

System-40 – Master Specification

2.1 THERMAL-ENERGY METERS

A. Integral, Direct Beam, Wetted – Ultrasonic, Thermal-Energy (Btu) Meters:

1. Basis of Design: **ONICON System 40 BTU Meter**. Manufacturers approved to bid subject to compliance with requirements include:
 - a. List additional manufacturers pre-approved to bid here
2. Description: Complete Thermal Energy (BTU) Measurement System with integral direct beam wetted ultrasonic flow sensor, matched temperature sensors, integral transmitter with remote mounting feature, operator interface with visual display, analog, pulse or serial communications capability or a combination as required by application and a wet calibration certificate – traceable to a recognized international standard.
3. Application: This contractor shall be responsible for selecting the energy meter options submitted based on the application. Energy metering system shall be constructed and calibrated for the intended application in terms of pipe size, pipe material, installation requirements, expected flow rate, ambient conditions and fluid characteristics which include but are not limited to pressure, temperature and viscosity.
4. Flow Sensing Technology: Direct Beam, Wetted, Transit Time Ultrasonic flow meter with matched transducers, dropped forged corrosion resistant metal body and IP 65 rated transmitter enclosure. Meter shall be designed for direct installation into the piping system.
5. Maximum Pressure Rating: 400 psig.
6. Maximum Temperature Range: 32 to 250 deg F.
7. Temperature Sensors: Insertion-type matched pair of 1000 OHM RTD sensors. Temperature sensors shall be certified and matched to an uncertainty of less than 0.18 deg. F. over the operating range.
8. BTU Calculator: Solid-state, integrating-type meter with non-volatile EEPROM solid state memory for totalized data and programming memory, designed for direct pipe mounting.

9. Data Output: Output signals shall be either serial network protocol, via pulse, analog output or combination. Pulse output for totalization of energy, British thermal units (BTU) typical. Optional serial communications output shall be native to the BTU meter, BACnet meters shall be BTL certified, secondary communication gateways shall not be permitted. Information provided via the serial communication network shall include: Energy rate, Energy Total, Flow Rate, Flow Total, both Supply and Return temperatures, and trend including peak values. Serial communication meters shall be able to provide up to three additional auxiliary pulses configured as inputs or outputs.
10. Calibration: Each thermal energy (Btu) metering system shall be factory programmed for the specific application and each metering system, including temperature sensors and flow meter, shall receive a certificate of calibration, directly traceable to NIST
11. Calculation Accuracy: Shall be less than or equal to 0.09% of energy rate reading at 30 deg. F.
12. Integral Display and Operator Interface: Provide an operator interface consisting of three push-buttons. Display shall visually indicate total fluid volume in gallons, instantaneous flow rate, supply temperature, return temperature, thermal energy flow rate and thermal-energy flow total in kilowatts per hour or British thermal units (BTU).
13. Strainer: Full size of main line piping shall be provided upstream of flowmeter.
14. Operating Instructions: Include complete instructions with each thermal-energy metering system.
15. Warranty: Each meter shall be covered by the manufacturer's three-year warranty.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install thermowells a minimum of 1/3 the pipe diameter into the flow stream.
- B. Install thermowells with extensions on insulated piping as required.
- C. Fill thermowells with heat-transfer medium.
- D. Install energy and flow indicators in piping systems in accessible positions for easy viewing.

- E. Install flow measurement elements in accessible positions in piping systems based on manufacturer's recommendations regarding orientation and straight run requirements.
- F. Install flowmeter elements with the minimum straight lengths of pipe, upstream and downstream from element, required to produce the published flowmeter accuracy according to manufacturer's written instructions.
- G. Mount thermal-energy meters on wall in accessible location.

3.2 CONNECTIONS

- A. Install meters adjacent to machines and equipment allowing service and maintenance of meters.
- B. This contractor shall be responsible for connecting flowmeter transmitters to flow metering elements.

3.3 COMMISSIONING

- A. After installation, commission all meters according to manufacturer's written instructions.

3.4 INTEGRAL THERMAL-ENERGY METER (BTU) SCHEDULE

- A. The following applications shall be provided with thermal energy (BTU) metering systems where shown on the drawings:
 - 1. Chilled Water Systems
 - 2. Heating Hot Water Systems
 - 3. Domestic Hot Water Heating Systems
 - 4. Condenser Water (Heat Loop) Systems
 - 5. Thermal Energy Storage Systems



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