp Class 1 Div 2,

[ ] 6 channel Online TOC TN Analyzer

[ ] 6 channel Online TOC TN Analyzer, IP54 Purge Ready

[ ] 6 channel Online TOC TN Analyzer, ATEX Compliant, EExp Zone 2,

[ ] 6 channel Online TOC TN Analyzer, ETL Certified, EExp Class 1 Div 2,

* 1. Instrument Accessories

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Select as many as required

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[ ] VOC mode used for measurement of Volatile Organic Carbon in the sample

[ ] Remote activation of Manual/Calibration port

[ ] Sample Sensor to detect presence of the sample and evaluate the quantity of air bubbles in the sample

[ ] Integrated oxygen concentrator

[ ] Filter pack for removal of water, dirt, and oil from compressed air (if using instrument air supply)

[ ] External oxygen concentrator with integrated compressor

[ ] Grab sample-Calibration Port and Sample Line Cleaning

Choose one or none

[ ] Profibus

[ ] Modbus RTU

[ ] Modbus TCP/IP

Choose one or none

[ ] BioTector Sample Overflow Chamber

[ ] BioTector Vacuum Sampler

[ ] BioTector Venturi Sampler

[ ] BioTector Flow Through Sampling Chamber with Sand Trap

[ ] BioTector Sampling Chamber with Sand Trap

1. EXECUTION
   1. Preparation
      * 1. Mounting
           1. As shown on the drawings
        2. Inlet and outlet connection sizes
           1. As shown on the drawings
   2. Installation
      1. Install TOC TN 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 and reagents is required. Third-party parts and reagents are not approved for use.

END OF SECTION