33 19 00 – District Thermal Energy and Water Utility Metering

A. GENERAL

1. Duke FMD Utilities & Engineering Services operates district energy and water systems to provide power, heating, and cooling utilities to University & Health System campus facilities. The metering applications listed below and the resultant data are critical to the successful operation, maintenance, and sustainability goals of the campus, and as such, are critical to building design.

2. The district energy and water utility metering equipment listed in this guideline are the only devices currently approved by Duke University FMD for use in existing and new construction. Any variance in design, hardware, or equipment, other than those provided in this guideline must be approved by Duke University FMD.

3. For all applications, designers should take care not to oversize hardware based on extreme operating conditions or unneccesarily conservative load calculations; rather, selecting metering hardware that meets the normal minimum and maximum loads anticipated by the facility through a normal operating year. Under no circumstances will Duke FMD accept “line-sizing” as a justification for meter hardware selection.

4. Refer to the following Design & Construction Standard sections for reference, as needed:

    a. 22 05 09 - Meters and Gauges for Plumbing

    b. 23 61 00 – Chilled Water Systems

    c. A33 63 00 – Steam Energy Distribution

B. METER APPLICATIONS

1. District Chilled Water

    a. Design & Installation

        a. Main supply and return main chilled water piping connections should be provided with flow, pressure, and temperature transmitters for accurate utility metering.

        b. In certain applications, to be discussed with Duke FMD staff, district chilled water supplied to process equipment should be provided with flow, pressure, and temperature transmitters for submetering of loads.

        c. All energy calculations and conversion should be done in the building automation system software, derived from the below specified hardware for flow, pressure, and temperature measurement. No standalone “flow computer” hardware should be specified.

d. All flow meters and temperature sensors must be installed in locations that can be regularly accessed from floor level, without the aid of a ladder or lift.

b. Hardware

a. Flow: Siemens Sitrans Ultrasonic flow meter model # FST020 (supply & return), provided with transducer set appropriate to pipe size. Provide switch to isolate 120V power locally for meter replacement.

b. Temperature: Reotemp 100ohm RTD assembly, 30-90F range (supply & return)

c. Automated Isolation Valving: Bray Model S70, 4-20mA modulating w/analog position feedback (supply & return). Provide switch to isolate 120V power locally for actuator replacement.

d. Pressure: Setra C206, pressure sensor, 0-200psi range (supply & return)

e. All utility metering hardware should be installed in locations and orientations that allow personnel simple access to calibrate, maintain, and replace these devices.

c. Data Acquisition and BAS Integration

a. District Chilled Water meters and associated transmitter hardware are to be connected to the Siemens building automation system. Designers, contractors, and integrators should discuss data capture intervals, specific BAS programming coding requirements, and long-term data storage requirements with Duke FMD staff.

2. District Hot Water

a. Design & Installation

a. Main supply and return main chilled water piping connections should be provided with flow, pressure, and temperature transmitters for accurate utility metering.

b. In certain applications, to be discussed with Duke FMD staff, district hot water supplied to process equipment should be provided with flow, pressure, and temperature transmitters for submetering of loads.

c. All energy calculations and conversion should be done in the building automation system, derived from the below specified hardware for flow, pressure, and temperature measurement. No standalone “flow computer” hardware should be specified.

d. All flow meters and temperature sensors must be installed in locations that can be regularly accessed from floor level, without the aid of a ladder or lift.

b. Hardware

a. Flow: Siemens Sitrans Ultrasonic flow meter model # FST020 (supply & return), provided with transducer set appropriate to pipe size. Provide switch to isolate 120V power locally for meter replacement.

b. Temperature: Reotemp 100ohm RTD assembly, 30-90F range (supply & return)

c. Automated Isolation Valving: Bray Model S70, 4-20mA modulating w/analog position feedback (supply & return). Provide switch to isolate 120V power locally for actuator replacement.

d. Pressure: Setra C206, pressure sensor, 0-200psi range (supply & return)

e. All utility metering hardware should be installed in locations and orientations that allow personnel simple access to calibrate, maintain, and replace these devices.

c. Data Acquisition and BAS Integration

d. Data Acquisition and BAS Integration

a. District Hot Water meters and associated transmitter hardware are to be connected to the Siemens building automation system. Designers, contractors, and integrators should discuss data capture intervals, specific BAS programming coding requirements, and long-term data storage requirements with Duke FMD staff.

3. Domestic Water

a. Design & Installation

a. For water utility connections falling within the Duke University FMD-owned utility system, all domestic water metering equipment should be installed within building mechanical rooms, as close as possible to piping entrance, backflow preventers, and isolation valves.

b. For facilities connected to the Durham water utility, domestic water metering equipment should be installed per direction from the City of Durham Water Management Department. Typically, this will be an in-ground vault external to the building footprint.

c. Designers should provide metering equipment for the main water service entering the building, and design any irrigation systems such that irrigation water can be submetered from a single take-off point.

d. Domestic water connected to fire protection services is not typically metered.

e. All metering devices must be installed in locations that can be regularly accessed from floor level, without the aid of a ladder or lift.

b. Hardware

a. Duke University owned metering, installed inside building mechanical rooms

(1) For water connections carried with less than 2" nominal pipe size, use Neptune T-10 positive-displacement nutating disc type meter equipped with TRICON/S pulse-output transmitter register. Provide with analog dial face, measuring in units of cubic feet

(2) For water connections carried with 2" and greater nominal pipe size, use Neptune Tru/Flo compound/dual-register meter equipped with TRICON/S pulse output transmitters. Provide each register with analog dial face, measuring in units of cubic feet.

b. Duke University owned metering, installed outside connected to City of Durham water utility

(1) For water connections carried in 2" and less nominal pipe size, use Neptune T-10 positive-displacement nutating disc type meter, "pit-set" version equipped with R900 "ecoder" option for remote data collection. Provide with analog dial face, measuring in units of cubic feet, and remote antenna kit for mounting in the meter vault lid.

(2) For water connections carried in greater than 2" nominal pipe size, use Neptune Tru/Flo compound/dual-register meter equipped with R900 "eCoder" option for remote data collection. Provide each register with analog dial face, measuring in units of cubic feet, and remove antenna kit for mounting in the meter vault lid.

c. Data Acquisition & BAS Integration

a. Meters equipped with Neptune TRICON/S pulse-output transmitter(s) should be connected to the Siemens building automation system prior to energizing water services. Designers, contractors, and integrators should discuss data capture intervals, specific BAS programming coding requirements, and long-term data storage requirements with Duke FMD staff.

b. Meters equipped with Neptune R900 "eCoder" AMR transmitters should be integrated with FMD maintained Neptune software prior to energizing water services.

4. District Steam and Condensate

   a. Design & Installation

      a. Main district steam supply piping connections to campus buildings should be metered.

      b. In certain but atypical applications, to be discussed with Duke FMD staff, district steam utility should be metered

      c. In certain applications, to be discussed with Duke FMD staff, district steam supplied to process equipment should be provided with flow, pressure, and temperature transmitters for submetering of loads.

      d. All energy calculations and conversion should be done in the building automation system, derived from the below specified hardware for flow, pressure, and temperature measurement. No standalone “flow computer” hardware should be specified.

      e. All metering devices must be installed in locations that can be regularly accessed from floor level, without the aid of a ladder or lift.

   b. Hardware

      a. Piping 2” NPS and larger: Veris Accelabar differential pressure flow meter, single transmitter option

      b. For horizontal installation arrangements, provide with integral transmitter port valves and direct mount transmitter

      c. For vertical (upward flow) installation arrangements, provide with integral port valves and remote mount transmitter kit

      d. For all material and installation requirements for steam systems, refer to sections **33 61 00 Steam Energy Distribution Metering,** and **40 10 00 Building Steam and Condensate Systems**

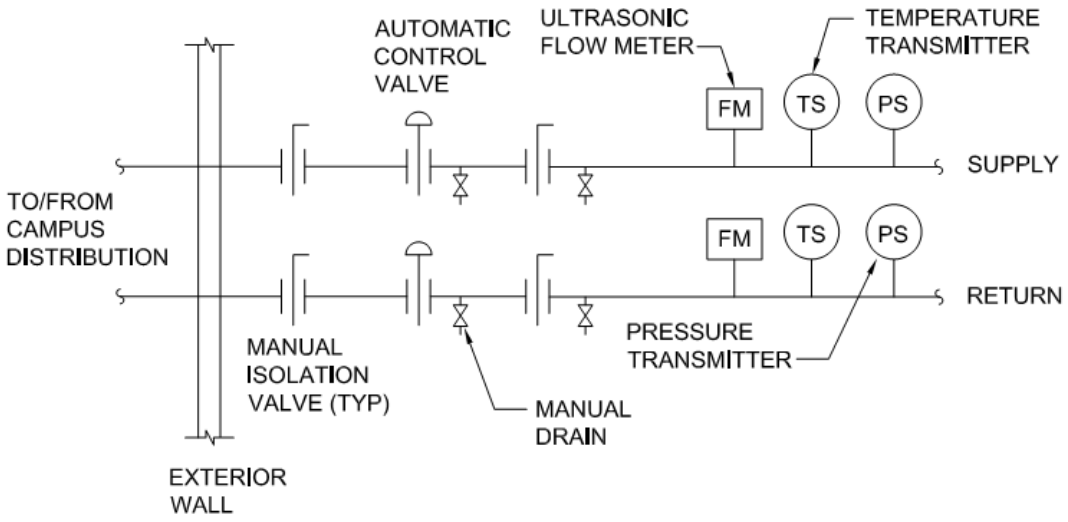
   c. Data Acquisition and BAS Integration

      a. District steam meters and associated transmitter hardware are to be connected to the Siemens building automation system. Designers, contractors, and integrators should discuss data capture intervals, specific BAS programming coding requirements, and long-term data storage requirements with Duke FMD staff.

5. Energy meters – see section **23 09 23 13 Energy Meters**

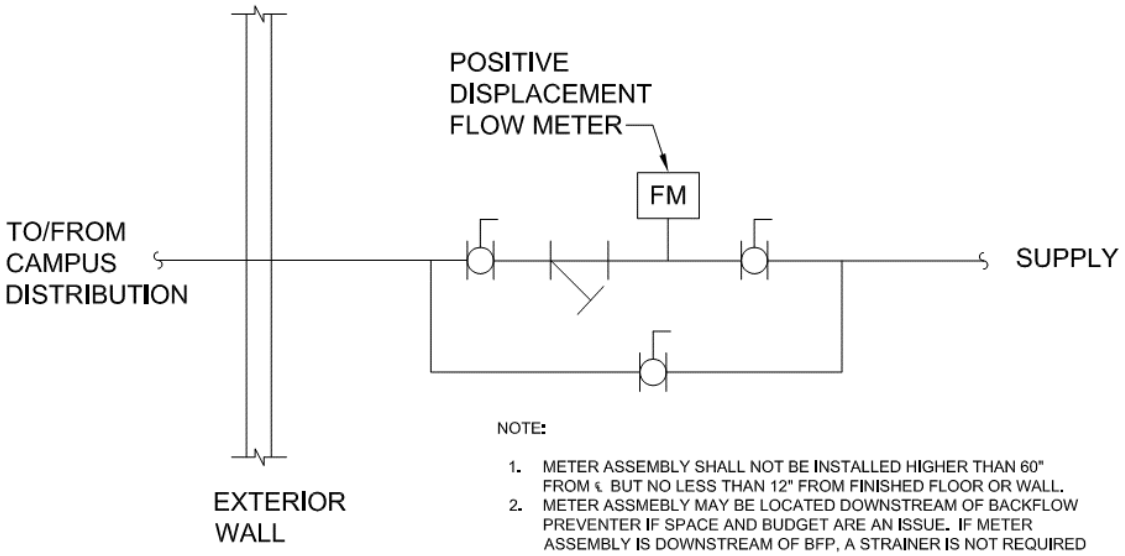
C. METER INSTALLATION

1. Campus Hot and Cold Water



CHILLED & HEATING WATER BUILDING CONNECTION DETAIL
NOT TO SCALE

2. Domestic & Irrigation Water - interior



DOMESTIC WATER BUILDING CONNECTION DETAIL
NOT TO SCALE

3. District Steam – Refer to A336300 Steam Energy Distribution for additional details./