SECTION 230510 – BUILDING SERVICE ENERGY METERS – CHILLED WATER & STEAM

1.0 All buildings on the University campus shall have chilled water and/or steam meters installed on the incoming building service if they are served by the campus chilled water system and/or the local steam utility.

2.0 Chilled Water:

A. Chilled water energy meters shall be installed on the primary chilled water supply or return piping after the isolation valves from the primary chilled water system. Each flow meter shall be accompanied by a temperature transmitter in both the primary chilled water supply and return piping.


C. Alternate (only with approval of University Engineering Department): Veris Accelabar/Armstrong, with Emerson or Foxboro DP transmitter, with Anderson Greenwood manifold isolation and RTD below.

D. Temperature Transmitter (to be installed on supply and return piping) shall be Minco Instruments
   1. Element – Tip Sensitive 100 ohm RTD TCR 0.00385.
   2. Provide Spring loaded Holder.
   3. Thermowell; ¾ or ½ inch, 316 SS Model TW 222 or 1218 U (sized to enter ½ the installed pipe diameter; add extension nipples to extend beyond insulation.) Thermowell shall be filled at least 1/3 full with heat conducting grease as manufactured by Dow Chemical.

3.0 Steam:

A. Steam energy meters shall be installed on the primary high pressure side of the incoming service, prior to the PRV station. Steam is considered to be slightly superheated, so energy metering must compensate for temperature and pressure. Steam meters shall have a flanged connection at both the meter and outside the reducers before transitioning to meter line size. Each flow meter shall be accompanied by a temperature transmitter and pressure transmitter installed downstream. Pressure transmitter shall be mounted vertically above the pipe penetration and have an isolation valve followed by a pigtail, a second isolation valve, and a port for calibration.


C. Alternate (only with approval of University Engineering Department): Veris Accelabar, with Emerson or Foxboro DP transmitter, with external pressure transmitter and RTD below.

D. Temperature Transmitter shall be Minco Instruments
   1. Element – Tip Sensitive 100 ohm RTD TCR 0.00385.
   2. Provide Spring loaded Holder.
   3. Thermowell; ¾ or ½ inch tapered, 316 SS Model TW 1218 or 1218 U (sized to enter ½ the installed pipe diameter; add extension nipples to extend beyond
insulation.) Thermowell shall be filled at least 1/3 full with heat conducting grease as manufactured by Dow Chemical.

5. Pressure Transmitter – Yokogawa EJA530 with Hart Protocol

4.0 General Notes for All Meters:

A. Provide a full size bypass around each meter.

B. The flow meter, temperature transmitters, (and pressure transmitters for steam meters) shall be connected to a Kessler Ellis Products (KEP) Flow Computer. The KEP shall be located within 20° 0” of the meter and installed at 5° 6” above the floor on a column, wall, or constructed support stand only. A double gang box with ¾” conduit to an accessible ceiling will be required within 4’ 0” of each meter for Penn Net to provide an Ethernet connection. The KEP shall be connected to the Penn Net Ethernet connection via Ethernet cable. Additionally, a single duplex 110V power outlet shall be provided either within the cabinet housing the KEP, or externally to provide power for systems technicians for future service work.

C. Flow Computer: KEP ES 749. Provide for each meter.

1. Adam 4572 Ethernet to Modbus Gateway.
2. SUPERtrol II RS 485 option with Modbus protocol.
3. 24V DC Power Supply Pulse 30 watt, model ML30.100 din rail mount, or equal with 110V input.
4. KEP Model MS799 NEMA 4X enclosure.
5. Duplex electrical outlet mounted flush to edge of enclosure.

D. Meters shall be designed based on the annual range of flows to be experienced. If necessary, multiple meters shall be installed to measure flow during low load/flow conditions that are outside the turndown of the meter needed for full flow.

E. The location of the meters shall be in accordance with the manufacturer’s requirements for upstream and downstream straight lengths of piping.

F. Install meters in accessible locations for servicing and replacement. Use flanges, valves, and piping bypasses and spool pieces to permit removal of the meters without interrupting service.

G. Provide calibration proof and forms to NIST standards as part of submittal process.

H. Insulate in line meters with removable covers.

I. Provide dedicated 120V power supply from a local source and 24V DC power supplies as needed to support the meters.

J. Engage University approved Integrator to provide graphics and communications to the University’s OCC SCADA system and Energy Management System. At a minimum the following information will have the capability to be logged and trended in 15 minute increments through the SCADA system:

1. Chilled Water:
   a Instantaneous Flow (GPM)
   b Cumulative Chilled Water Use (Gallons)
<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>c</td>
<td>Instantaneous Energy Flow (BTU/hr, Ton hrs)</td>
</tr>
<tr>
<td>d</td>
<td>Cumulative Energy Use (mmBTU’s, Ton days)</td>
</tr>
<tr>
<td>e</td>
<td>Supply Water Temperature</td>
</tr>
<tr>
<td>f</td>
<td>Return Water Temperature</td>
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<tr>
<td>g</td>
<td>Differential Temperature</td>
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2. Steam:

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
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<tbody>
<tr>
<td>a</td>
<td>Steam Supply (lbs)</td>
</tr>
<tr>
<td>b</td>
<td>Instantaneous Mass Flow Rate (lbs/hr)</td>
</tr>
<tr>
<td>c</td>
<td>Totalized Mass Consumption (lbs)</td>
</tr>
<tr>
<td>d</td>
<td>Steam pressure and temperature compensation</td>
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