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

Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.

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.

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

C701-07.....Cold Water Meters-Turbine Type, for Customer Service AWWA/ ANSI

C702-01.....Cold water meters – Compound Type

D. International Code Council (ICC):

IPC-06.....(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 COMPOUND WATER METER.

A. The Town of Lexington, MA standard for water meters is the Neptune Compund Water Meter; The water meter supplied and installed under this contract shall meet the Town Standard in all respects.
The compound water meter shall consist of a combination of an AWWA Class II turbine meter and a nutating disc type positive displacement meter, in a single maincase. An automatic valve shall direct flows through the disc meter at low flow rates and through the turbine meter at high flow rates. At high flow rates the automatic valve shall restrict the flow through the disc meter to minimize wear. . Maximum contionuous flow rate shall 1,400 gpm). The minimum meter flow rate shall be be 3/4 gpm). Each Register shall indicate in U.S. gallons.

B. The water meter shall be rated for use at temperatures ranging from -- 40° F and 158° F and operate at a working pressure of 1034 kPa (150-psig).

C. The main case and cover shall be cast from an NSF/ANSI 61, Annex G and Annex F certified lead free high copper alloy containing a minimum of 85% copper. The size, model, NSF certification and arrows indicating direction of flow shall be cast in raised characters on the mancase or cover. The covers shall contain a stainless steel calibration vane fro the purpose of calibrating the turbine measuring element while the meter is inline and under pressure. A test plug shall be located in the maincase of the cover for the purpose of field testing of the meter.

D. Register box and covers shall be of bronze composition. The name of the manufacturer shall be clearly identifiable and located on the register box covers.

E. The turbine measuring chamber shall be a self-contained unit, attached to the cover for easy removal. The turbine shaft shall be tungsten carbide with tungsten carbide inserts and shall rotate in removable graphite bushings. Thrust bearings shall be tungsten carbide.

F. The nutating disc chamber shall be mounted on the cover for easy removal and easily removable from the cover. It shall conform to s AWWA Standard C700. The inlet to the disc chamber shall be a “single” opening of adequate size not to be suseptable to plugging and water restriction by water borne debris.

G. The meter shall have flanged ends and supplied with gaskets and AISI Type 316 stainless steel bolts and nuts.

H. Registration accuracy over the normal operating range shall be 98.5% to 101.5%. Registratio0n at the crossover shall be not less than 95% with direct reading registers. Registratio0n at the crossover shall be not less than 90% with absolute encoder or generator remote registers. Registratio0n at the extended low flow rate shall be not less than 95%.

I. A strainer shall be provided for the disc meter. It shall be easily removable and have an effective straining area of double the disc meter inlet.

J. The intermediate gear train shall be directly coupled to from the turbine rotor and mechanically coupled to the register through the meter cover. The gear train shall be housed in the turbine measuring chamber. All moving parts of the gear train shall be made of a self-lubricating polymer or stainless steel for operation in water.

K. The meter shall be supplied with a pit version E-CODER.

2.2 WATER METER STRAINER

A. The strainer screen shall be made of perforated AISI Type 18-8 stainless steel plate and shall be shaped for maximum rigidity against forces exerted by the flow stream.

B. The effective strainer shall be at least double that of the meter maincase inlet area.

C. Strainers larger than 3” shall be furnished with round flanged connections. Bolt circles, bolt hole diameters, and flange dimensions tance shall be incompliance with meter connection specifications contained in ANSI/AWWA C701.

D. The strainer bodies and covers shall be made from an NSF/ANSI 61, Annex G and Annex F certified lead free high copper alloy containing a minimum of 85% copper. The strainer pipe size, manufacturer’s name and model, and arrows indicating direction of flow shall be cast in raised characters and shall be clearly visible.

E. cover bolts and nuts shall be AISI Type 316 stainless steel.

F. Strainer cover shall be equipped with a vent screw to remove trapped air at installation.

2.3 WATER METER PROGRAMMING

A. All meters 50 mm or DN50 (2 inches) and above 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.

F. The meter shall be equal to SCADAmetrics: EtherMeter SCADA/METER GATWAY suitable for Neptune Compund Meter..

2.4 WATER METER COMMUNICATION PROTOCOL

A. The meter shall use a native BACnet Ethernet communication protocol supporting Modbus and shall easily integrate with other modern SCADA systems . The communications shall be protected against surges induced on its communications channels.

2.5 PRESSURE GAGES FOR WATER AND SEWAGE 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. Building water service entrance into building
2. Inlet and outlet of each pressure reducing valve
3. Suction and discharge of each domestic water pump or re-circulating hot water return pump.

E. Water meter installation shall conform to AWWA C700, AWWA C701, and AWWA C702. 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 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.

3.3 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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