

**SECTION 23 09 53 – PNEUMATIC AND ELECTRIC CONTROL SYSTEMS FOR HVAC**

**PART 1: GENERAL**

**1.01 System of Overview**

- A. The Building Automation System (BAS) shall include a hybrid HVAC temperature control system consisting of digital and pneumatic control components. Equipment controlled digitally shall include primary and secondary HVAC equipment including fans; chilled water coils, heating coils, pumps, humidification equipment, and VAV boxes.
- B. Texas State University-San Marcos standard-VAV boxes serving conditioned zone space shall be controlled digitally using electric actuators and temperature sensors.
- C. Major HVAC component valve and damper actuators including air handler mixing dampers, smoke management system dampers, and air handler valves shall be electronic.
- D. Texas State University-San Marcos standard building monitoring points shall be incorporated into the design.
- E. Texas State University-San Marcos maintains standard HVAC control sequences which shall be incorporated into the project design. Control sequences are based on Texas State University-San Marcos standard HVAC equipment configurations. Deviations from standard equipment configurations shall require modifications to standard control sequences.

**1.02 Compatibility – Digital**

- A. Due to the need for compatibility with existing BAS equipment, the automation contractor shall be approved by Texas State University-San Marcos Physical Plant prior to acceptance of the contractor's proposal.
- B. To ensure compatibility, design and procurement of the automation system shall include Texas State University-San Marcos Standard documents as follows:
  - 1. Contractor technical proposal requirements
    - a. BAS Cost Summary—completed by the proposed contractor.

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- b. BAS Scope Checklist—completed by the proposed contractor.
  - c. Equipment technical information.
  - d. Contractor personnel information.
2. Specifications
- a. Control drawings and schematics
  - b. Point schedules

**PART 2: PRODUCTS (NOT USED)**

**PART 3: EXECUTION**

**3.01 Design Requirements**

- A. The 50% Schematic Document review submission shall include automation system plans and specifications and shall include a list of deviations from standards.
- B. Statement of deviations from standards approved by Physical Plant.
- C. Incorporate Physical Plant standard HVAC control documents and details into project Contract Documents.
- D. Show BAS enclosure locations on mechanical plans. Coordinate locations with other divisions—architectural, electrical, telecommunications, etc. Ensure adequate mounting space and floor area including service access. Enclosure preferred location is adjacent to and within the same room as equipment served.
- E. Show automation system communication requirements on telecommunication plans.
- F. Two electrical circuits sourced from one panel location for automation system power and routed to each BAS enclosure. Power sourced from an emergency system.

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**3.02 Coordination**

- A. Fire alarm and smoke management system. Independent of BAS HVAC control system.
  - 1. Fire alarm system smoke detector shutdown and start/stop control of fans.
  - 2. Smoke management system control of dampers and fans.
  - 3. Interface with BAS for control of HVAC components.
  
- B. Motor controls
  - 1. Motor starters: minimum one DPDT auxiliary contact. Maintained H-O-A with automation system start/stop through automatic side of switch. Hardwired equipment safeties with annunciator.
  - 2. Variable speed drives: provisions to operate with 4-20ma, 0-10VDC or 3-15psi pneumatic control signal. Components for communication with BAS. 4-20 ma analog output signal from drive that varies in direct proportion to drive speed. Minimum 2 programmable analog outputs. Minimum two form C dry contacts for run mode and fault mode indication. Texas State University-San Marcos standard drive mounting configuration including disconnects and external bypass mounted on rack.
  
- C. Electrical
  - 1. Power source: electrical contractor provides circuits and breakers at a central location. BAS contractor provides wire and conduit from this location to automation equipment.
  - 2. Source of all power for BAS including network hardware shall be emergency/backup power.
  
- D. Telecommunications and Network
  - 1. Coordinate BAS network and telecommunications requirements with telecommunications design.
  - 2. BAS network requirements include one data outlet in each main mechanical room and at least one data outlet on each floor. Location of data outlet to be coordinated with location of BAS equipment enclosures. All circuits shall be routed back to centrally located BAS network switch.

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Network switch shall be provided with UPS, which shall be powered from 30amp 120 VAC emergency power circuit. 30-amp circuit provided with NEMA L5-30 receptacle located adjacent to UPS location.

3. BAS telecommunication requirements include voice outlet in each main mechanical and electrical room with phone set.

E. Utility metering

1. Chilled water flow meter and temperature sensors. Steam or condensate meters and temperature sensors.
2. Other miscellaneous utility meters as required by project.

F. Safety Annunciator

1. Texas State University-San Marcos standard fan and motor safety annunciator and components shall be used.

**END OF SECTION 23 09 5**