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PART 1 GENERAL

1.1 DESCRIPTION

A. Purpose

1. This section covers building water meters and sub-meters for use on the UW Seattle Campus water systems where other services including steam or natural gas are not provided to the building and no Data Collection Controller will be provided. Confirm application of this specification with UW Campus Utilities and Operations.

1.2 QUALIFICATIONS

A. Approved manufacturers

- a. Totalizing Display
 - 1) Onicon Incorporated – D-100 Series Flow Meter Display
 - 2) Or approved equal
- b. Domestic Water Flow Tube Meter – New Construction
 - 1) Onicon Incorporated – F-3100 Series
 - 2) Or approved equal
- c. Central Cooling Water Insertion Meter – Retrofit Existing Meters
 - 1) Onicon Incorporated – F-3500 Series
 - 2) Or approved equal

1.3 RELATED SECTIONS

- A. 01 91 00 – General Commission Requirements
- B. Section 23 08 00.11 – Mechanical Meter Integration and Commission

1.4 REFERENCES

- A. Applicable codes, standards, and references codes, regulations and standards
 1. NSF/ANSI Standard 61
 2. NSF/ANSI Standard 372
 3. AWWA C700 Standards
 4. AWWA C701 Class 2 Standards
 5. State and local codes and ordinances
- B. Attachments and Details
 1. 23 00 00 Attachment #1 – Mechanical Meter Schematic

1.5 COORDINATION

- A. Coordinate design of utility services and associated mechanical systems in accordance with 23 00 00 Attachment #1 – Mechanical Meter Schematic
- B. Coordinate Operations and Maintenance training times with the Owner.

- C. Coordinate the quantity and location of Facility Network (FacNet) Ethernet ports with Div 27 Low Voltage Communications, UWIT, and Campus Utilities & Operations. Standalone domestic water meter connects directly to the FacNet to integrate with the campus Metering and Monitoring System
- D. The project team shall complete the required fields on the “Early Building Services (EBS)” tab of the UW-IT Outlet Schedule. All fields listed under “Project Responsibility” on the EBS tab must be filled in
- E. If a UW-IT Outlet Schedule is not being maintained for the project, the project team shall submit a FacNet IP Address Request by emailing uwfot@uw.edu with the subject line: “FacNet IP address request.”

In the body of the email, provide the following information for each IP address being requested:

- Location: Room name and number
 - If using an existing biscuit jack, include the Outlet ID (label on the data outlet).
- Device Type: For example, Electrical Meter, CCW Meter, Data Collection
 - Controller, etc.
- IDF Room: IT service origination for data jack, if known.
- Panel Name: Device enclosure name or label.
- MAC Address: Format should follow standard convention (e.g.,
 - 00:05:e4:05:0D:d2).
- F. Device startup, commissioning, and integration into the Owner’s data aggregation software shall be completed in accordance with the Startup, Commissioning, and Integration Specification (26 08 00.11 for Electrical or 23

08 00.11 for Mechanical).

- G. (For mechanical systems only) BACnet Device Instance ID provisioning shall be coordinated on the “Early Building Services (EBS)” tab with both the UW Facilities OT Team and the UWF Environmental Control Systems Manager (ECSM), Shop 69. Use of uncoordinated or self-assigned Device Instance IDs is strictly prohibited. If a UW-IT Outlet Schedule is not being maintained for the project, requests may also be emailed to uwfot@uw.edu with the subject line “BACnet Device ID Request” and coordination with Shop 69 will be managed by UW Facilities OT and the ECSM.

1.6 SUBMITTALS

A. General

1. Submittals shall be in accordance with Conditions of the Contract and Division 01 Specification Sections.
2. Submittals shall be complete and provide all necessary details for full review of products and shop drawings against project design documents. Incomplete or partial submittals will be rejected and not reviewed.
3. Submit detailed maintenance manuals and drawings, which include catalog information indicating the complete electrical and mechanical characteristics.

4. Submit dimensioned cross-sectional drawings (manufacturer's data sheets are acceptable).
5. Submit finished meter tests – Manufacturer's Certified Test Reports showing accuracy tests
6. Submit a completed "Worksheet: Mechanical Meter Schedule" form per Specification 23 08 00.11 and add to Submittals.
7. The project team shall complete the required fields on the "Early Building Services (EBS)" tab of the UW-IT Outlet Schedule. All fields listed under "Project Responsibility" on the EBS tab must be filled in
8. If a UW-IT Outlet Schedule is not being maintained for the project, the project team shall submit a FacNet IP Address Request by emailing uwfot@uw.edu with the subject line: "FacNet IP address request."

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- 9. Device startup, commissioning, and integration into the Owner's data aggregation software shall be completed in accordance with the Startup, Commissioning, and Integration Specification (26 08 00.11 for Electrical or 23

08 00.11 for Mechanical).

10. (For mechanical systems only) BACnet Device Instance ID provisioning shall be coordinated on the "Early Building Services (EBS)" tab with both the UW Facilities OT Team and the UWF Environmental Control Systems Manager (ECSM), Shop 69. Use of uncoordinated or self-assigned Device Instance IDs is strictly prohibited. If a UW-IT Outlet Schedule is not being maintained for the project, requests may also be emailed to uwfot@uw.edu with the subject line "BACnet Device ID Request" and coordination with Shop 69 will be managed by UW Facilities OT and the ECSM.

1.7 OPERATIONS AND MAINTENANCE (O&M) MANUALS

- A. Operations and Maintenance Manuals shall be in accordance with Conditions of the Contract and Division 01 Specification Sections.
- B. Operations and Maintenance Manuals shall include catalog information indicating complete electrical and mechanical characteristics.
- C. Manufacturer's Certified Test Reports
- D. Manufacturer's drawings of meter wiring diagram.

1.8 MEETINGS

- A. Pre-installation conference
 - 1. The Contractor shall request a pre-installation conference with the UW Meter Shop (Shop 69) before project begins construction.
- B. Post installation meeting with UW Campus Utilities and Operations and Associated Maintenance Zone.
- C. Attend meetings with the Owner and/or Owner's Representative as required to resolve any installation or functional problems.

PART 2 PRODUCTS

2.1 GENERAL

- A. These building water meter specifications are in accord with the Owner's policy to construct permanent installations with long life, coupled with maximum reliability and safety.

2.3 Main Building Water Meter

- A. The following shall apply to all main building water meters as defined by this section:
 - 1. Water meter shall operate by electromagnetic induction principle.
 - a. Meter shall measure flow using Faraday's law.
 - b. Meter shall have a stable K-factor that is not influenced by external piping or mounting orientation.
 - c. Meter shall have uniform magnetic field flux distribution piping straight run and flow profiling.
 - d. Meter shall measure fluids with conductivity greater than or equal to 3.0 uS/cm²
 - e. Meter shall be capable achieving an accuracy of +/- 0.25% of the reading for liquids with a 1.5x pipe diameter from center of meter of straight pipe run up and downstream.
 - f. Meter shall be capable of achieving an accuracy of +/- 0.50% of the reading for liquids without any piping straight run.
 - g. Meter shall accept dedicated 120V AC power source.
 - 2. Water meter shall measure and report the following quantities at a minimum:
 - a. Setup to record cubic feet.
 - 3. Water meter shall have digital display and totalization for local monitoring. The display can be internal or remote depending on meter installation and physical barriers/constraints around the meter.
 - 4. Water meter shall have a minimum of 2 pulse and analog (4-20mA) outputs for remote monitoring
 - 5. Configured for BACNet IP Communication
 - 6. Meter housing shall be NEMA 4X rated

PART 3 EXECUTION

3.1 REQUIREMENTS

A. Application

1. Main Building Water Meter

- a. Provide a main building water meter for each building served by the domestic water service. Meter shall be connected to the Data Collection Controller.

2. Water Submeters

- a. Provide water submeters for each of the following sub-systems:
 - 1) Reclaimed water (if provided at project's discretion),
 - 2) Rainwater harvest (if provided at project's discretion)
 - 3) Water subsystems where Facilities Services recharges self-sustaining departments
 - 4) Elsewhere as required to meet code or achieve rating system credits.
- b. Water submeters shall be connected to the UW data collection controller.

3. Sewer Submeters

- a. Provide water sub-meters in accordance with Specification 23 05 19.31 Sewer Sub-meter for each of the following sub-systems:
 - 1) Irrigation (Civil/Site)
 - 2) Irrigation (Mechanical/Building)
 - 3) Cooling Tower Makeup
 - 4) Cooling Tower Blowdown/Drain/Overflow

4. Water Submeters Miscellaneous

- a. Provide water sub-meters each of the following sub-systems:
 - 1) Hydronic closed loop makeup water connections
 - 2) Elsewhere as necessary to function as part of Building Automation System.
- b. Miscellaneous Water submeter to communicate to the Building Automation System (BAS).

B. General installation

1. Identification and Labeling

- a. Reference section 23 05 53 Identification of Mechanical Piping and Equipment
- b. All wiring and devices shall be properly labeled in accordance with system diagrams and wiring details to identify device tag, name, and purpose.
- c. Wire labels shall be machine made shrink type labels and match wire designations on the instrumentation drawings.
- d. Field devices including flow meters shall be labeled with Brother P-touch or equal.
- e. Label in accordance with other sections of this specification.

2. Installation

- a. Install per manufacturers requirements

- b. Only personnel qualified and experienced in this type of work shall make connections.
 - c. The installation of meters shall be done with care to avoid damage.
 - 1) Meters showing damage after installation shall be replaced.
 - 2) Meters shall have adequate clearance for service, repairs, and replacement.
 - d. Provide adequate pipe diameters upstream and downstream of installed meter. See Manufacturer's recommendations.
 - e. Each water meter shall have a dedicated twisted-pair shielded cable installed for each 24VDC digital pulse out between flow meter and flow display. The 24VDC digital pulse cable shall be installed in a dedicated conduit to the flow display.
 - f. For Miscellaneous Water Submeters coordinate wiring requirements for the BAS with the Building BAS Vendor. Verify the meter pulse signal is sufficient to meet the Building BAS requirements.
 - g. Meters shall be installed such that the display can be easily read and accessible. Meter display shall be mounted at an easily read height (4'-5') above finished floor (AFF). A shield shall be installed if display is installed in direct sunlight.
 - h. Water meters shall be provided with shutoff valves and a full size bypass connection to allow for continuous service during periods of meter maintenance.
 - i. Provide appropriate installation kit based upon pipe material.
 - j. Provide adequate slack in flexible communication/power seal flex conduit to allow for the removal of the water meter.
3. Each device requiring communication on the FacNet network shall be provided with a dedicated Category 6 (CAT6) communication cable. The cable shall be installed in a minimum 1" rigid conduit and terminated at a FacNet data jack in accordance with UW-IT Specification Drawing OL- CI-2. The data jack shall be housed inside the following Milbank enclosure components:
- a. Milbank #12126-LC1 (12" x 12" x 6" enclosure)
 - b. Milbank #A-LKSFMKEYL (hinged cover with lock)
 - c. Key: #2233

Refer to UW-IT Specification Drawing CNT-CI-2: [CNT-CI-2 Drawing](#)

- 4. The Milbank enclosure shall be mounted in a serviceable area within 10' of the device that will be communicating on the FacNet network. Any exceptions must be reviewed and approved by the Owner.
- 5. The Milbank enclosure shall be mounted at an accessible height (4'-5') above the finished floor. Exceptions must be reviewed and approved by the Owner.
- 6. A durable label (Brother P-touch or equal) shall be affixed to the exterior of the

enclosure cover, indicating the IT Room from which service originates.

7. Where shared use of a FacNet data jack is proposed (e.g., electrical meter and lighting control device sharing a connection), the Contractor shall coordinate with the Owner and obtain approval prior to installation.
8. UW will check the Contractor's work to ensure the accuracy of the installation.
 - a. The Contractor shall arrange with the Owner for the times when their services will be required, and under no circumstances shall the Contractor connect to the existing system without Owner's knowledge.
 - b. The proper connection of the wires and cables to other systems as specified is entirely the responsibility of the Contractor.
 - c. In the event the connections cannot be made as specified, the Contractor shall make the necessary corrections at his own expense.
9. Install meters per manufacturer's recommendations.
10. Meter shall be UL Listed from manufacturer or shall be field listed.

C. Mounting and electrical connections

1. In accordance with manufacturer's installation instructions.
2. Rigid-style GRC or IMC conduit must be used for installations in utility tunnels, utility vaults, or building service entrances. EMT conduit is only permissible in mechanical rooms and inside buildings. EMT fittings shall be compression type. All conduits must use threaded conduit style junctions (LB, LR, LL, C, TEE, etc.) with no unused/open hubs or Knockout holes (No 4" sq., etc.). LFMC liquid-tight flexible metallic conduit shall be used when transitioning from conduit to device.
3. Install a dedicated 120VAC circuit from a normal panelboard to the building water meter and sub-meters totalizing displays with #12 THHN/THWN stranded wire to provide power to the flow meters. Wiring shall be in a dedicated ¾" conduit run with no sharing of conduit for multiple power sources. All wiring shall be continuous with no breaks from source to endpoint.
4. Do not provide secondary means of 120VAC electrical disconnect external of totalizing display. Safe means of access will be achieved by LOTO of dedicated circuit feeding device at service panelboard.
5. Totalizing display must be clearly labeled to show 120V service including panel name, circuit, and room number. Label shall read (for example) *"Fed from PCB-01-N01, Circuit 25 – Located in Room 025"*
6. 120v Electrical Panel must be clearly labeled to show circuit/feed to totalizing display. Label shall read *"Building Water Meter"* or other system sub-meter name.
7. Install 24VDC circuits from the totalizing display to the flow meters. 24V circuit shall be TSP and installed in a ¾" conduit. A conduit is to be used when transitioning from conduit to device. From conduit to device, use ½" LFMC with enough slack to allow for the removal of the device.
8. For Miscellaneous Water Submeters, coordinate with Building BAS Vendor for power and communication requirements.

D. Testing

1. Contractor to verify meter is reading accurately. Contractor shall present meter verification plan and gain approval from UW Campus Utilities and Operations and/or associated maintenance zone on meter reading verification.
 2. Contractor to submit meter accuracy report of verified meter reading.
 3. Contractor shall supply all test equipment and meters to verify accuracy of meter reading.
- E. The project team shall complete the required fields on the “Early Building Services (EBS)” tab of the UW-IT Outlet Schedule. All fields listed under “Project Responsibility” on the EBS tab must be filled in.

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END OF SECTION