

SAMPLE PRODUCT SPECIFICATIONS

Thermometers & Gauges

Product Guide Specification

THERMOMETERS & GAUGES

Specifier Notes: This section covers Miljoco Corporation thermometers and pressure gauges suitable for application in commercial HVAC systems. Consult Miljoco for assistance in editing this section for specific applications.

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Thermometers.
- B. Pressure gauges.

1.2 RELATED SECTIONS

Specifier Notes: Edit the following list as required for the project. List other sections with work directly related to meters and gauges.

- A. Section 220519 Thermometers and Gauges for Domestic Water Piping
- B. Section 230519 Thermometers and Gauges for Mechanical, HVAC and Steam Piping

1.3 REFERENCES

- A. ASTM E1-03a - Standard Specification for ASTM Liquid-in-Glass Thermometers.
- B. ASTM E77-98 (2003) - Standard Test Method for Inspection and Verification of Thermometers.
- C. ASME B40.200 - 2001 - Thermometers, Direct Reading and Remote Reading.
- D. ASME B40.100 - 1998 - Pressure Gauges and Gauge Attachments.

1.4 SUBMITTALS

- A. Comply with requirements of Section 01330 - Submittal Procedures.
- B. Product Data: Include scale range and manufacturer's rating for each product specified.
- C. Shop Drawings: Include schedule indicating manufacturer's number, scale range, fittings, and location for each meter and gauge.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.
- B. Storage: Store materials in an indoor area, protected from damage and in accordance with manufacturer's instructions.
- C. Handling: Handle products in accordance with manufacturer's instructions. Protect materials and finished during handling and installation to prevent damage.

PART 2 PRODUCTS

2.1 LIQUID-IN-GLASS THERMOMETER - ****MOST TYPICALLY SPECIFIED****

- A. Manufacturers:
 - 1. Miljoco Corporation.
 - 2. Other approved equal.
- B. Case: Precision die-cast aluminum with powder-coat finish, 9-inches long.
- C. Tube: Non-toxic, blue-reading organic filled, with magnifying lens front.
- D. Scale: V-shaped aluminum with white finish and black markings.
- E. Window: Acrylic.
- F. Connector: Adjustable type, 180° in vertical plane, 360° in horizontal plane, with locking device, finished to match case.
- G. Stem: Die-cast aluminum for thermowell installation and of length to suit installation.
- H. Accuracy: Plus or minus one percent of range or plus or minus one scale division.



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Thermometers & Gauges, cont'd

2.2 DUCT-TYPE, LIQUID-IN-GLASS THERMOMETER - ****MOST TYPICALLY SPECIFIED FOR AIR-DUCTS****

- A. Manufacturers:
 - 1. Miljoco Corporation
 - 2. Other approved equal.
- B. Case: Precision die-cast aluminum with powder-coat finish, 9-inches long.
- C. Tube: Non-toxic, blue-reading organic filled, with magnifying lens front.
- D. Scale: V-shaped aluminum with white finish and black markings.
- E. Window: Acrylic.
- F. Connector: Adjustable type, 180° in vertical plane, 360° in horizontal plane, with locking device, finished to match case.
- G. Stem: Perforated aluminum with flange fitting for attachment to duct.
- H. Accuracy: Plus or minus one percent of range or plus or minus one scale division.

2.3 SOLAR DIGITAL THERMOMETER - ****CURRENT TREND FOR TYPICAL SPECIFICATION****

- A. Manufacturers:
 - 1. Miljoco Corporation.
 - 2. Other approved equal.
- B. Case: High-impact black ABS plastic.
- C. Display: LCD, gray background, 1/2-inch high black characters.
- D. Display Update: 6 times per minute.
- E. Illuminance: Bi-directional solar collectors, 35 lux.
- F. Sensor: Glass passivated thermistor.
- G. Connector: Adjustable type, 180° in vertical plane, 360° in horizontal plane, with locking device, molded to match case.
- H. Stem: Die-cast aluminum for thermowell installation and of length to suit installation.
- I. Accuracy: Greater value of one degree or one percent of reading.

2.4 DIRECT-MOUNTING, VAPOR-ACTUATED DIAL THERMOMETER - ****FASTEST RESPONDING****

- A. Manufacturers:
 - 1. Miljoco Corporation
 - 2. Other approved equal.
- B. Case: Drawn stainless steel, brightly finished, 4-1/2 inch diameter.
- C. Element: Phosphor bronze bourdon tube type, with brass connector.
- D. Movement: Brass with precision milled teeth.
- E. Dial: Aluminum with white finish and black markings.
- F. Pointer: Adjustable type, aluminum with black finish.
- G. Window: Shatter-proof acrylic.
- H. Ring: Stainless steel, brightly finished.
- I. Connector: Adjustable type, 180-degrees in vertical plane, with locking device.
- J. Thermal System: Vapor-actuated, with thermowell connection and copper sensing bulb of length to suit application.
- K. Accuracy: Plus or minus one scale division.

2.5 REMOTE-MOUNTING, VAPOR-ACTUATED DIAL THERMOMETER - ****WHERE REMOTE READING IS REQUIRED****

- A. Manufacturers:
 - 1. Miljoco Corporation
 - 2. Other approved equal.
- B. Case: Black glass-filled nylon, 4-1/2 inch diameter.
- C. Element: Phosphor bronze bourdon tube type, with brass connector.
- D. Movement: Brass with precision milled teeth.
- E. Dial: Aluminum with white finish and black markings.
- F. Pointer: Adjustable type, aluminum with black finish.
- G. Window: Clear glass.
- H. Ring: Stainless steel, brightly finished.
- I. Thermal System: Vapor-actuated, copper capillary with protective bronze-braided armor, thermowell connection and copper sensing bulb of length to suit application.
- J. Accuracy: Plus or minus one scale division.



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2.6 BIMETALLIC-ACTUATED DIAL THERMOMETER - ****HERMETICALLY SEALED FOR OUTDOOR USE****

- A. Manufacturers:
 - 1. Miljoco Corporation
 - 2. Other approved equal.
- B. Case: Stainless steel, 5-inch diameter.
- C. Element: Bimetal coil helix with silicone dampening on ranges up to 300 deg F.
- D. Dial: Aluminum with white finish and black markings.
- E. Pointer: Aluminum with black finish.
- F. Recalibrator: Recalibrator screw on rear of case.
- G. Window: Clear glass.
- H. Ring: Stainless steel.
- I. Connector: Adjustable angle type with 1/2" NPT thermowell connection.
- J. Stem: 0.250" O.D., of length to suit application.
- K. Accuracy: Plus or minus one percent of range.

2.7 THERMOWELLS

Specifier Notes: Thermowells not required for duct-type thermometers.

- A. Manufacturers (Same as manufacturer of thermometer being used):
 - 1. Miljoco Corporation
 - 2. Other approved equal.
- B. Description: Pressure-tight, socket-type metal fitting for insertion into piping and of type, diameter, connection length to hold thermometer.
- C. Material: To suit the process media.

Specifier Notes: Edit or delete the following sections for product as required by the project.

2.8 DIRECT-MOUNT, DIAL-TYPE PRESSURE GAUGE, 1/2% ACCURACY - ****PREMIUM GAUGE FOR LASTING RELIABILITY****

- A. Manufacturers:
 - 1. Miljoco Corporation
 - 2. Other approved equal.
- B. Case: Dry type, cast aluminum with surface mounting flange, black finished, 4-1/2-inch diameter.
- C. Pressure Element Assembly: Phosphor-bronze bourdon tube.
- D. Pressure Connection: Brass, 1/4" NPT, bottom-outlet type.
- E. Movement: Stainless steel rotary type.
- F. Dial: Aluminum with white finish and black markings.
- G. Pointer: Micro-adjustable type, aluminum with black finish.
- H. Window: Clear glass.
- I. Ring: Stainless steel.
- J. Accuracy: Plus or minus one-half percent of entire range (conforms to ASME B40.100, Grade 2A).

2.9 DIRECT-MOUNT, DIAL-TYPE PRESSURE GAUGE, 1% ACCURACY - ****TYPICALLY SPECIFIED COMMERCIAL GAUGE****

- A. Manufacturers:
 - 1. Miljoco Corporation
 - 2. Other approved equal.
- B. Case: Dry-type, drawn stainless steel, brightly finished, 4-1/2 inch diameter.
- C. Pressure Element Assembly: Phosphor-bronze bourdon tube.
- D. Pressure Connection: Brass, 1/4" NPT, bottom-outlet type.
- E. Movement: Brass with precision milled teeth.
- F. Dial: Aluminum with white finish and black markings.
- G. Pointer: Adjustable type, aluminum with black finish.
- H. Window: Shatter-proof acrylic.
- I. Ring: Stainless steel.
- J. Accuracy: Plus or minus one percent of entire range (conforms to ASME B40.100, Grade 1A).



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2.10 DIRECT-MOUNT, DIAL-TYPE PRESSURE GAUGE, LIQUID-FILLED CASE - ****HERMETICALLY SEALED FOR OUTDOOR USE****

- A. Manufacturers:
 - 1. Miljoco Corporation
 - 2. Other approved equal.
- B. Case: Glycerine-filled type, stainless steel, 4-inch diameter.
- C. Pressure Element Assembly: Brass bourdon tube.
- D. Pressure Connection: Brass, 1/4" NPT, bottom-outlet type.
- E. Movement: Brass with precision milled teeth.
- F. Dial: Aluminum with white finish and black markings.
- G. Pointer: Aluminum with black finish.
- H. Window: Clear glass.
- I. Ring: Stainless steel, bayonet type.
- J. Accuracy: Plus or minus one percent of entire range (conforms to ASME B40.100, Grade 1A).

2.11 PRESSURE GAUGE FITTINGS

- A. Manufacturers:
 - 1. Miljoco Corporation
 - 2. Other approved equal.

Specifier Notes: Edit the following list as required for the project.

- B. Valves: 1/4" NPT, brass needle type.
- C. Syphons: 1/4" NPT, coil of steel tubing with threaded ends.
- D. Snubbers: 1/4" NPT brass bushing with porous stainless steel disc suitable for system fluid and working pressure.

2.12 TEST PLUGS

- A. Manufacturers:
 - 1. Miljoco Corporation
 - 2. Other approved equal.
- B. Body: Brass body plug in 1/4" or 1/2" NPT fitting of length to extend beyond insulation.
- C. Pressure Rating: 500 psig minimum
- D. Core: Self-sealing valve, suitable for inserting 1/8-inch O.D. probe from dial-type thermometer or pressure gage.
- E. Core Material: Minus 30 to plus 275 deg F, ethylene-propylene-diene terpolymer rubber.
- F. Test Plug Cap: Gasketed and threaded cap, of same material as plug.
- G. Test Kit: Pressure gauge and adapter with probe, two bimetal dial thermometers, and protective carrying case.
 - 1. Pressure and Temperature Ranges: Approximately two time the system's operating conditions.

PART 3 EXECUTION

3.1 METER AND GAGE INSTALLATION

- A. Install Thermometers, gauges, and accessories according to manufacturer's written instructions for applications where used.

3.2 THERMOMETER INSTALLATION

- A. Install liquid-in-glass, direct-mounted vapor-actuated, or bimetallic-actuated thermometers in the following locations:

Specifier Notes: Edit, add or delete the following list as required for the project.

- 1. Inlet and outlet of each hydronic zone.
- 2. Inlet and outlet of each hydronic boiler and chiller.
- 3. Inlet and outlet of each hydronic coil in air-handling units and built-up central systems.
- 4. Inlet and outlet of each hydronic heat exchanger.
- 5. Inlet and outlet of each hydronic heat-recovery tank.
- 6. Inlet and outlet of each thermal-storage tank.
- 7. Outside-air, return-air, and mixed-air ducts.



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B. Provide the following temperature ranges for liquid-in-glass thermometers:

Specifier Notes: Edit the following list as required for the project.

1. Domestic Hot Water: 30 to 240 deg F, with 2-deg scale divisions (0 to 115 deg C, with 1-deg scale divisions).
2. Domestic Cold Water: 0 to 120 deg F, with 1-deg scale divisions (-10 to 50 deg C, with 1-deg scale divisions).
3. Heating Hot Water: 30 to 300 deg F, with 2-deg scale divisions (0 to 150 deg C, with 1-deg scale divisions).
4. Condenser Water: 0 to 160 deg F, with 2-deg scale divisions (-15 to 70 deg C, with 1-deg scale divisions).
5. Chilled Water: 0 to 120 deg F, with 1-deg scale divisions (-10 to 50 deg C, with 1-deg scale divisions).
6. Steam & Condensate: 30 to 300 deg F, with 2-deg scale divisions (0 to 150 deg C, with 1-deg scale divisions).
7. Air Ducts: -40 to 110 deg F, with 2-deg scale divisions (-40 to 40 deg C, with 1-deg scale divisions).

B. Provide the following temperature ranges for solar digital thermometers:

1. All locations: -58 to 302 deg F, with tenth-deg resolution (-50 to 150 deg C, with tenth-deg resolution).

C. Provide the following temperature ranges for direct-mounted vapor-actuated thermometers:

Specifier Notes: Edit the following list as required for the project.

1. Domestic Hot Water: 30 to 240 deg F, with 2-deg scale divisions (0 to 115 deg C, with 1-deg scale divisions).
2. Domestic Cold Water: 20 to 80 deg F, with 1-deg scale divisions (-5 to 25 deg C, with 1-deg scale divisions).
3. Heating Hot Water: 30 to 300 deg F, with 1-deg scale divisions (0 to 150 deg C, with 2-deg scale divisions).
4. Condenser Water: -40 to 110 deg F, with 2-deg scale divisions (-40 to 40 deg C, with 2-deg scale divisions).
5. Chilled Water: -40 to 110 deg F, with 2-deg scale divisions (-40 to 40 deg C, with 2-deg scale divisions).
6. Steam & Condensate: 30 to 300 deg F, with 1-deg scale divisions (0 to 150 deg C, with 2-deg scale divisions).
7. Air Ducts: -40 to 110 deg F, with 2-deg scale divisions (-40 to 40 deg C, with 2-deg scale divisions).

D. Provide the following temperature ranges for bimetallic-actuated thermometers:

Specifier Notes: Edit the following list as required for the project.

1. Domestic Hot Water: 0 to 250 deg F, with 2-deg scale divisions (-20 to 120 deg C, with 1-deg scale divisions).
2. Domestic Cold Water: 25 to 125 deg F, with 1-deg scale divisions (-5 to 50 deg C, with 1/2-deg scale divisions).
3. Heating Hot Water: 50 to 500 deg F, with 2-deg scale divisions (10 to 260 deg C, with 2-deg scale divisions).
4. Condenser Water: -40 to 160 deg F, with 2-deg scale divisions (-40 to 70 deg C, with 1-deg scale divisions).
5. Chilled Water: -40 to 160 deg F, with 2-deg scale divisions (-40 to 70 deg C, with 1-deg scale divisions).
6. Steam & Condensate: 50 to 500 deg F, with 2-deg scale divisions (10 to 260 deg C, with 2-deg scale divisions).
7. Air Ducts: -40 to 160 deg F, with 2-deg scale divisions (-40 to 70 deg C, with 1-deg scale divisions).

3.3 PRESSURE GAUGE INSTALLATION

- A. Install pressure gauges in piping tees at most-readable position.
- B. Install dry-type pressure gauges in the following locations:
 1. Discharge of each pressure-reducing valve.
 2. Building water-service entrance.
 3. Chilled-water and condenser-water inlets and outlets of chillers.
- C. Install liquid-filled-type pressure gauges at suction and discharge of each pump.
- D. Install pressure-gauge needle valve and snubber in piping to pressure gauges.
 1. Exception: Install syphon instead of snubber in piping to steam pressure gauges.
- E. Provide pressure ranges equal to approximately two-times the system pressure.

END OF SECTION

A copy of this specification is available in electronic format at www.miljoco.com.

