

DIVISION 15 - MECHANICAL

Section 15980 - UTILITY METERS

Introduction

Meters are required on chilled water, water (load) side of steam to water heat exchangers, and domestic water.

Part 1 - General

- Design, specify, furnish, install, and commission all utility meters required and owned by the University.
- Utility meters shall be designed and specified by the project Design Professional. Project contractor shall furnish and install all utility meters. Utility meter commissioning shall be a joint effort between the project contractor and the Design Professional and The University of Arizona. The University will not accept any utility meter until it has been shown to be fully functioning and operational.
- Design shall include selecting, scheduling, and specifying each utility meter as would be done for any piece of specialized equipment.
- Review the proposed metering scope with PDC Mechanical Engineer early in the project to confirm the campus wide requirements are being fulfilled. Projects that interface with existing building systems may require a different configuration.
- Flow Meters shall be selected to handle the flow range they will encounter at present design conditions.
- Meters shall be connected to the University's campus data collection system via a Niagara^{AX} JACE furnished with a BACnet server license.
- All meters shall be capable of fully monitoring the building energy and water usage.
 - The meter shall be selected with BACnet/IP or Modbus TCP output, or Modbus RTU.
 - All meters, transducers and RTD's will be non-intrusive.
 - Project control drawings and specifications shall include all the information, including, but not necessarily limited to, points, termination, and programming necessary to provide complete building energy use reporting on the University's EMCS in addition to the building EMCS (refer to section 15970).
 - Metering submittal shall include information specific to the product(s) being proposed. At minimum, the following product information shall be provided for any utility meter product:
 - Product technical specifications (data sheet or cut sheet)
 - Installation/wiring/configuration manual
 - Technical or programming manual/guide
 - Owner's manual or maintenance guide
 - Modbus technical information (including register map & data encoding)
 - Troubleshooting guide
 - IT hardening guide
 - University of Arizona shall assist in reviewing the project contractor's utility metering submittal.
 - Project drawings and specifications shall include the following utility meter information as a minimum:
 - Domestic Water, Chilled Water, and Heating system, Meters:
 - Type of service (i.e., chilled water, Heating, or domestic water).

- Size of meter, manufacturer, type, model number.
- Location of meter, sensors, and remote readouts.
- Meter shall be located, including dimensions of installation if a specific location is necessary for proper operation.
- Meter or meter remote readouts shall be readily accessible and at a level (5'6") that can be read without using a ladder.
- Complete network topology diagram detailing serial and IP network configuration including:
 - IP configuration information for IP devices
 - Modbus TCP
 - BACnet/IP
 - LonWorks/LonTalk over IP
 - Modbus RTU network configuration information for serial networks and Modbus devices (where applicable)
 - BACnet MS/TP network configuration information for serial networks and BACnet devices (where applicable)
 - LonWorks/LonTalk network configuration information for serial networks and Modbus devices (where applicable)
- Accuracy and Repeatability to meet federal guidelines for billable meter requirement.
- Domestic Water, Chilled Water, and Heating Water Meters:
 - Range: maximum flow, minimum flow, and normal flow expected at present design conditions.
 - Installation details: details shall be complete and include all necessary information, including, but not limited to, length of straight pipe required upstream and downstream, distance required from valves or fittings, any required concentric reducers and location of temperature and pressure sensors.
- Chilled Water and Heating water Meters:
 - All items necessary to allow the chilled water flow sensors to function as energy meters shall be specified and shown on the drawings and included in installation details.
 - Output of energy meter shall be in BTU's and totalized in MBTU's.
 - These additional items shall include, but are not limited to, temperature sensors, BTU totalizing computer, connection requirements to the campus SCADA C3 system at the Modbus gateway with a BACnet or Lon connection from the University EMCS system, programming requirements and software.
 - Delta-temperature transmitters shall be platinum 1000 OHM RTD, Where 1000 ohms equals 32°F.
 - Delta-temperature sensors shall be matched pairs of calibrated sensors with an accuracy of 0.12° F.
 - Flow transducers shall be selected for the expected flow range encountered at present design conditions, pipe size and material. Particular attention shall be made to low flow conditions; specified accuracy shall be maintained under low flow conditions.
 - For all installations an energy totalizing computer will be required.

Part 2 - Products (UTILITY METER REQUIREMENTS) – Discuss With UA Planning Design & Construction

- Domestic Water Meter:
 - Shall be clamp-on ultrasonic flow meter, Metron flow meter with 1180 series BUM, Siemens SITRANS FUS1010, or approved equal.
 - Meters shall read in gallons and totalized in KGAL.
 - Water meters shall have a local readout as well as Modbus output to report to the Campus SCADA C3 system and thru a BACnet or Lon connection from the Modbus Gateway to the University's EMCS system.
- Chilled Water and Heating water flow sensor:

- Shall be clamp-on ultrasonic energy meter, Metron flow meter with 1180 series BUM, Siemens SITRANS FUE1010, or approved equal.
- Where an energy totalizing computer is required, it will use the Modbus protocol for output. Modbus TCP is preferred, while Modbus RTU is acceptable.
- Flow transducers shall be combined with supply and return temperature sensors.
- Transducers and temperature RTD's will be factory calibrated matched sets.
- Meters shall be capable of local or remote reading within the building close to the meter location.
- Provide a Modbus TCP output or Modbus RTU output to the Campus SCADA C3 system Modbus gateway; from the Modbus gateway provide a BACnet or Lon connection to the University's EMCS.

Part 3 – Execution

- Include energy meter data on the graphic screen as part of the building EMCS in addition to the connection to the university's campus wide utility metering system (SCADA).
- Provide heating meters on the load side of all systems that use steam to water heat exchangers.
- The supply of any utility to a building shall not be activated until the specified metering is in place, functional, and has been commissioned.
- During the final phase of the project and before final close out, project contractor shall be required to prove that all utility meters are installed properly and function as designed and specified. The utility meter commissioning shall be accomplished by the contractor in conjunction with the project consulting engineers and The University of Arizona. Proper functionality includes:
 - Proper installation of the meter and associated appurtenances according to manufacturer's installation recommendations, University of Arizona specifications, and all applicable local codes and standards. Follow NEC and University of Arizona standards for electrical, sensor, and network cabling. [In general, U of A should require all cabling installed in mechanical/electrical/storage or unfinished space to be in conduit, and any cabling not in conduit to be in cable tray or properly supported to the structure – not supported on other conduit, piping, or infrastructure.]
 - Meter accuracy performing as-specified under all expected design flow conditions.
 - Local flow display installed as-specified, reading in the specified units.
 - Modbus interface communicating without error, providing 100% of requested data samples to client systems.
 - SCADA system receiving continuous data from the meter(s) in the specified units.
 - EMCS receiving continuous data from the meter(s) in the specified units.
 - Require calibration data, O & M manuals, details, etc., to be submitted prior to joint commissioning of the meter(s) with the Design Professional and the University.

End of Section 15980