PART 1 - GENERAL

1.01 REFERENCE STANDARDS

A. ASME B40.100 - Pressure Gauges and Gauge Attachments 2013.


E. AWWA C700 - Cold-Water Meters -- Displacement Type, Metal Alloy Main Case 2015.


1.02 SUBMITTALS

A. Product Data: Provide list that indicates use, operating range, total range and location for manufactured components.

1.03 GENERAL INFORMATION AND DESIGN GUIDELINES


B. Intent: Metering to meet the performance-based LEED NC/EB Energy & Atmosphere Credit – Building-level energy metering standards for ongoing accountability and optimization of building energy and water consumption performance over time.

C. Refer to and coordinate with Section 25 00 00 – Integrated Automation.
D. Metering Equipment: Allow Campus the ability to identify problems and achieve improved system performance. Select meters for future connection to a remote-read automated metering network.

E. BTU meter shall be installed at each building and for each system (DHW and HHW). Controlotron, EMCO ST30 Ultrasonic, or approved equal.

F. Flow Meters:
   1. Function: Non-invasive flow measurement with a transmitter with 2-line backlit display with 4-button keypad. Connect to Campus Energy Management System (EMS) by Siemens.
   2. Execution: Locate on straight run of pipe with no flow interruptions such as valves or direction change. Installed location shall typically have straight uninterrupted pipe for 10 diameters upstream and 5 diameters downstream. Consult manufacturer’s installation instructions for specific installation requirements and other piping configurations.

G. Keys for Cabinets and Padlocks:
   1. Cabinets and Equipment: Provide 2 keys per panel. Coordinate with Section 08 06 05 – Key Schedule.
   2. Padlocks: Coordinate with Section 08 06 05 – Key Schedule.
   3. Closeout Submittal: Provide panel keys separated and labeled. Provide location, room number, quantity, manufacturer name and model numbers of keys, and coordinate closeout submittal with Section 08 06 05 – Key Schedule.

PART 2 - PRODUCTS

2.01 POSITIVE DISPLACEMENT METERS (LIQUID)

A. AWWA C700, positive displacement disc type suitable for fluid with metal alloy main case and cast-iron frost-proof, breakaway bottom cap, hermetically sealed register, remote reading.

B. Meter: Brass body turbine meter with magnetic drive register.
   1. Service: Cold water, 122 degrees F (50 degrees C).
2. Service: Hot water, 200 degrees F (93 degrees C).
3. Accuracy: 1-1/2 percent.

2.02 HEAT CONSUMPTION METERS

A. Meter: Brass body turbine meter with magnetic drive register, platinum temperature sensors.
   1. Maximum Service Temperature: 200 degrees F (93 degrees C).
   2. Accuracy: 1-1/2 percent.

2.03 LIQUID FLOW METERS

A. Calibrated ASME MFC-3M Venturi orifice plate and flanges with valved taps, chart for conversion of differential pressure readings to flow rate, with pressure gauge in case.

B. Annular element flow stations with meter set.
   1. Measuring Station: Type 316 stainless steel pitot type flow element inserted through welded threaded couplet, with safety shut-off valves and quick coupling connections, and permanent metal tag indicating design flow rate, reading for design flow rate, metered fluid, line size, station or location number.
      a. Pressure rating: 275 psi (1896 kPa).
      b. Maximum temperature: 400 degrees F (204 degrees C).
      c. Accuracy: Plus 0.55 percent to minus 2.30 percent.

2.04 PRESSURE GAUGES

A. Pressure Gauges: ASME B40.100, UL 393 drawn steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background.
   1. Mid-Scale Accuracy: One percent.
   2. Scale: Psi and KPa.

2.05 PRESSURE GAUGE TAPPINGS

A. Gauge Cock: Tee or lever handle, brass for maximum 150 psi (1034 kPa).

B. Needle Valve: Brass, 1/4 inch (6 mm) NPT for minimum 150 psi (1034 kPa).
C. Pulsation Damper: Pressure snubber, brass with 1/4 inch (6 mm) connections.

D. Syphon: Steel, Schedule 40, 1/4 inch (6 mm) angle or straight pattern.

2.06 STEM TYPE THERMOMETERS

A. Thermometers - Fixed Mounting: Red- or blue-appearing non-toxic liquid in glass; ASTM E1; lens front tube, cast aluminum case with enamel finish.
   1. Accuracy: 2 percent, per ASTM E77.
   2. Calibration: Degrees F.

B. Thermometers - Adjustable Angle: Red- or blue-appearing non-toxic liquid in glass; ASTM E1; lens front tube, cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device; adjustable 360 degrees in horizontal plane, 180 degrees in vertical plane.
   1. Accuracy: 2 percent, per ASTM E77.
   2. Calibration: Degrees F.

2.07 DIAL THERMOMETERS

A. Thermometers - Fixed Mounting: Dial type bimetallic actuated; ASTM E1; stainless steel case, silicone fluid damping, white with black markings and black pointer, hermetically sealed lens, stainless steel stem.
   4. Accuracy: 1 percent.
   5. Calibration: Degrees F.

B. Thermometer: ASTM E1, stainless steel case, adjustable angle with front recalibration, bimetallic helix actuated with silicone fluid damping, white with black markings and black pointer hermetically sealed lens, stainless steel stem.
   6. Accuracy: 1 percent.
   7. Calibration: Degrees F.

2.08 STATIC PRESSURE GAUGES

A. 3-1/2 inch (90 mm) diameter dial in metal case, diaphragm actuated, black figures on white background, front recalibration adjustment, 2 percent of full scale accuracy.
PART 3 - EXECUTION

3.01 INSTALLATION

A. Install positive displacement meters with isolating valves on inlet and outlet to AWWA M6. Provide full line size valved bypass with globe valve for liquid service meters.

B. Provide instruments with scale ranges selected according to service with largest appropriate scale.

END OF SECTION  23 05 19