

**SECTION 23 05 19  
METERS, GAUGES AND THERMOMETERS FOR HVAC**

**PART 1 – GENERAL**

1.01 WORK INCLUDED

- A. The work of this Section shall include, but is not limited to, the following:
  - 1. Flow meters
  - 2. Pressure gauges
  - 3. Static pressure and filter gauges
  - 4. Pressure/temperature test ports
  - 5. Thermometers

1.02 RELATED DOCUMENTS

- A. Section 23 05 01 – HVAC General Provisions
- B. Section 23 21 13 – Hydronic Piping

1.03 REFERENCE STANDARDS

Published specifications standards, tests or recommended methods of trade, industry or governmental organizations apply to work in this Section where cited below:

- A. ASME – American Society of Mechanical Engineers
  - 1. ASME B40.100: Pressure Gauges and Gauge Attachments
  - 2. ASME B40.200: Thermometers, Direct Reading and Remote Reading

1.04 QUALITY ASSURANCE

- A. Instruments shall be factory-calibrated for the temperature and pressure of the systems in which they are installed.
- B. Pressure gauges shall be manufactured in accordance with ASME Standard B40.100.
- C. Thermometers shall be manufactured in accordance with ASME Standard B40.200 and ANSI Specification B40.3.

1.05 SUBMITTALS

- A. Submit list indicating use, operating range, total range and location.
- B. Submit manufacturer's data for instrument types, materials, accessories and installation.

**PART 2 – PRODUCTS**

2.01 ACCEPTABLE MANUFACTURERS

- A. Flow Meters: Onicon, Badger, Fox Thermal Instruments

- B. Thermometers: Weiss, Trerice, Weksler, Taylor, Ashcroft
- C. Pressure Gauges: Weiss, Trerice, Weksler, Taylor, Ashcroft
- D. Filter Gauges: Dwyer, Trerice, Orange Research
- E. Pressure/Temperature Test Ports: Peterson Engineering, Trerice, Weksler

## 2.02 FLOW METERS

- A. Meter device shall be dual turbine element flow station set supplied by one manufacturer. Measuring station shall be stainless steel complete with safety shut-off valves, quick coupling connections, and a permanent metal tag showing designed flow rates, meter readings for designed flow rates, metered fluid, line size and tag, station or location number.
- B. Stations shall be either nipple section or weld insert type and be rated to 275 pounds per square inch at 400 degrees F. Sensing elements shall be rotatable. Accuracy of the flow measuring elements shall be plus or minus 2 percent with plus or minus 0.2 percent repeatability as verified by independent laboratory reports. Output 4 to 20 milliamps; supply voltage 24 volts DC.
- C. Flow meters to be provided under Section 23 09 23 and installed under this Section.

## 2.03 PRESSURE GAUGES

- A. Process type in an impact resistant phenolic case, 4½-inch diameter glycerine-filled phosphor-bronze bourdon tube rated to 600 pounds per square inch. Stainless steel movement, ½ inch brass socket and 1-percent mid-scale accuracy, black figures on white background. Provide brass needle valve and snubber. Weiss Instrument Model LF4UGY1, or equal. Where fluid temperature exceeds 150 degrees F, provide non-liquid filled gauge Weiss Instrument Model NF4UGY1, or equal.
- B. For steam appliances, provide dry type gauges with coil siphon.

## 2.04 FILTER GAUGES

- A. Provide filters with direct reading gauges, 4-inch dial type, diaphragm actuated, in a metal case to monitor both primary and secondary filter banks. Dwyer Magnehelic Series 2000, or approved equal.
- B. Provide direct reading gauges, 4-inch dial type, diaphragm actuated, in a metal case with electrical control contacts to provide high pressure alarm at the BMS. Dwyer Photohelic Series 3000MR, or approved equal.
- C. Lettering shall be black figures on white background. Provide front recalibration adjustment.
- D. Provide gauges with the following differential ranges in inches water gauge:

MERV 7 to 10 filters:	0.0 to 1.0
MERV 11 to 12 filters:	0.0 to 2.0
MERV 13 to 16 filters:	0.0 to 2.0
MERV 17 and above filters:	0.0 to 4.0

Activated carbon filters:	0.0 to 2.0
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- E. Provide one gauge for each filter bank, suitable for flush- or surface-mounting. Include an air filter gauge accessory package consisting of mounting bracket, aluminum tubing, two static pressure tips, and vent valves for each gauge.

#### 2.05 PRESSURE / TEMPERATURE TEST PORTS

- A. Provide test ports ½ inch NPT made of brass with Nordel core. In addition, supply three (3) kits consisting of ¼ inch NPT pressure gauge, gauge adapter with ⅛-inch probe and protecting shield, bi-metal thermometer range 25 degrees F to 125 degrees F with 5-inch stem and 1¾-inch diameter dial, bi-metal thermometer range 20 degrees F to 240 degrees F with 5-inch stem and 1¾-inch diameter dial. Each kit to be provided in an impact-resistant carrying case.

#### 2.06 THERMOMETERS

- A. Adjustable angle dial face, bi-metal thermometer, with 2 degree F scale division, accurate to plus or minus 1 percent of scale range, Type 304 stainless steel case and bezel, shatter-proof glass window, silicone filled.
- B. For pipes up to 2-inch diameter, Weiss Model SF3VBM, or equal.
- C. For pipes larger than 2-inch diameter, Weiss Model SF5VBM, or equal.
- D. Thermometers shall be installed where shown on the Drawings or as specified. Pressure temperature ratings of each thermometer shall be suitable for the system in which it is installed. Thermometers shall have the following insertion lengths:
  - 1. Up to 5-inch pipe: 2½ inches
  - 2. 6-inch thru 8-inch pipe: 4 inches
  - 3. 10-inch thru 16-inch pipe: 6 inches
  - 4. Larger than 16-inch pipe: 9 inches
- E. Provide Type 304 stainless steel wells for all pipe-mounted thermometers.
- F. Provide extended wells and stem length to accommodate insulation thickness for insulated pipe applications.

### **PART 3 – EXECUTION**

#### 3.01 INSTALLATION

- A. Install flow meters according to manufacturer's installation instructions. Allow minimum ten (10) pipe diameters upstream of metering station and four (4) pipe diameters downstream, or distances as recommended by the manufacturer.
- B. Provide one pressure gauge per pump. Install piping from pressure gauge to taps before strainers and on suction and discharge of pump. Refer to details on the Drawings.
- C. For pipes smaller than 2½ inches, enlarge pipe for installation of thermometer wells.

### 3.02 SCHEDULE

- A. Flow Metering Stations: Chilled water and hot water systems where indicated on the Drawings.
- B. Pressure Gauges:
  - 1. Pumps, inlet and outlet
  - 2. Expansion tanks
  - 3. Glycol tanks
  - 4. Charging tanks
  - 5. Storage tanks, inlet and outlet
  - 6. Chillers, inlet and outlet
  - 7. Boilers, inlet and outlet
  - 8. Built-up cooling coils, inlet and outlet
  - 9. Built-up heating coils, inlet and outlet
  - 10. Other locations as indicated on the Drawings
- C. Filter Gauges:
  - 1. Built-up system filter banks
  - 2. Other locations as indicated on the Drawings and in equipment specifications
- D. Pressure/Temperature Test Ports:
  - 1. Pumps, inlet and outlet
  - 2. All automatic control valves, inlet and outlet
  - 3. Cooling and heating coils, inlet and outlet
  - 4. Other locations as indicated on the Drawings
- E. Thermometers:
  - 1. Chillers, inlet and outlet
  - 2. Boilers, inlet and outlet
  - 3. Built-up cooling coils, inlet and outlet
  - 4. Built-up heating coils, inlet and outlet
  - 5. Other locations as indicated on the Drawings

END OF SECTION 23 05 19