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.

PART 1 GENERAL

1.1 Section includes:

A. Instrument for continuous, online monitoring of turbidity in water that includes predictive diagnostics capability to monitor instrument status using one of the following compliance methods:

[ ] DIN EN ISO 7027

[ ] USEPA Approved Hach Method 10258

1.2 Measurement Procedures

A. The sensor is used with an SC controller to measure low range turbidity in water. These sensors collect scattered light at an angle of 90° in a 360° radius around the axis of the incident light beam.

1.3 Alternates

A. Methods of turbidity measurements that do not include a laser light source and a 360° x 90° detection system are not acceptable.

B. Instruments that do not have predictive diagnostic capabilities are not acceptable

1.4 System Description

A. Performance Requirements

[ ] DIN EN ISO7027 Sensor

a. Measuring Range

1) 0 to 1000 NTU / FNU / TE/F / FTU

2) 0 to 250 EBC

[ ] USEPA Approved Hach Method 10258 Sensor

b. Measuring Range

1) 0 to 700 NTU / FNU / TE/F / FTU

2) 0 to 175 EBC

B. Other Specifications

a. Detection Limit

1) 0.002 NTU / NTU / FNU / TE/F / FTU

b. Accuracy

1) ±2% of reading ±0.01 NTU from 0 to 40 NTU based on formazin primary standard at 25°C

2) ±10% of reading from 40 to 1000 NTU based on formazin primary standard at 25°C

c. Repeatability

1) ±1% of reading or 0.002 NTU, whichever is greater based on formazin primary standard at 25°C

d. Resolution

1) 0.0001 NTU / FNU / TE/F / FTU / EBC

e. Response Time

1) T90 <45s at 100 mL/min

f. Sample Flow

1) 100 to 1000 mL/min; optimal flow rate 200 to 500mL/min

g. Sample Pressure

1) Max. 6 bar (87 psi) compared to air at sample temperature range of 0 to 40 °C (32 to 104 °F)

2) Max. 3 bar (43 psi) compared to air at temperature range of 40 °C to 60°C (104 °F to 140 °F)

h. Sample Temperature
1) 2 to 60 °C (36 to 140 °F)

1.5 Certifications
A. CE Compliant
B. US FDA accession number: 1420493-001 EPA version, 1420492-001 ISO version. Complies with IEC/EN 60825-1 and to 21 CFR 1040.10 in accordance with Laser Notice No. 50)
C. Australian RCM Marking

1.6 Environmental Requirements
A. Operational Criteria
1. Storage Temperature: -40 to 60 °C (-40 to 140 °F)
2. Operating Temperature: 0 to 50 °C (32 to 122 °F)
3. Relative Humidity: 5 to 95 %, non-condensing

1.7 Enclosure Rating
A. Electronic compartment IP55; all other functional units IP65 with process head/ACM attached

1.8 Maintenance Service
A. Unscheduled Maintenance
1. Clean the measurement vial, depending on cleanliness of the sample
2. Replacement of desiccant cartridge (depending on ambient temperature, ambient humidity, and sample temperature)
3. Replacement of measurement vial, depending on cleanliness of the sample

PART 2 PRODUCTS

2.1 Manufacturer
A. TU5300sc Low Range Laser Turbidimeter
B. Hach

2.2 Sensor
A. The low range online laser turbidimeter consists of a Class 1 650nm (EPA) or 850 nm (ISO) laser light source and 360° x 90° detection system with predictive diagnostics designed to continuously monitor turbidity in a sample stream. Automatic cleaning and flow measurement options are available.

2.3 Equipment
A. Online turbidimeter
1. Utilizes a laser-based 360° x 90° optical system that measures turbidity from multiple different angles.
2. Continuous particle removal using a vortex created by the fluid path.
3. Utilizes an identical laser-based optical system that matches the laboratory turbidimeter described in 2.3.C. for direct comparison between laboratory and online measurements.
4. If chosen, includes capability to communicate measurements and calibration information via RFID to the laboratory turbidimeter described in 2.3.C.

5. Includes capability to actively monitor all internal components and present diagnostics on the overall health of the turbidimeter and time to next required maintenance.
6. When connected to a predictive diagnostics capable controller the overall status of instrument performance is displayed as a percentage value via a measurement indicator
7. When connected to a predictive diagnostics capable controller the overall time remaining until maintenance tasks are due is displayed in days
8. Built in-help screens included.

B. Controller
   1. Provide an SC controller for turbidimeter operation.

   [ ] Includes optional capability to communicate measurements and calibration information via LAN to the laboratory turbidimeter described in 2.3.C.

C. Laboratory Turbidimeter
   1. Furnish laboratory turbidimeter with the same 360° x 90° detection system as the online turbidimeter, for validation of readings from the online turbidimeter.

D. Calibration Standards
   1. Frequency of use of calibration standards determined by recommendation of local regulator.
   2. Manufacturer must make available certified calibration standards that can be used in online and bench top instruments for highest calibration accuracy
   3. Calibration standards must be capable of being used to calibrate laboratory turbidimeters with similar optics systems.
   4. Calibration standards must be capable of functioning with the instrument's optional RFID module.

2.4 Components

A. Analytical instrument
   To deliver:
   1. Turbidimeter as selected in section 1.1.A.
   2. Mounting bracket
   3. Desiccant cartridge
   4. User Manual

B. Dimensions: Refer to turbidimeter drawings

C. Weight: 5 lbs (2.3 kg)

2.5 Instrument Options,
****
Must be added to instrument at time of order. Choose none, one, or both
****

[ ] System Check Module
[ ] RFID Module

2.6 Instrument Accessories
****
Select as many as required
****

[ ] Flow sensor
[ ] Automatic Cleaning Module (adds an additional 3.74 lbs (1.7kg) of weight)
[ ] Bubble trap
[ ] Turbidimeter maintenance kit
[ ] Glass calibration/verification rod
[ ] StablCal® Sealed Vial Calibration Standards

****
Flow sensor offers real-time information about sample flow into the sensor. Automatic cleaning module reduces operational risk by automating instrument cleaning process.
****

PART 3 EXECUTION

3.1 Preparation

1. Mounting
   a. As shown on the drawings
2. Inlet and outlet connection sizes
   a. As shown on the drawings

3.2 Installation

A. Install turbidimeter following transmittal drawings and instrument user manual.

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