

## SECTION 230943 - PNEUMATIC CONTROL SYSTEM FOR HVAC

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes a complete and functional pneumatic temperature control system.
- B. The Temperature Control Contractor shall bid directly to and be contracted directly by the General Contractor or Construction Manager.
- C. Related Sections include the following:
  - 1. Division 23 Section "Meters and Gages for HVAC Piping" for measuring equipment that relates to this Section.
  - 2. Division 23 Section "Instrumentation and Control Devices for HVAC"

#### 1.3 SYSTEM DESCRIPTION

- A. The Temperature Control System (TCS) shall consist of, but not necessarily be limited to, room thermostats and humidistats, temperature, pressure, and humidity sensors, control amplifiers, relays, switches, gauges, control valves, dampers, actuating motors, air compressor, pressure reducing station, air dryer, filters, and interconnecting piping. All controllers, switches, relays, gauges, etc., shall be mounted in approved steel control panels, one for each system. Pressure gauges shall be 1-1/2 inch diameter style mounted directly on the device, and not on the control panel door.

#### 1.4 SUBMITTALS

- A. Product Data: Include manufacturer's technical literature for each control device. Indicate dimensions, capacities, performance characteristics, electrical characteristics, finishes for materials, and installation and startup instructions for each type of product indicated.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 1. Bill of materials of equipment indicating quantity, manufacturer, and model number.
  - 2. Details of control panel faces, including controls, instruments, and labeling.
  - 3. Schedule of dampers including size, leakage, and flow characteristics.

4. Schedule of valves including flow characteristics.
  5. Sequence of Operation.
- C. Field quality-control test reports.
- D. As-Built Drawings: Furnish neatly drawn as-built diagrams of the temperature control systems, complete with sequence operations, all mounted in a glass covered suitable frame to be hung from the wall in a location designated in the field. One set of as-built control drawings shall be reproduced in a dense black diazo image on .003 inch thick polyester film with matte surface on reverse side, in 18" x 24" size. Any tracings smaller than 18" x 24" shall be reproduced in the lower right hand corner of the material. Any tracing larger than 18" x 24" shall be reduced to fit on 18" x 24" material. Scale of these tracings need not be retained.
- E. Operation and Maintenance Data: For HVAC instrumentation and control system to include in emergency, operation, and maintenance manuals.

## 1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Factory-Mounted Components: Where control devices specified in this Section are indicated to be factory mounted on equipment, arrange for shipping of control devices to equipment manufacturer.

## 1.7 COORDINATION

- A. Coordinate location of thermostats, humidistats, and other exposed control sensors with plans and room details before installation.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers unless otherwise specified.
1. Honeywell.
  2. Johnson Controls.
  3. Siemens.

## 2.2 PRIMARY CONTROL DEVICES

- A. All gauges used in the control system shall be "in-line" type, not panel mounted.
- B. All pneumatic devices shall have brass fittings, no plastic fittings will be allowed.
- C. Primary control devices shall be pneumatic amplifier-controllers operating on the force balance principle. Controllers shall have field adjustable authority. Proportional band, direct or reverse action, and control point. Control point shall be remotely adjustable if required. Controllers shall have integral air restrictions and filters. All input and output ports shall be provided with suitable pressure gauges. Powers RC-185 Series Powerstak Controllers and Johnson T-9000 Series controllers are not acceptable.
- D. Temperature sensors shall provide proportional pneumatic input signals to the primary amplifier-controllers. Outdoor air and fluid immersion sensors shall be of the rod and tube design. Air duct sensors shall be of the liquid filled capillary style with 20 foot long averaging elements.
- E. Humidity sensors shall provide proportional pneumatic input signals to the primary amplifier-controllers. Sensing element shall be nylon. Automatically compensated for temperature variation.
- F. Static pressure sensors shall provide proportional pneumatic input signals to the primary amplifier controllers. Sensor shall be capable of positive, negative, or differential pressure control, as referenced to atmosphere. Instrument control range shall be selected for maximum sensitivity within designated operating limits. Averaging sensing elements shall be installed across the full flow area in a serpentine fashion on rigid supports designed specifically for this purpose.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Special equipment shall be installed in accordance with manufacturer's instructions and recommendations. All control instruments, valves, etc., shall be carefully adjusted and set for proper operating of the equipment served as noted herein or as required by the equipment manufacturer's instructions and recommendations.
- B. Outdoor air sensors shall be installed on the north or west walls/equipment, and provided with sun and damage guards.
- C. Immersion sensors shall be provided with immersion wells.
- D. Verify location of thermostats, humidistats, and other exposed control sensors with Drawings and room details before installation.
- E. Install automatic dampers according to Division 23 Section "Air Duct Accessories."

- F. Install damper motors on outside of duct in warm areas, not in locations exposed to outdoor temperatures.
- G. Install labels and nameplates to identify control components according to Division 23 Section "Identification for HVAC Piping and Equipment."
- H. Install hydronic instrument wells, valves, and other accessories according to Division 23 Section "Hydronic Piping."
- I. Install steam and condensate instrument wells, valves, and other accessories according to Division 23 Section "Steam and Condensate Heating Piping."
- J. Install duct volume-control dampers according to Division 23 Sections specifying air ducts.

### 3.2 FIELD QUALITY CONTROL

- A. Provide field supervision, and calibration and start up service.
- B. Upon completion of the work, the Contractor shall instruct the Owner's Operating Engineer and acquaint him with all of the operating characteristics of all equipment installed by him including the TCS and all other systems, at the same time operating each and every system individually for a period of two days, unless otherwise specified. During this two day period the building's Operations Manual shall be used for reference.

### 3.3 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain HVAC instrumentation and controls.

END OF SECTION 230943