

Mechanical – Purchase Specs

23 05 19.21 Central Cooling Water Meter – Purchase Spec

PART 1 – GENERAL

1.01 DESCRIPTION

A. Purpose

1. This section covers central cooling water meters for use in the Owner's central cooling water systems.

1.02 QUALIFICATIONS

A. Approved manufacturers

1. BTU Meter
 - a. Onicon Incorporated – System-10 BTU Meter
 - b. Central Station Steam Co – Cadillac Heatx-2 BTU Meter
 - c. Spire Metering Technology – SpireMag T-Mag BTU Meter
2. Central Cooling Water Flow Tube Meter – New Construction
 - a. Onicon Incorporated – F-3100 Series
 - b. Central Station Steam Co – Cadillac CMAG
 - c. Spire Meter technology – MAG888
3. Central Cooling Water Insertion Meter – Retrofit Existing Meters
 - a. Onicon Incorporated – F-3500 Series
 - b. Central Station Steam Co – Cadillac CMAG
 - c. Spire Metering Technology – SpireMag T-Mag Insertion Sensor

1.03 RELATED SECTIONS

- A. 01 91 00 – General Commission Requirements
- B. 23 08 00.11 – Mechanical Meter Integration and Commission
- C. 26 09 13.11 – Data Collection Controller

1.04 REFERENCES

- A. Applicable codes, standards, and references codes, regulations and standards
 1. NEMA 4X/6P (IP66/IP67)
 2. State and local codes and ordinances

1.05 COORDINATION

- A. Coordinate Operations and Maintenance training times with the Owner.
- B. Coordinate the quantity and location of Facility Network (Facnet) Ethernet ports with Campus Engineering & Operations and UWIT. Contractor shall provide a completed "Mechanical Meter Profile Report" form per Specification 23 08 00.11 Appendix A for each meter.

1.06 SUBMITTALS

- A. General
 - 1. Submittals shall be in accordance with Conditions of the Contract and Division 01 Specification Sections.
 - 2. Submit detailed maintenance manuals and drawings, which include catalog information indicating the complete electrical and mechanical characteristics.
 - 3. Submit dimensioned cross-sectional drawings (manufacturer's data sheets are acceptable).
 - 4. Submit finished meter tests – Manufacturer's Certified Test Reports showing accuracy tests

1.07 OPERATIONS AND MAINTENANCE (O&M) MANUALS

- A. Operations and Maintenance Manuals shall be in accordance with Conditions of the Contract and Division 01 Specification Sections.
- B. Operations and Maintenance Manuals shall include catalog information indicating complete electrical and mechanical characteristics.
- C. Manufacturer's Certified Test Reports
- D. Manufacturer's drawings of meter wiring diagram.

1.08 MEETINGS

- A. Pre-installation conference
 - 1. The Contractor shall request a pre-installation conference with the UW Engineering Services for central cooling water projects
- B. Attend meetings with the Owner and/or Owner's Representative as required to resolve any installation or functional problems.

PART 2 - PRODUCTS

2.01 GENERAL

- A. These central cooling water meter specifications are in accord with the Owner's policy to construct permanent installations with long life, coupled with maximum reliability and safety.

2.02 BTU METER

- A. The following shall apply to the BTU meters installed on the UW Campus:
1. BTU meter shall be provided with two temperature sensors.
 - a. Temperature sensors shall have a differential temperature accuracy of +/- 0.15 degree F over the calibrated range
 2. BTU meter shall have the following accuracy:
 - a. +/- 1.0% of reading from 2 to 20 ft/sec
 - b. +/- 0.02 ft/sec below 2 ft/sec
 3. BTU meter shall be capable of receiving a 0-15V pulse input from a flow meter.
 4. BTU meter shall accommodate fluid temperature range
 - a. 32°F to 200°F Standard
 - b. 120°F to 300°F Optional
 5. BTU meter shall have digital display and totalization for local monitoring. Local display shall include supply temperature, return temperature, gallons per minute (GPM), btu/hr, gallons and btu (dual mode).
 6. BTU meter shall have an isolated solid state dry contact for energy totalization.
 7. Meter electronics shall be housed in a NEMA 4X enclosure.
 8. Meter shall be suitable ambient temperatures of -20 to 140° F.
 9. Meter shall be provided with memory retention of program parameters in the event of a power loss.
 10. BTU meter shall accommodate a 120V AC source.
 11. BTU meter shall have a RJ45 port with BACNet IP communication protocol.
 12. BTU meter shall have 2 4-20mA analog inputs available.

2.03 CENTRAL COOLING WATER FLOW TUBE METER

- A. The following shall apply to central cooling water in-line magnetic flow meters installed on the UW Campus
1. In-line magnetic flow meter shall use electromagnetic sensing method.
 2. Meter shall have a flow range of 0.10 ft/sec to 33 ft/sec.
 3. Meter shall have a reading accuracy as follows:
 - a. +/- 0.4% for velocities between 3.3 ft/sec and 33 ft/sec
 - b. +/- 0.75% for velocities between 1 ft/sec and 3.3 ft/sec
 4. Meter shall have empty pipe detection
 5. Meter shall measure fluids with conductivity greater than or equal to 5.0 uS/cm
 6. Meter shall have an option for bidirectional flow
 7. Meter shall have a stainless steel internal flow tube.
 8. Meter body shall be constructed of stainless steel.
 9. Meter shall be capable of ANSI Class 150 flange connections, with the option of ANSI Class 300 flange connections

10. Meter shall be provided with ground rings for each side
11. Meter shall have a maximum operating pressure of 230-580 psi depending flange rating
12. Meter shall be suitable for installations on pipes from 1" to 48"
13. Meter shall accommodate fluid temperature range
 - a. 32°F to 200°F Standard
 - b. 120°F to 300°F Optional
14. Meter electronics shall be housed in a NEMA 4X enclosure.
15. Meter shall be suitable for ambient temperatures of 0 to 140° F.
16. Meter shall have a local digital display that indicates total flow, flow rate, flow direction and alarm conditions
17. Meter shall have non-volatile memory for retention of program parameters and totalized values.
18. Meter shall be equipped with a 4-20 mA analog output for flow rate
19. Meter shall have a programmable digital/pulse outputs.
20. Meter shall accommodate 120V AC power source.

2.04 CENTRAL COOLING WATER INSERTION FLOW METER

- A. The following shall apply to central cooling water insertion flow meters installed on the UW Campus
 1. Insertion flow meter shall use electromagnetic sensing method.
 2. Meter shall have a flow range of 0.10 ft/sec to 20 ft/sec
 3. Meter shall have a reading accuracy as follows:
 - a. +/- 1% for velocities between 2 to 20 ft/sec
 - b. +/- 0.02 ft/sec for velocities below 2 ft/sec
 4. Meter shall have a conductivity range of 20 to 60,000 uS/cm
 5. Meter shall have turndown that exceeds 80:1
 6. Meter shall be capable of being installed in the upper 240 degrees of a horizontal pipe
 7. Meter shall accommodate pipes sizes from 3" to 72"
 8. Meter shall have a pressure drop of less than 0.1 psi at a velocity of 12 ft/sec in pipes 3" and larger.
 9. Meter shall have an operating pressure of 400 psi
 10. Meter shall be able to accommodate liquid temperatures from 32 to 200° F
 11. Meter shall be suitable for ambient temperatures of -20 to 140° F.
 12. Meter shall have 0-15V pulse output
 13. Meter shall be equipped with a 4-20 mA analog output for flow rate
 14. Meter shall be equipped with an isolated solid dry contact for energy totalization
 15. Meter electronics shall be housed in a NEMA 4X housing
 16. Meter shall accommodate 120V AC power source.

PART 3 - EXECUTION

3.01 REQUIREMENTS

A. Application

1. Central Cooling Water meter system shall be provided and installed on the main CCW pipe services to each building.

B. General installation

1. Identification

- a. Reference section 23 05 53 Identification of Mechanical Piping and Equipment

2. Installation

- a. Only personnel qualified and experienced in this type of work shall make connections.
 - b. The installation of meters shall be done with care to avoid damage.
 - i. Meters showing damage after installation shall be replaced.
 - ii. Meters shall have adequate clearance to service, repairs, and replacement.
 - iii. Data collection cabinets hung improperly shall be properly secured and all paint scratches shall be touched up.
 - c. Provide adequate pipe diameters upstream and downstream of installed meter. See Manufacturer's recommendations.
 - d. Each BTU meter shall have dedicated CAT5E communication cable installed to connect the meter to the facility network (Facnet). Install communication cable in rigid conduit.
 - e. Meters shall be installed such that the display can be easily read. A shield shall be supplied if display is in direct sunlight.
 - f. Provide shutoff valves and a bypass connection as necessary to allow for continuous service during periods of meter maintenance.
 - g. Provide weldolet and ½" NPT brass thermos wells (for less than 6" pipe) or ½" NPT stainless steel thermos wells (for pipe 6" or larger) for installation of insertion flow meter.
 - h. Provide Pete's Plugs adjacent to each temperature sensors to provide owner a test point for the temperature sensors.
 - i. Provide appropriate installation kit based upon pipe material.
 - j. Provide adequate slack in flexible communication conduit to allow for the removal of the flow meter.
3. UW's Power Plant Department will check the Contractor's work to ensure the accuracy of the installation.
 - a. The Contractor shall arrange with the Owner for the times when their services will be required, and under no circumstances shall the Contractor connect to the existing system without Owner's knowledge.

- b. The proper connection of the wires and cables to other systems as specified is entirely the responsibility of the Contractor.
 - c. In the event the connections cannot be made as specified, the Contractor shall make the necessary corrections at his own expense.
 4. Install meters per manufacturer's recommendations.
 5. Meter shall be UL Listed from manufacture or shall be field listed.
- C. Mounting and electrical connections
 1. In accordance with manufacturer's installation instructions.
 2. Install a dedicated 120V circuit from the power source to the BTU meter to provide power to the meters and temperature sensors. Install 120V circuit in rigid conduit.
 3. Install 24V circuits from the BTU meter to each flow meter and temperature sensor.
 4. 24V circuit shall be THWN or XHHW insulation and installed in a rigid conduit to a junction box located next to the meter. A flexible conduit shall be connected from the junction box to the meter with enough slack to allow for removal of the meter.
- D. Testing
 1. Contractor to verify meter is reading accurately.
- E. Integration and Commissioning
 1. See section 23 08 00.11 - Mechanical Meter Integration and Commissioning