SECTION 23 0519
METERS AND GAGES FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Positive displacement meters.
B. Flow meters.
C. Pressure gages and pressure gage taps.
D. Thermometers and thermometer wells.
E. Static pressure gages.
F. Filter gages.

1.02 RELATED REQUIREMENTS
A. Section 23 0923 - Direct-Digital Control System for HVAC.
B. Section 23 0993 - Sequence of Operations for HVAC Controls.
C. Section 23 2113 - Hydronic Piping.
D. Section 23 2213 - Steam and Condensate Heating Piping.

1.03 REFERENCE STANDARDS
A. ASME B40.100 - Pressure Gauges and Gauge Attachments; 2013.
E. AWWA C700 - Cold-Water Meters -- Displacement Type, Metal Alloy Main Case; 2015.
F. AWWA C701 - Cold-Water Meters -- Turbine Type, for Customer Service; 2012.
G. AWWA C702 - Cold-Water Meters -- Compound Type; 2010.
I. UL 393 - Indicating Pressure Gauges for Fire-Protection Service; Current Edition, Including All Revisions.
J. UL 404 - Gauges, Indicating Pressure, for Compressed Gas Service; Current Edition, Including All Revisions.

1.04 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide list that indicates use, operating range, total range and location for manufactured components.
C. Project Record Documents: Record actual locations of components and instrumentation.
D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Gage Oil for Inclined Manometers: One bottle.
   3. Extra Pressure Gages: One of each type and size.

1.05 FIELD CONDITIONS
A. Do not install instrumentation when areas are under construction, except for required rough-in, taps, supports and test plugs.

PART 2 PRODUCTS

2.01 POSITIVE DISPLACEMENT METERS (LIQUID)
A. Manufacturers:
4. Substitutions: See Section 01 6000 - Product Requirements.

B. AWWA C700, positive displacement disc type suitable for fluid with metal alloy main case and cast iron frost-proof, breakaway bottom cap, hermetically sealed register, remote reading.

C. Meter: Brass body turbine meter with magnetic drive register.
   1. Service: Cold water, 122 degrees F.

2.02 PRESSURE GAGES

A. Manufacturers:
   4. Substitutions: See Section 01 6000 - Product Requirements.

B. Pressure Gages: ASME B40.100, UL 393 drawn steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background.
   1. Case: Steel with brass bourdon tube.
   2. Size: 4-1/2 inch diameter.
   3. Mid-Scale Accuracy: One percent.
   4. Scale: Psi and KPa.

2.03 PRESSURE GAGE TAPPINGS

A. Gage Cock: Tee or lever handle, brass for maximum 150 psi.
B. Needle Valve: Brass, 1/4 inch NPT for minimum 150 psi.
C. Pulsation Damper: Pressure snubber, brass with 1/4 inch connections.
D. Syphon: Steel, Schedule 40, 1/4 inch angle or straight pattern.

2.04 STEM TYPE THERMOMETERS

A. Manufacturers:
   4. Substitutions: See Section 01 6000 - Product Requirements.

B. Thermometers - Fixed Mounting: Red- or blue-appearing non-toxic liquid in glass; ASTM E1; lens front tube, cast aluminum case with enamel finish.
   1. Size: 9 inch scale.
   2. Window: Clear Lexan.
   4. Accuracy: 2 percent, per ASTM E77.
   5. Calibration: Degrees F.

C. Thermometers - Adjustable Angle: Red- or blue-appearing non-toxic liquid in glass; ASTM E1; lens front tube, cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device; adjustable 360 degrees in horizontal plane, 180 degrees in vertical plane.
   1. Size: 9 inch scale.
   2. Window: Clear Lexan.
   4. Accuracy: 2 percent, per ASTM E77.
   5. Calibration: Degrees F.
2.05 DIAL THERMOMETERS

A. Manufacturers:
   4. __________.
   5. Substitutions: See Section 01 6000 - Product Requirements.

B. Thermometers - Fixed Mounting: Dial type bimetallic actuated; ASTM E1; stainless steel case, silicone fluid damping, white with black markings and black pointer, hermetically sealed lens, stainless steel stem.
   1. Size: 5 inch diameter dial.
   2. Lens: Clear glass.
   3. Accuracy: 1 percent.
   4. Calibration: Degrees F.

C. Thermometer: ASTM E1, stainless steel case, adjustable angle with front recalibration, bimetallic helix actuated with silicone fluid damping, white with black markings and black pointer hermetically sealed lens, stainless steel stem.
   1. Size: 3 inch diameter dial.
   2. Lens: Clear glass.
   3. Accuracy: 1 percent.
   4. Calibration: Degrees F.

2.06 THERMOMETER SUPPORTS

A. Socket: Brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain.

B. Flange: 3 inch outside diameter reversible flange, designed to fasten to sheet metal air ducts, with brass perforated stem.

2.07 TEST PLUGS

A. Test Plug: 1/4 inch or 1/2 inch brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with neoprene core for temperatures up to 200 degrees F.

2.08 STATIC PRESSURE GAGES

A. Manufacturers:
   5. Substitutions: See Section 01 6000 - Product Requirements.

B. 3-1/2 inch diameter dial in metal case, diaphragm actuated, black figures on white background, front recalibration adjustment, 2 percent of full scale accuracy.

C. Inclined manometer, red liquid on white background with black figures, front recalibration adjustment, 3 percent of full scale accuracy.

D. Accessories: Static pressure tips with compression fittings for bulkhead mounting, 1/4 inch diameter tubing.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

END OF SECTION 23 0519