# GENERAL

## SECTION INCLUDES

### Sight flow indicators.

### Pressure gages and pressure gage taps.

### Thermometers and thermometer wells.

### Piping pressure and temperature test plugs.

### Static pressure and filter gages.

## REFERENCE SECTION 23 05 00 FOR THE FOLLOWING:

### Quality assurance.

### References

### Submittals

### Operation and maintenance manuals.

### Project record documents

#### Accurately record actual locations of instrumentation.

### Delivery, storage, and handling

## ENVIRONMENTAL REQUIREMENTS

### Do not install instrumentation when areas are under construction, except for required rough‑in, taps, supports and test plugs.

# PRODUCTS

## SIGHT FLOW INDICATORS

### Bronze or stainless-steel body, with sight glass and paddle wheel indicator, threaded or flanged ends.

### Minimum pressure rating: 150 psig.

### Minimum temperature rating: 200 deg F.

### End connections for NPS 2 inch and smaller: Threaded.

### End Connections for NPS 2-1/2 inch and larger: Flanged.

## PRESSURE GAGES

### Standard: ASME B40.200.

### Type: General use, ASME B40.1, Grade A, phosphor bronze bourdon-tube type, bottom connection, liquid-filled.

### Case: Drawn steel or brass, glass lens, 4-1/2-inches diameter.

### Connector: Brass, 1/4-inch NPS.

### Scale: White coated aluminum, with permanently etched markings.

### Accuracy: Plus or minus 1 percent of range span.

### Range: Conform to the following:

#### Vacuum: 30 inches Hg to 15 psi.

#### All fluids: 2 times operating pressure.

## PRESSURE GAGE ACCESSORIES

### Syphon: 1/4-inch NPS straight coil constructed of brass tubing with threads on each end.

### Snubber: 1/4-inch NPS brass bushing with corrosion-resistant porous metal disc. Disc material shall be suitable for fluid served and rated pressure.

## GLASS THERMOMETERS

### Standard: ASME B40.200.

### Case: Die cast, aluminum finished, in baked epoxy enamel, glass front, spring secured, 9 inches long.

### Adjustable Joint: Finished to match case, 180-degree adjustment in vertical plane, 360-degree adjustment in horizontal plane, with locking device.

### Tube: Red reading, magnifying lens, with non-mercury fluid.

### Scale: Satin-faced, nonreflective aluminum, with permanently etched markings.

### Stem: Copper-plated steel, aluminum or brass, for separable socket, length to suit installation.

### 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.

### Scale range: Temperature ranges for services listed as follows:

#### Condenser/Heat Pump Water: 0 to 160 deg F with 2-degree scale divisions (minus 18 to 70 deg C with 1-degree scale divisions).

#### Heating Water: 30 to 250 deg with 2-degree scale divisions (0 to 150 deg C with 1-degree scale divisions).

#### Chilled Water: 0 to 100 deg F with 2-degree scale divisions (minus 20 to 50 deg C with 1-degree scale divisions).

#### Steam and Condensate: 50 to 400 deg F with 2-degree scale divisions (0 to 200 deg C with 1-degree scale divisions).

## THERMOMETER WELLS

### Thermometer Wells: Brass or stainless steel, pressure rated to match piping system design pressure; with 2-inch extension for insulated piping and threaded cap nut with chain permanently fastened to well and cap.

## PIPING PRESSURE AND TEMPERATURE TEST PLUGS

### Test Plugs shall be nickel-plated brass body, with 1/2-inch NPS fitting and 2 self-sealing valve-type core inserts, suitable for inserting a 1/8-inch O.D. probe assembly from a dial-type thermometer or pressure gage. Test plug shall have gasketed and threaded cap with retention chain and body of length to extend beyond insulation. Pressure rating shall be 500 psig.

### Core Material: Conform to the following for fluid and temperature range:

#### Air, Water, Oil, and Gas, 20 to 200 deg F (minus 7 to 93 deg C): Neoprene.

## STATIC PRESSURE GAGES

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

### Accessories: Static pressure tips with compression fittings for bulkhead mounting, 1/4 inch (6 mm) diameter tubing.

### Construction: Bronze or stainless-steel body, with sight glass and [ball, flapper, or paddle wheel] <Insert device> indicator, and threaded or flanged ends.

### Minimum Pressure Rating: [125 psig (860 kPa)] [150 psig (1034 kPa)] <Insert value>.

### Minimum Temperature Rating: [200 deg F (93 deg C)] <Insert temperature>.

### End Connections for NPS 2 (DN 50) and Smaller: Threaded.

### End Connections for NPS 2-1/2 (DN 65) and Larger: Flanged.

# EXECUTION

## GENERAL

### Install in accordance with manufacturer's instructions.

## FLOW MEASURING METERS

### Install where shown on plans and schematics as indicated.

### Assemble and install connections, tubing, and accessories between flow-measuring elements and flowmeters according to manufacturer's written instructions and as detailed on drawings.

### Install flowmeter elements in accessible positions in piping systems. Maintain manufacturer-recommended minimum upstream and downstream distances.

### Install permanent indicators on walls or brackets in accessible and readable positions.

### Install connection fittings in accessible locations for attachment to portable indicators.

### Mount thermal-energy meters on wall if accessible; if not, provide brackets to support meters.

### Install flow meters for piping systems located in accessible locations at most readable position.

### Calibrate meter after installation in accordance with manufacturer's installation instructions.

### Installation of steam meter and associated wiring, pressure transmitter and RTD assembly, shall be in strict accordance with manufacturer’s printed instructions and recommendations, applicable BOCA requirements, and as detailed on drawings.

### Pressure and temperature taps shall be installed a minimum of three pipe diameters downstream, before any isolation valves.

### Steam will not be turned on by UNL personnel until the steam meter is fully installed and operating satisfactorily and the downstream steam piping is successfully leak tested and secure.

### Only UNL personnel will be authorized to turn steam service on or off.

## PRESSURE GAGES

### Install pressure gages in piping tee with pressure gage valve, located on pipe at most readable position.

### Install as shown on plans, and elsewhere as indicated.

### Pressure Gage Ball Valves: Install in piping tee with snubber. Install syphon in lieu of snubber for steam pressure gages.

## THERMOMETERS

### Install thermometers in vertical and tilted positions to allow reading by observer standing on floor.

### Install as shown on plans and elsewhere as indicated.

### Thermometer Wells: Install in piping tee where thermometers are indicated, in vertical position. Fill well with oil or graphite and secure cap.

## TEST PLUGS

### Test Plugs: Install where indicated, located on pipe at most readable position. Secure cap.

## ADJUSTING AND CLEANING

### Adjusting: Adjust faces of meters and gages to proper angle for best visibility.

### Cleaning: Clean windows of meters and gages and factory-finished surfaces. Replace cracked and broken windows, and repair scratched and marred surfaces with manufacturer's touch-up paint.

END OF SECTION 23 05 19