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CHAPTER 1—UTILITY METERING SPECIFICATIONS

Section 1.1 Location of Meters

1.1.1 The Engineer shall provide manufacturers required service and maintenance access space for building energy meters and associated devices at locations approved by KSU Energy Program.

1.1.2 Building energy meters shall be installed on interior of building (i.e. Mechanical Room), near utility-service entrance. In the case of Utility Company provided meter installation, where meters are utilized for billing purposes, the meters shall be installed exterior to the building or per utility company requirements, with pathway as required for communication wiring to enter mechanical room.

Section 1.2 Electric Meters

1.2.1 Action Submittals

1.2.1.1 Wiring Diagrams: For power signal and control wiring, identify terminals, wiring descriptions and color-codes to facilitate installation, operation, and maintenance. Indicate recommended types, wire sizes, and circuiting arrangements for field-installed wiring, and show circuit protection features.

1.2.2 Quality Assurance

1.2.2.1 Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.2.3 Products

1.2.3.1 Kilowatt-hour/Demand Meter: Electronic three-phase meters, measuring electricity use and demand. Demand shall be integrated over a 15-minute interval.

1.2.3.1.1 Voltage and Phase Configuration: Meter shall be designed for use on both 3-phase 3-wire delta and 3-phase 4-wire wye circuits with voltage rating and phase configuration indicated for its application.

1.2.3.1.2 Display: 4-line by 20-character backlit LCD, indicating accumulative kilowatt-hours, current time and date, current demand, and time and date of historic peak demand.

1.2.3.1.3 Memory: Shall retain 2 channels of accumulated kilowatt-hour and historic peak demand in a nonvolatile memory, until reset. 36 days of accumulated data shall be stored in 15 intervals.

1.2.3.1.4 Meter shall have a 3rd channel for an external pulse input for use in totalization of other utility usage (water, gas, etc.).

1.2.3.2 General Requirements for Owner’s Meters

1.2.3.2.1 Enclosure: Industrial Grade JIC, with hasp for padlocking or sealing. Option for weatherproof enclosure.
1.2.3.2.2 Sensors: Current-sensing type, with voltage output 0-2V, selected for optimum range and accuracy for meters indicated for this application. Sensors shall allow for remote mounting up to 500 feet from meter without loss of power.

1.2.3.2.2.1 Type: Split Core

1.2.3.2.3 Building Automation System (BAS) Interface: Match signal to Honeywell input and arrange to convey the instantaneous, integrated, demand and usage level measured by meter to provide data for processing and programmed analysis by designation system.

1.2.3.2.4 Relays/Alarms: Optional load control/alarm relay with high and low threshold adjustment.

1.2.3.2.5 Installation diagnostics and verification system.

1.2.3.2.6 Approvals: Shall be UL and CSA listed. Shall comply with ANSI C12.1 and C12.16.

1.2.3.3 Communications Options

1.2.3.3.1 Modbus RTU or TCP/IP

1.2.3.3.2 LONworks TP (twisted pair)

1.2.3.4 Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1.2.3.4.1 Square D

1.2.3.4.2 Emon Demon

1.2.3.4.3 Approved Equal, as determined by KSU Energy Dept.
Section 1.3  Flow Meters: Domestic Water Meters, Steam Meters, Natural Gas Meters

1.3.1  Action Submittals

1.3.1.1  General - Submit the following:

1.3.1.1.1  Product data for each type of meter. Include scale range, ratings, and calibrated performance curves, certified where indicated. Submit meter schedule showing manufacturer’s figure number, scale range, location, and accessories for each meter and gauge.

1.3.1.1.2  Product certificates signed by manufacturers of meters certifying accuracy under specified operating conditions and products’ compliance with specified requirements.

1.3.1.1.3  Include flow straighteners for instances or locations where pipe-diameter-clearance cannot be achieved for turbulence issues.

1.3.1.1.4  Maintenance data for each type of meter for inclusion in Operating and Maintenance Manuals for project.

1.3.2  Quality Assurance

1.3.2.1  Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
Section 1.4 Domestic Water Meters

1.4.1 Positive Displacement Flow Meter

1.4.1.1 Flow meter shall be non-magnetic, with forward curved impeller blades designed for water containing debris. Materials which will be wetted shall be made from non-corrosive materials and shall not contaminate water.

1.4.1.2 Equip each flow meter with a metal identification tag indicating the size, location, GPM and meter reading for the GPM specified.

1.4.1.3 Sensor accuracy shall be plus or minus 1.5% of reading over the full range of flow, minimum operating flow velocity shall be ~1 foot per second. Sensor repeatability and linearity shall be plus or minus 1%. Materials which will be wetted shall be made from non-corrosive materials and shall not contaminate water.

1.4.1.4 The flow meter shall be provided with particulate strainer, isolation valves and bypass line to be rated for installation in pipes of 3/4 to 10 inch diameters.

1.4.1.5 A pulse transmitter shall provide a pulse output that is scalable to gallons per pulse (not to exceed 10 Gallons per pulse) and clearly defined in supporting documentation. The pulse transmitter housing shall be NEMA 1, NEMA 3R or NEMA 4.

1.4.1.6 Manufacturers: Subject to compliance with requirements, provide products by one of the following, with registration in gallons:

1.4.1.6.1 Badger

1.4.1.6.2 Elster, AMCO

1.4.1.6.3 Neptune Water Meter Co.

1.4.1.6.4 Approved Equal, as determined by KSU Energy Dept.
Section 1.5  Saturated Steam Meters

1.5.1  Turbine Mass Flow Meter

1.5.1.1  Calibration: Factory programmed application specific

1.5.1.2  Accuracy: Plus or Minus 1 percent of reading for volumetric flow and plus or minus 2 percent for mass flow over the entire operating range.

1.5.1.3  Sensing Method: Turbine rotor with electromagnetic pick-up.

1.5.1.4  Operating Range: -40 degrees F to 140 degrees F ambient, -40 degrees F to 750 degrees F medium. Maximum 300 PSI operating pressure.

1.5.1.5  Material: 316L stainless steel body with epoxy painted aluminum or cast aluminum electronics enclosure.

1.5.1.6  Output Signal: 4 to 20 mA or 14 to 36 VDC for mass flow rate, scaled pulse output for total flow.

1.5.1.7  Display: 2 line alphanumeric LCD

1.5.1.8  Power: 14 to 36 MDC, 20 mA maximum

1.5.1.9  Pipe Connections: ANSI Class 150, 300, or 600 Flange as required by application.

1.5.1.10  Provide all components required to calculate mass flow.

1.5.1.11  Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   1.5.1.11.1  Spirax-Sarco: EMCO

   1.5.1.11.2  Onicon

   1.5.1.11.3  Approved Equal, as determined by KSU Energy Dept.

1.5.2  Vortex Shedding Mass Flow Meter

1.5.2.1  Calibration: Factory programmed application specific

1.5.2.2  Accuracy: Plus or Minus 1 percent of reading for volumetric flow and plus or minus 1.5 percent for mass flow over the entire operating range.

1.5.2.3  Sensing Method: Vortex shedding with integral piezoelectric sensors and integral 1000 ohm platinum RTD.

1.5.2.4  Operating Range: -40 degrees F to 140 degrees F ambient, -40 degrees F to 450 degrees F medium. Maximum 300 PSI operating pressure.

1.5.2.5  Material: 316L or 304 stainless steel body with epoxy painted aluminum or cast aluminum electronics enclosure.
1.5.2.6 Output Signal: 4 to 20 mA or 14 to 36 VDC for mass flow rate, scaled pulse output for total flow.

1.5.2.7 Display: 2 line alphanumeric LCD

1.5.2.8 Power: 14 to 36 MDC, 20 mA maximum

1.5.2.9 Pipe Connections: ANSI Class 150, 300, or 600 Flange as required by application.

1.5.2.10 Provide all components required to calculate mass flow.

1.5.2.11 Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1.5.2.11.1 Spirax-Sarco: EMCO

1.5.2.11.2 Onicon

1.5.2.11.3 Approved Equal, as determined by KSU Energy Dept.

Section 1.6 Saturated Steam Meters

1.6.1 Strain Gauge Mass Flow Meter

1.6.1.1 Calibration: Factory programmed application specific.

1.6.1.2 Accuracy: Plus or Minus 1 percent of reading for volumetric flow and plus or minus 1.5 percent for mass flow over the entire operating range.

1.6.1.3 Sensing Method: Strain Gauge

1.6.1.4 Operating Range: -40 degrees F to 140 degrees F ambient, -65 degrees F to 425 degrees medium. Maximum 300 PSI operating pressure.

1.6.1.5 Material: 316L or 304 stainless steel body with epoxy painted aluminum or cast aluminum electronics enclosure.

1.6.1.6 Output Signal: 4 to 20 mA or 14 to 36 VDC for mass flow rate, scaled pulse output for total flow.

1.6.1.7 Display: 2 line alphanumeric LCD

1.6.1.8 Power: 14 to 36 MDC, 20 mA maximum

1.6.1.9 Pipe Connections: ANSI Class 150, 300, or 600 Flange as required by application.

1.6.1.10 Provide all components required to calculate mass flow.
1.6.1.11 Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1.6.1.11.1 Aaliant

1.6.1.11.2 Approved Equal, as determined by KSU Energy Dept.

Section 1.7 Natural Gas Meters

1.7.1 Mass Flow Meter

1.7.1.1 Equip each flow meter with a metal identification tag indicating the size, and location.

1.7.1.2 Sensor accuracy shall be plus or minus 0.5% of full scale or plus or minus 1% or reading. Sensor repeatability shall be plus or minus 0.2%. Materials which will be wetted shall be made from non-corrosive materials.

1.7.1.3 The mass flow meter shall be provided with isolation valves and shall be rated for installation in pipes of 1/4 to 36 inch diameters.

1.7.1.4 The transmitter shall provide a 4 to 20 mA dc pulse output linearly proportional to flow. The pulse transmitter housing shall be NEMA 1, NEMA 3R, or NEMA 4.

1.7.1.5 Manufacturers: Subject to compliance with requirements, provide products by one of the following, with registration in MCF:

1.7.1.5.1 Sage

1.7.1.5.2 Kurz

1.7.1.5.3 Eldridge

1.7.1.5.4 Approved Equal, as determined by KSU Energy Dept.