

CONSTRUCTION SPECIAL SPECIFICATION

SECTION 15135_S

METERS AND GAUGES

	<u>Page</u>
 <u>PART 1 - GENERAL</u>	
1.01 DESCRIPTION.....	2
1.02 QUALITY ASSURANCE	2
1.02 REFERENCES	2
1.04 SUBMITTALS	2
1.05 DELIVERY, STORAGE, AND HANDLING	3
 <u>PART 2 - PRODUCTS</u>	
2.01 ACCEPTABLE MANUFACTURERS.....	3
2.02 THERMOMETERS	4
2.03 PRESSURE GAUGES.....	4
2.04 FLOW-MEASURING SYSTEMS	6
 <u>PART 3 - EXECUTION</u>	
3.01 INSTALLATION/APPLICATION/ERECTION	6
3.02 ADJUSTING AND CLEANING.....	8

CONSTRUCTION SPECIAL SPECIFICATION**SECTION 15135_S****METERS AND GAUGES****PART 1 - GENERAL****1.01 DESCRIPTION**

- A. This Section specifies the physical and performance requirements of the meters and gauges used on the mechanical systems. Typical locations are identified.
- B. Meters and gauges furnished as part of factory-fabricated equipment are specified as part of the equipment assembly in other Sections.

1.02 QUALITY ASSURANCE

- A. Comply with applicable portions of American Society of Mechanical Engineers (ASME) and Instrument Society of America (ISA) standards pertaining to construction and installation of meters and gauges.
- B. Base the types, sizes, capacities, ranges, profiles, connections, and dimensional requirements of meters and gauges on the Drawings and on the specific manufacturer types and models indicated.

1.02 REFERENCES

- A. American National Standards Institute (ANSI) B16.1
- B. ANSI B16.24
- C. ASME
- D. ISA
- E. Underwriter's Laboratories (UL)

1.04 SUBMITTALS

- A. Make submittals according to this Section and Section 01330.
- B. Submit product data for each type of meter, gauge, and fitting specified. Include scale range, ratings, and calibrated performance curves, certified where indicated. Submit a meter and gauge schedule showing manufacturer's figure number, scale range, location, and accessories for each meter and gauge.

- C. Submit product certificates signed by manufacturers of meters and gauges certifying accuracies under specified operating conditions and compliance with specified requirements.
- D. Submit maintenance data in the operating and maintenance manual as specified in Section 01330. Include data for the following:
 - 1. Test plugs.
 - 2. Flow measuring systems.
 - 3. Flow meters.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. See Section 15010.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with requirements, provide products by one of the following:
 - 1. Liquid-in-Glass Thermometers:
 - a. Marsh Instrument Co.
 - b. Marshalltown Instruments, Inc.
 - c. H.O. Trerice Co.
 - d. Weiss Instruments, Inc.
 - e. Weksler Instruments Corp.
 - 2. Pressure Gauges:
 - a. AMETEK, U.S. Gauge Div.
 - b. Ashcroft by Dresser Industries, Instrument Div.
 - c. Marsh Instrument Co.
 - d. Marshalltown Instruments, Inc.
 - e. H.O. Trerice Co.
 - f. Weiss Instruments, Inc.
 - g. Weksler Instruments Corp.
 - h. WIKA Instruments Corp.

3. Test Plugs:
 - a. Flow Design, Inc.
 - b. MG Piping Products Co.
 - c. Peterson Equipment Co., Inc.
 - d. Sisco Co., Spedco, Inc.
 - e. H.O. Trerice Co.
 - f. Watts Regulator Co.
4. Turbine Flow Meters:
 - a. Onicon

2.02 THERMOMETERS

A. General

1. Scale Range: Provide a scale range which exceeds the system operating range by 100 percent both above and below the operating range limits unless noted otherwise on the Drawings. Provide 2-degree (deg.) Fahrenheit and 1-deg. Celsius (C) scale divisions.
2. Accuracy: Plus or minus 1 percent of range span or plus or minus one scale division to maximum of 1.5 percent of range span.
3. Case: Drawn steel, brass or aluminum with 4-1/2-in. (115 mm) -diameter glass lens.
5. Scale: Satin-faced nonreflective aluminum with permanently etched markings.
6. Stem: Copper-plated, steel, aluminum, or brass for a separable socket of length to suit installation.

B. Wells

1. Description: Brass or stainless-steel thermometer well.
2. Pressure Rating: Not less than piping system design pressure.
3. Stem Length: To extend 2 in. (50 mm) into fluid.
4. Extension for Insulated Piping: 2 in. (50 mm) nominal, but not less than thickness of insulation.
5. Threaded Cap Nut: With chain permanently fastened to well and cap.

2.03 PRESSURE GAUGES

A. Construction

1. Description: ASME B40.1, Grade A phosphor-bronze Bourdon-tube pressure gauge, with bottom connection.
2. Case: Drawn steel, brass or aluminum with 4-1/2-in. (115 mm) -diameter glass lens.
3. Connector: Brass, 1/4-in. (8 mm) NPS.
4. Scale: White-coated aluminum, with permanently etched markings.
5. Accuracy: Plus or minus 1 percent of range span.
6. Range: Conform to the following:
 - a. Vacuum: 15-pounds-per-square-inch-gauge (psig) of vacuum to 15 psig pressure.
 - b. Fluids Under Pressure: Provide a scale range which exceeds the system operating range by 100 percent both above and below the operating range limits unless noted otherwise on the Drawings. Provide 2, 5, or 10 unit scale divisions as appropriate to system range. Provide psig divisions for all systems but heating, ventilating and air-conditioning movement which shall be inches water gauge.

B. Accessories

1. Syphons: 1/4-in. (8 mm) straight coil of brass tubing with threads on each end.
2. Snubbers: 1/4-in. (8 mm) brass bushing with corrosion-resistant porous-metal disc of material suitable for system fluid and working pressure.

2.04 FLOW-MEASURING SYSTEMS

A. General

1. Flow-measuring systems include calibrated flow element, separate meter, hoses or tubing, valves, fittings, and conversion chart that is compatible with flow element, meter, and system fluid.
2. Flow range of flow-measuring element and meter covers operating range of equipment or system where used.

B. Meters

1. Turbine Flow Meters

- a. Description: Dual impeller flow meter made for insertion in hydronic piping fluid flow that measures flow directly in gallons/minute (L/s).
- b. Totalization: Include register to indicate total volume in gallons (cu. m).
- c. Transmitter: Include a transmitter to translate signal to a 4 to 20 milli-Ampere signal.
- d. Indicator: Include a register to indicate instantaneous flow.
- e. Construction: Bronze body and plastic impeller with ceramic bearings. Size as indicated on the Drawings.
- f. Pressure Rating: 150 psig (1035 Kpa) minimum.
- g. Temperature Rating: -30 deg. F to 180 deg. F.
- h. Accuracy: Plus or minus 0.5 percent of reading at calibrated velocity.

Plus or minus 1.0 percent of reading from 3 to 20 ft/s.

- i. Design Basis: Onicon F-1210

PART 3 - EXECUTION

3.01 INSTALLATION/APPLICATION/ERECTION

A. Meter and Gauge

1. Install meters and gauges of types, sizes, capacities, and with features indicated.
 2. Install meters, gauges, and accessories according to manufacturers' written instructions for applications where used.
- B. Thermometer
1. Install thermometers and adjust vertical and tilted positions.
 2. Install in the following locations and as indicated on the Drawings:
 - a. At inlet and outlet of each hydronic zone.
 - b. At inlet and outlet of the chiller.
 - c. At inlet and outlet of each hydronic coil in air-handling units and built-up central systems.
 - d. At inlet and outlet of each hydronic heat exchanger.
 - e. At inlet and outlet of each hot water heater.
 3. Thermometer Wells: Install in vertical position in piping tees where thermometers are indicated.
 - a. Install wells with stem extending minimum of 2 in. (50 mm) into fluid.
 - b. Fill wells with oil or graphite and secure caps.
- C. Pressure Gauge
1. Install pressure gauges in piping tee with pressure gauge valve located on pipe at most readable position.
 2. Install in the following locations and as indicated on the Drawings:
 - a. At suction and discharge of each pump.
 - b. At inlet and discharge of each pressure-reducing valve.
 - c. At building water service entrance.
 - d. At chilled water and condenser water inlets and outlets of chillers.
 - e. At inlet and outlet of each hydronic coil.
 - f. At inlet and outlet of each strainer.
 3. Pressure Gauge Needle Valves: Install in piping tee with snubber. Install syphon instead of snubber for steam pressure gauges.
- D. Test Plug

1. Install test plugs in piping tees where indicated, located on pipe at most readable position. Secure cap.

E. Flow-Measuring Systems

1. Install per manufacturers recommendations.
2. Install flow meters for piping systems located in accessible locations at most readable position.
3. Install flow meter as indicated.
4. Provide manufacturer recommended straight lengths of piping upstream and downstream of flowmeter installation locations. Minimum 10 diameters upstream and 5 diameters downstream.

F. Connections

1. Piping installation requirements are specified in other Division 15 Sections. The Drawings indicate the general arrangement of piping, fittings, and specialties.
2. Install meters and gauges adjacent to machines and equipment to allow servicing and maintenance.
3. Connect flow-meter transmitters to meters.
4. Make electrical connections to power supply and electrically operated meters and devices.

3.02 ADJUSTING AND CLEANING

- A. Calibrate meters according to manufacturer's written instructions, after installation.
- B. Adjusting: Adjust faces of meters and gauges to proper angle for best visibility.
- C. Cleaning: Clean windows of meters and gauges and factory-finished surfaces. Replace cracked and broken windows and repair scratched and marred surfaces with manufacturer's touch-up paint.

END OF SECTION