

SECTION 15950 – INSTRUMENTATION AND CONTROLS FOR HVAC

PART I - GENERAL

1.01 DESCRIPTION

- A. Section 15050, Basic Mechanical Materials and Methods, shall be considered a part of these specifications.
- B. The contractor under this heading shall be the heating and air conditioning contractor who shall furnish all control equipment, engineering services, job drawings, and field supervision for temperature control.
- C. This specification is intended to cover equipment for the automatic temperature control of the:
 - Heating,
 - Ventilation, and
 - Air Conditioning Systems.

1.02 GUARANTEE

- A. The control system shall be free from defects in workmanship and material under normal use and service. If within 12 months from date of acceptance by the engineer, any of the equipment herein described is proved to be defective in workmanship or material, it shall be replaced or repaired free of charge.
- B. This contractor shall, after completion of the original test of the installation and acceptance by the engineer, provide any service incidental to the proper performance of the temperature control system under guarantees outlined above for the period of one year. After completion of the installation, this contractor shall regulate and adjust all equipment provided under this contract. He shall place them in complete operating condition subject to the approval of Walgreen Co.

PART II - PRODUCTS

2.01 THERMOSTATS

- A. Programmable thermostat for *Carrier* packaged rooftop units to be *Carrier* (Energy Management System) space sensor with adjustment and remote sensor. *Trane* packaged rooftop units to utilize *Trane* programmable thermostat and remote sensor, unless noted otherwise.
- B. Temperature sensor and thermostat for Entrance heater (EH-1) roof-top unit to be as described on the drawings.
- C. The respective RTU shall be controlled initially from a temperature sensor located in the Manager's Office or later from a remote sensor in the Sales area.

2.02 FIRE PROTECTION

- A. Provide firestats and/or smoke detectors as described in Section 16720.

2.03 INDOOR RELATIVE HUMIDITY SENSOR

- A. This sensor, located in the Sales area shall control the Dehumidification by Trane.

PART III - EXECUTION

3.01 INSTALLATION

- A. All dampers shall be positioned by the ventilation contractor. Ventilation contractor shall also mark positions of dampers on "as built" layouts.
- B. All control motors must be spring return and must have oil immersed gear train.
- C. All electrical wiring and mounting of temperature control devices shall be provided under the electrical contract and shall be in accordance with all existing codes. The electrical contractor shall run all wiring and conduit. This contractor shall provide wiring drawings to the electrical contractor for the installation.
- D. All temperature control devices and sensors shall be labeled with the associated RTU or exhaust fan number. (ie: RTU- 1, EH- 1, EF- 1, etc.)

3.02 PERFORMANCE

- A. The Energy Management System (EMS) capabilities shall include control, monitoring and alarming of HVAC and refrigeration equipment and accessories as follows:
 - 1. Control
 - a. RTU evaporator fan
 - b. RTU cool stage 1
 - c. RTU cool stage 2
 - d. RTU heat stage 1
 - e. RTU heat stage 2
 - f. Economizer position (0 – 100%)
 - g. Space relative humidity
 - h. Interlock preventing simultaneous start of rooftop units
 - i. Sequence start/stop control of RTU's
 - 2. Monitoring
 - a. HVAC
 - 1) space relative humidity
 - 2) space temperatures
 - 3) supply air temperatures
 - 4) outdoor air temperature
 - 5) temperature setpoints
 - 6) equipment status: fan, heat stage 1 & 2, cool stage 1 & 2, economizer status, outdoor air damper position
 - b. Refrigeration
 - 1) freezer temperature
 - 2) cooler temperature
 - c. Alarming (System shall be able to generate and email the following alarm messages:
 - 1) Space temperature – High
 - 2) Space temperature – Low
 - 3) Fire alarm shutdown
 - 4) Supply fan status
 - 5) Compressor lockout
 - 6) Sensor(s) failure (applies to temperature and humidity type sensors)
 - 7) Freezer temperature (High/Low)
 - 8) Freezer/cooler trouble alarm

9) Space humidity – High

d. Future Expansion

System shall have capacity for future expansion and incorporation of functions currently performed by store control system (such as interior lighting, miscellaneous power, wall and entrance heat controls, etc.)

e. Communication

1) Within Walgreens Intranet

Ethernet TCP/IP communication with EMS panels in the stores shall be performed via dedicated server(s) at Walgreens Mount Prospect facility. The server shall provide graphical views of the system, which can be accessed via a standard web browser such as *Internet Explorer* or *Netscape Navigator*.

2) Outside Walgreens Intranet

Vendors would be able to communicate with EMS panels via dedicated port (firewall) in above-mentioned server(s) or via Internet VPN (vendors shall discuss details with Walgreens IT security).

f. Support

1) Submittal documentation package including control drawings

2) Initial programming

3) Technical support during installation and startup

4) On-site commissioning

5) First year 24 hour, 7 days-a-week support via vendor monitoring center including receiving and logging calls, diagnosing and addressing problems, program scheduling, etc. Vendor shall provide Call Center support to dispatch service provider.

g. Warranty – 1 year control component warranty

B. *Carrier or Trane* Sequence of Operations: The heating and cooling setpoints shall be individually adjustable for both occupied and unoccupied periods. The thermostats shall have a minimum deadband of 2 degrees F and a maximum deadband of 5 degrees F (no mechanical heating or cooling shall operate within this deadband). Space temperature deviation above cooling setpoint or below the heating setpoint shall generate a demand signal to control the system as follows:

1. Heating: The EMS system (temperature control device) shall control the heating outputs based on the demand signal communicated from the temperature control program, taking into account both space temperature deviation (proportional error) and the duration of that temperature deviation (integral error). The outdoor air damper shall be at a minimum position during the occupied period, and shall be closed during the unoccupied period of the heating mode. Auxiliary heat shall be controlled at 2 degrees F below heating setpoint on heat pump systems.

2. Cooling: The EMS system (temperature control device) shall control the cooling outputs based on the demand signal communicated from the thermostat program, taking into account both space temperature deviation (proportional error) and the duration of that temperature deviation (integral error).

C. Heating Setback and Cooling Setup: Initiation of heating setback or cooling setup for each of 7 days shall be provided by a programmed time schedule manually entered into the thermostat. When all or a portion of a manually programmed schedule is unavailable, the thermostat shall control the unavailable program functions to occupied mode and default setpoint ranges as follows:

TABLE OF DEFAULT SETPOINT RANGES				
	Occupied		Unoccupied	
	°F	°C	°F	°C
Heating	68	20	55	13
Cooling	78	26	90	32

D. Setpoint Recovery from Unoccupied to Occupied: The thermostat shall employ Intelligent Recovery™. This shall select the optimum time to begin building warm up or cool down based on setpoints and occupied program.

1. The temperature shall ramp 5 degrees per hour for both heating and cooling on a conventional system.
2. The temperature shall ramp 3 degrees per hour for heating and 5 degrees for cooling on a heat pump system.

E. An enthalpy based changeover control shall determine the capability of the outdoor air to provide free cooling. A differential enthalpy, comparative enthalpy or dry bulb control should not be used.

F. Fan Operation:

1. HVAC unit fan operation shall be constant during the occupied period.
2. Fan operation shall be intermittent during the unoccupied period.

G. Heating and Cooling Operation Minimum On/Off Times: The thermostat shall incorporate a program to maintain minimum-stage operation times of 2 minutes “on” and 4 minutes “off” for compressor stages, and 2 minutes “on” and 2 minutes “off” for heat (gas or electric resistive).

H. Economizer Interface:

1. The economizer’s minimum position shall be controlled such that then the occupied period is in effect, the economizer will operate as described in Section E. During unoccupied periods, this contact will open defeating economizer minimum position. However, the economizer will be available for free cooling if outdoor return air conditon permits.

END OF SECTION