

# Mechanical – Purchase Specs

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## 23 05 19.41 Building Water Meter – Purchase Spec

### **PART 1 – GENERAL**

#### 1.01 DESCRIPTION

##### A. Purpose

1. This section covers building water meters and sub-meters for use in the Owner's water systems.

#### 1.02 QUALIFICATIONS

##### A. Approved manufacturers

1. UW Water Meter and Sub-Meters
  - a. Cadillac Meter – CMAG Magnetic Flow Meter w/ Integral Converter
2. Twisted-pair shielded cable
  - a. Belden 88760
  - b. Or Approved Equal

#### 1.03 RELATED SECTIONS

- A. 01 91 00 – General Commission Requirements
- B. Section 23 08 00.11 – Mechanical Meter Integration and Commission
- C. Section 26 09 13.11 – Data Collection Controller

#### 1.04 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

#### 1.05 COORDINATION

- A. Coordinate Operations and Maintenance training times with the Owner.
- B. Contractor shall provide a completed “Mechanical Meter Profile Report” form per Specification 23 08 00.11 Appendix A for each meter.

## 1.06 SUBMITTALS

### A. General

1. Submittals shall be in accordance with Conditions of the Contract and Division 01 Specification Sections.
2. Submit detailed maintenance manuals and drawings, which include catalog information indicating the complete electrical and mechanical characteristics.
3. Submit dimensioned cross-sectional drawings (manufacturer's data sheets are acceptable).
4. Submit finished meter tests – Manufacturer's Certified Test Reports showing accuracy tests

## 1.07 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.

## 1.08 MEETINGS

### A. Pre-installation conference

1. The Contractor shall request a pre-installation conference with the UW Engineering Services

- B. Attend meetings with the Owner and/or Owner's Representative as required to resolve any installation or functional problems.

## **PART 2 - PRODUCTS**

### 2.01 GENERAL

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

### 2.03 UW WATER METER

- A. The following shall apply to all UW water meters on the UW Campus:

1. UW 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/cm<sup>2</sup>
  - 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 120V AC power source.
2. UW water meter shall have the following rangeability:
    - a. 300 to 1 turndown minimum at +/- 0.25% accuracy
    - b. 400 to 1 turndown minimum at +/- 0.50% accuracy
    - c. 500 to 1 turndown minimum at +/- 1.00% accuracy
  3. UW water meter shall measure and report the following quantities at a minimum:
    - a. Setup to record cubic feet.
  4. Meter fluid temperature range
    - a. 14°F to 248°F with integral electronics, PFA liner, and Hastelloy C electrodes
    - b. 14°F to 356°F with remote electronics, PFA liner, and Hastelloy C electrodes
  5. UW water meter shall have digital display and totalization for local monitoring
  6. UW water meter shall have a minimum of 2 pulse and analog (4-20mA) outputs for remote monitoring
  7. Meter electronics shall be housed in a NEMA 4X enclosure.
  8. Meter shall be suitable for installations on pipes sizes from 0.5" to 48" diameters.
  9. Meter shall be capable of measuring following flow:

Magmeter	Liquid Flow Range Table	
	Minimum Volumetric (gal/min) Range	Maximum Volumetric (gal/min) Range
0.5"	0.00-0.25	0.00-25.00
1"	0.00-0.75	0.00-75.00
1.5"	0.00-1.75	0.00-175.0
2"	0.00-3.00	0.00-300.0
3"	0.00-8.00	0.00-800.0
4"	0.00-12.50	0.00-1250.0
6"	0.00-25.00	0.00-2500.0
8"	0.00-50.00	0.00-5000.0
10"	0.00-75	0.00-7500.0

## 10. Meter Body

- a. The meter will consist of a full bore body with encapsulated and rigidly retained set of coils.
- b. The meter body shall be constructed of 316 stainless steel, and rated for a maximum allowable non-shock pressure and temperature for steel pipe flanges, according to ANSI B16.5.
- c. The meter body end connections shall be carbon steel or 316 stainless steel flanged, according to ANSI B16, Class 150 and AWWA Class B standards.
- d. The meter body shall be available in ANSI Class 150 or Class 300 ratings.

## **PART 3 - EXECUTION**

### 3.01 REQUIREMENTS

#### A. Application

##### 1. Main Building Water Meter

- a. Provide a main UW water meter for each building served by the UW water service. Meter to communicate to UW Advanced Metering System.
- b. SPU to provide main water meter for buildings served by SPU water service.

##### 2. Water Submeters

- a. Provide water submeters for each of the following sub-systems:
  - i. Reclaimed water (if provided at project's discretion),
  - ii. Rainwater harvest (if provided at project's discretion)
  - iii. Water subsystems where Facilities Services recharges self-sustaining departments
  - iv. Elsewhere as required to meet code or achieve rating system credits.
- b. Water submeters to communicate to the Advanced Metering System.

##### 3. Sewer Submeters

- a. Provide water sub-meters in accordance with Specification 23 05 19.31 Sewer Submeter Purchase Spec for each of the following sub-systems:
  - i. Irrigation (Civil/Site)
  - ii. Irrigation (Mechanical/Building)
  - iii. Cooling Tower Makeup
  - iv. Cooling Tower Blowdown/Drain

##### 4. Water Submeters Miscellaneous

- a. Provide water sub-meters each of the following sub-systems:

- i. Hydronic closed loop makeup water connections
    - ii. Elsewhere as necessary to function as part of Building Automation System.
  - b. Water submeter to communicate to the Building Automation System (BAS).
- B. General installation
  1. Identification
    - a. Reference section 23 05 53 Identification of Mechanical Piping and Equipment
  2. Installation
    - a. Only personnel qualified and experienced in this type of work shall make connections.
    - b. The installation of meters shall be done with care to avoid damage.
      - i. Meters showing damage after installation shall be replaced.
      - ii. Meters shall have adequate clearance to service, repairs, and replacement.
      - iii. Data collection cabinets hung improperly shall be properly secured and all paint scratches shall be touched up.
    - c. Provide adequate pipe diameters upstream and downstream of installed meter. See Manufacturer's recommendations.
    - d. Each UW water meter shall have a dedicated twisted-pair shielded cable installed for each 24VDC digital pulse out to the data collection controller.
    - e. Meters shall be installed such that the display can be easily read. A shield shall be supplied if display is in direct sunlight.
    - f. UW water meters shall be provided with shutoff valves and a bypass connection to allow for continuous service during periods of meter maintenance.
    - g. Provide appropriate installation kit based upon pipe material.
    - h. Provide adequate slack in flexible communication conduit to allow for the removal of the deduct meter.
  3. 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.
  4. Install meters per manufacturer's recommendations.
  5. 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. Install a dedicated 120V circuit from power source to the Data Collection Controller to provide power to the UW water meter and sub-meters.
3. Install 24V circuits from the Data Collection Controller to the water meter and sub-meters. 24V circuit shall be THWN or XHHW insulation and installed in a GRC/IMC conduit. A 'C' conduit is to be used when transitioning from conduit to device. Flexible conduit shall be jacketed metallic "sealtite" style with enough slack to allow for the removal of the device.

D. Testing

1. Contractor to verify meter is reading accurately.
2. Contractor to submit meter accuracy report of verified meter reading.

E. Integration and Commissioning

See section 23 08 00.11 Mechanical Meter Integration and Commissioning