

SECTION 22 05 19**METERS AND GAGES FOR PLUMBING PIPING****PART 1 - GENERAL****1.1 DESCRIPTION**

This section describes the requirements for water meters and pressure gages.

1.2 RELATED WORK

- A. Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.
- B. Section 22 08 00, COMMISSIONING OF PLUMBING SYSTEMS.
- C. Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.
- D. Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.
- B. Manufacturer's Literature and Data:
 - 1. Water Meter.
 - 2. Pressure Gages.
 - 3. BACnet communication protocol
 - 4. Product certificates for each type of meter and gauge
- C. Operations and Maintenance manual shall include:
 - 1. System Description
 - 2. Major assembly block diagrams
 - 3. Troubleshooting and preventive maintenance guidelines
 - 4. Spare parts information.
- D. Shop Drawings shall include the following:
 - 1. One line, wiring and terminal diagrams including terminals identified, protocol or communication modules, and Ethernet connections.
- E. Completed System Readiness Checklist provided by the Commissioning Agent and completed by the contractor, signed by a qualified technician and dated on the date of completion, in accordance with the requirements of Section 22 08 00, COMMISSIONING OF PLUMBING SYSTEMS.

1.4 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

- B. American National Standards Institute (ANSI):
 American Society of Mechanical Engineers (ASME): (Copyrighted Society)
 B40.1-05.....Gauges-Pressure Indicating Dial Type-Elastic
- C. American Water Works Association (AWWA):
 C700-07 (R 2003).....Standard for Cold Water Meters, Displacement
 Type, Bronze Main Case
- D. International Code Council (ICC):
 IPC-2009.....(2007 Supplement) International Plumbing Code

1.5 AS-BUILT DOCUMENTATION

- A. The electronic documentation and copies of the Operations and Maintenance Manual, approved submittals, shop drawings, and other closeout documentation shall be prepared by a computer software program complying with Section 508 of the Rehabilitation Act of 1973, as amended (29 U.S.C 794d). The manufacturer or vendor of the software used to prepare the electronic documentation shall have a Voluntary Product Accessibility Template made available for review and included as part of the Operations and Maintenance Manual or closeout documentation. All available accessibility functions listed in the Voluntary Accessibility Template shall be enabled in the prepared electronic files. As Adobe Acrobat is a common industry format for such documentation, following the document, "Creating Accessible Adobe PDF files, A Guide for Document Authors" that is maintained and made available by Adobe free of charge is recommended."
- B. Four sets of manufacturer's literature and data updated to include submittal review comments and any equipment substitutions.
- C. Four sets of operation and maintenance data updated to include submittal review comments shall be inserted into a three ring binder. All aspects of system operation and maintenance procedures, including piping isometrics, wiring diagrams of all circuits, a written description of system design, control logic, and sequence of operation shall be included in the operation and maintenance manual. The operations and maintenance manual shall include troubleshooting techniques and procedures for emergency situations. Notes on all special systems or devices such as damper and door closure interlocks shall be included. A List of recommended spare parts (manufacturer, model number, and quantity) shall be furnished. Information explaining

any special knowledge or tools the owner will be required to employ shall be inserted into the As-Built documentation.

PART 2 - PRODUCTS

2.1 DISPLACEMENT WATER METER

- A. For pipe sizes under 50 mm (2 inches), the water meter shall be displacement type, full size nutating disc, magnetic drive, sealed register, and fully conform to AWWA C700. Peak domestic flow shall be 2.2 L/S (34 gpm). The meter register shall indicate flow in liters (U.S. gallons).
- B. The water meter shall be rated for use at temperatures ranging from -40° C (-40° F) and +70° C (158° F) and operate at a working pressure of 1034 kPa (150-psig).
- C. The meter case, bottom caps, and register box lids shall be constructed from cast bronze.

2.2 WATER METER STRAINER

- A. All meters shall be fitted with a bronze inlet strainer with top access. The strainer shall conform to AWWA 702.

2.3 WATER METER PROGRAMMING

- A. All meters shall be programmable with software supplied by the meter manufacturer.
- B. The software shall have a Microsoft based interface and operate on the latest Windows operating system. The software shall allow the user to configure the meter, troubleshoot the meter, query and display meter parameters, and configure data and stored values.
- C. The meter firmware shall be upgradeable through one of the communication ports without removing the unit from service.
- D. the meter shall include output for analog 4-20 milliamp signals and binary output.
- E. The meter shall have two dry contact relays outputs for alarm or control functions.

2.4 WATER METER COMMUNICATION PROTOCOL

- A. The meter shall use a native BACnet Ethernet communication protocol supporting Modbus. The communications shall be protected against surges induced on its communications channels.

2.5 PRESSURE GAGES FOR WATER USAGE

- A. ANSI B40.1 all metal case 114 mm (4-1/2 inches) diameter, bottom connected throughout, graduated as required for service, and identity labeled. Range shall be 0 to 1375 kPa (0 to 200 psi) gauge.

- B. The pressure element assembly shall be bourdon tube. The mechanical movement shall be lined to pressure element and connected to pointer.
- C. The dial shall be non-reflective aluminum with permanently etched scale markings graduated in kPa and psi.
- D. The pointer shall be dark colored metal.
- E. The window shall be glass.
- F. The ring shall be brass or stainless steel.
- G. The accuracy shall be grade A, plus or minus 1 percent of middle half of scale range.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Direct mounted pressure gages shall be installed in piping tees with pressure gage located on pipe at the most readable position.
- B. Valves and snubbers shall be installed in piping for each pressure gage.
- C. Test plugs shall be installed on the inlet and outlet pipes all heat exchangers or water heaters serving more than one plumbing fixture.
- D. Pressure gages shall be installed where indicated on the drawings and at the following locations:
 - 1. Inlet and outlet of each pressure reducing valve
- E. Water meter installation shall conform to AWWA C700. Electrical installations shall conform to IEEE C2, NFPA 70 (National Electric Code), and to the requirements specified herein. New materials shall be provided.
- F. Each water meter shall communicate with the building energy management and control system and report daily water consumption and peak daily flow rate.

3.2 STARTUP AND TESTING

- A. Operating: Tests shall be run in presence of PM/COTR.
- B. Procedure:
 - 1. Operate system at constant maximum required capacity for one hour.
 - 2. Demonstrate all features of the meter system including diagnostics and flow and cycle indications.
- C. The Commissioning Agent will observe startup and contractor testing of selected equipment. Coordinate the startup and contractor testing schedules with the PM/COTR and Commissioning Agent. Provide a minimum of 7 days prior to notice.

3.3 COMMISSIONING:

- A. Provide commissioning documentation accordance with the requirements of Section 22 08 00 - COMMISSIONING OF PLUMBING SYSTEMS for all inspection, startup, and contractor testing required above and required by the System Readiness Checklist provided by the Commissioning Agent.
- B. Components provided under this section of the specification will be tested as part of a larger system. Refer to Section 22 08 00, COMMISSIONING OF PLUMBING SYSTEMS and related sections for contractor responsibilities for system commissioning.

3.4 FIELD QUALITY CONTROL

- A. The meter assembly shall be visually inspected and operationally tested. The correct multiplier placement on the face of the meter shall be verified.

3.5 TRAINING

- A. A training course shall be provided to the medical center on meter configuration and maintenance. Training manuals shall be supplied for all attendee with four additional copies supplied. The training course shall cover meter configuration, troubleshooting, and diagnostic procedures.

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