

SECTION 23 0933**ELECTRIC AND ELECTRONIC CONTROL SYSTEM FOR HVAC****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install automatic temperature control system as described in Contract Documents.
 - 2. Furnish and install conductors and make connections to control devices, motors, and associated equipment.
 - 3. Assist in air test and balance procedure.
- B. Related Requirements:
 - 1. Section 23 0501: Common HVAC Requirements.
 - 2. Section 23 0593: Air test and balance.
 - 3. Section 23 3300: Furnishing and installing of temperature control dampers.
 - 4. Division 26:
 - a. Furnishing and installing of raceway, conduit, and junction boxes, including pull wires, for temperature control system except as noted above.
 - b. Power wiring to magnetic starters, disconnect switches, and motors.
 - c. Motor starters and disconnect switches, unless integral with packaged equipment.

1.2 SUBMITTALS

- A. Informational Submittals:
 - 1. Qualification Statements: Submit document from Approved Distributor confirming sponsorship.
- B. Closeout Submittals:
 - 1. Record Documentation:
 - a. Provide two CD copies with fully commissioned LonSpec database.
 - b. Leave with O&M Manual specified in Section 23 0501.

1.3 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installer:
 - a. Before bidding, obtain sponsorship from a local, Approved Distributor specified under PART 2 PRODUCTS. Initial requirements for sponsorship are:
 - 1) Be one of following Honeywell supported partners:
 - a) Honeywell-Automation Control Specialist (ACS).
 - b) Honeywell-Commercial Comfort & Energy Specialist (CCES).
 - c) Honeywell Authorized Control Integrator (ACI).
 - 2) Receive product training from and exhibit LCBS system skills to sponsoring Approved Distributor.

PART 2 - PRODUCTS**2.1 SYSTEMS**

- A. Manufacturers:
 - 1. Manufacturer List:

- a. Air Products & Controls Ltd, Pontiac, MI www.ap-c.com.
 - b. Fire-Lite Alarms, Northford, CT www.firelite.com.
 - c. Honeywell Inc, Minneapolis, MN www.honeywell.com.
 - d. ICCA Firex, Carol Stream, IL www.icca.invensys.com.
 - e. System Sensor, St Charles, IL www.systemsensor.com.
 - f. Zimmerman Technologies, Renton, WA (425) 255-1906.
- B. Distributors:
1. Obtain WebStat Building Manager, RP panels, thermostats, and other control equipment from following Sponsoring Approved Distributors. See Section 01 4301.
 2. Alabama:
 - a. Quality Controls Inc: (205) 324-1775. nbrewster@shopqci.com Nettie Brewster
 - b. Ener-Tech Industries: (615) 269-5643. bpfleiger@ener-techindustries.com Bob Pfleiger
 3. Georgia:
 - a. Stromquist & Co Inc: (404) 794-3421. brogers@stromquist.com Bob Rogers
 4. Florida:
 - a. Building Automation Inc: (954) 492-0110. engineering@buildingautomation.com Tom Gannon
 - b. Eng Control Sys Inc. (305) 418-8901. John.pittaluga@goecsi.com John Pittaluga
 - c. GC Controls Inc: (305) 774-5794 ramiro@garciacolinias.com Ramiro Garcia
 - d. Victor Distributing Co: (727) 572-7276. dwhite@victordist.com Dave White
- C. Performance:
1. Design Criteria:
 - a. Automatic Temperature Control System design concept utilizes communicating thermostats located near furnace, with electronic sensors and electric / electronic actuation of dampers and with thermostats connected with Echelon approved communication cable. A WebStat Building Manager will interface with the thermostats to provide access via internet browser.
 - b. Network communications and control devices will be LonWorks compliant. System shall include HVAC control, WebStat Building Manager to provide maintenance management functions related to normal building operations.
- D. Components:
1. Thermostats And Sensors:
 - a. Thermostat and Sensor Kit:
 - 1) Category Four Approved Product. See Section 01 6200 for definitions of Categories.
 - a) Part Number Y7335H1009 consisting of following:
 - (1) Communicating Thermostat: Low voltage type provided with automatic change-over feature for both heating and cooling stages, seven-day / 365 day program with two starts and stops per day, and provisions for damper operators. Honeywell T7350H1009.
 - (2) Push-Button Remote Room Sensor: Honeywell T7771A1005 with three push buttons, OVERRIDE, WARMER, COOLER, and with selectable ohm resistance, 10k or 20k.
 - (3) Discharge Air Sensor: Honeywell C7041B2005, 6 inch
 - b. Plain Face Remote Room Sensor:
 - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories.
 - a) Honeywell T7770A3002, plain face, 10k ohms.
 - b) Honeywell T7770A2004, plain face, 20k ohms.
 - c. Non-Programmable Thermostat:
 - 1) Low voltage type.
 - 2) Category Four Approved Product. See Section 01 6200 for definitions of Categories.
 - a) Honeywell T87F1009 with 50010944-001 range stop.
 2. Guard For Cultural Center Sensors:
 - a. Match color of sensor.
 - b. Category Four Approved Product. See Section 01 6200 for definitions of Categories.
 - 1) MSI-244 Sensor Guard with integral wood base by Zimmerman Technologies.
 3. Duct Smoke Detectors:
 - a. Photoelectric duct mounted smoke detector in systems with airflow greater than 2000 CFM. Detectors to operate on 120 VAC.

- b. Category Four Approved Products. See Section 01 6200 for definitions of Categories.
 - 1) Model DH100 ACDPC duct mounted smoke detector by System Sensor.
 - 2) Model FL-D350RP by Fire-Lite.
 - 3) Model SL-2000P by Air Products And Controls Inc.
 - 4) Model 2650-761 by ICCA Firex.
4. Transformer:
 - a. 120 / 24 V, 50VA Honeywell AT150F.
 - b. 120 / 24 V, 75VA Honeywell AT175F.
5. Damper Actuators:
 - a. Electric type equipped for Class I wiring.
 - b. Shall not consume power during UNOCCUPIED cycle or use chemicals or expandable media.
 - c. Have built in spring return.
 - d. Category Four Approved Product. See Section 01 6200 for definitions of Categories.
 - 1) Honeywell S0524-2POS. Also shown as MS8105 1008
 - 2) Honeywell S0524-2POS-SW2 w/ Auxiliary switches.
6. Conductors:
 - a. Color-coded and No. 16 and No. 12 AWG Type TWN, TFN, or THHN, stranded.
 - b. Thermostat Cable: 12, 8, or 4 conductor, 18AWG solid copper wire, insulated with high-density polyethylene. Conductors parallel enclosed in brown PVC jacket (22 AWG cable not allowed).
 - c. Communicating Cable:
 - 1) Category Four Approved Product. See Section 01 6200 for definitions of Categories.
 - a) Honeywell AK3798.
7. Local Relay (RP) Panels For Chapel And Cultural Center Systems:
 - a. 16-ga 1.59 mm screw cover, painted sheet metal. Box with cover and knockouts, pre-wired terminal strips, relay, and transformer.
 - b. Category Four Approved Product. See Section 01 6200 for definitions of Categories.
 - 1) LDS Models RP-1 or RP-5.
8. Command Display Interface:
 - a. Category Four Approved Product. See Section 01 6200 for definitions of Categories.
 - 1) Standard: LDS Models RP-1 or RP-5.
 - 2) Dehumidification: LDS Model RP-5DH.
9. Outdoor Air Pre-Heat Coil Temperature Controller:
 - a. 0 to 100 deg F range.
 - b. 5 foot copper capillary and bulb.
 - c. Category Four Approved Product. See Section 01 6200 for definitions of Categories.
 - 1) Honeywell: T991A1004 with 107324A bulb holder.
10. Control Valve And Motor:
 - a. Category Four Approved Product. See Section 01 6200 for definitions of Categories.
 - 1) Honeywell: V5013N three-way modulating type.
 - 2) Honeywell: ML7420A3063 valve motor.
11. Outdoor Air Temperature Sensor:
 - a. Minus 30 to plus 90 deg F operating range.
 - b. 5 foot capillary length.
 - c. Category Four Approved Product. See Section 01 6200 for definitions of Categories.
 - 1) Honeywell: T6031A1052.
12. Aquastat Controller:
 - a. Strap-on type.
 - b. Category Four Approved Product. See Section 01 6200 for definitions of Categories.
 - 1) Honeywell: L6006C1018.
13. Remote Humidity Room Sensor:
 - a. Three percent Relative Humidity (RH) accuracy.
 - b. Category Four Approved Product. See Section 01 6200 for definitions of Categories.
 - 1) Honeywell: H7635A1006.
14. CO₂ Return Air Sensor:
 - a. Duct mount with display.
 - b. Category Four Approved Product. See Section 01 6200 for definitions of Categories.
 - 1) Honeywell: C7232B1006.

E. Operation Sequences:

1. Programmable thermostat shall control unoccupied and occupied status of fan system based on adjustable seven day program and remote room sensor / push button. Fan shall run continuously in occupied mode and cycle in unoccupied mode.
2. Adjustable heating and cooling set points shall control space temperature by activating either heating or cooling equipment. Programmable thermostat provides automatic change over between heating and cooling.
3. Remote room sensor provides optional override of thermostat program by allowing three hour timed override of thermostat program at any time by pushing ON / OFF button on remote room sensor cover. This shall activate thermostat to occupied mode and system shall control to occupied set point.
4. Minimum outside air damper, spring return type, shall open in occupied mode and remain closed in unoccupied mode in zones using outside air.
5. Two Sensor Averaging, Bishop Zone:
 - a. Sensors shall control zone HVAC equipment by averaging temperature in spaces containing sensors.
 - b. Third dummy sensor, typically located in unlocked common space, is place-holder for OVERRIDE, WARMER, and COOLER buttons and does not sense temperature.
6. Two Sensor Averaging, Stake Suite: One sensor has OVERRIDE, WARMER, COOLER buttons. Set jumper to appropriate setting necessary to average with another sensor.
7. Electric Booster Heat:
 - a. On call for heat from non-programmable thermostat, blower motor of associated furnace shall energize and duct heater shall be enabled.
 - b. Internal safeties and controls of duct heater shall be satisfied before operation of duct heater.
 - c. Duct heater shall be locked out whenever T7350 thermostat cooling or heating circuits are energized.
8. Outdoor Air Pre-Heat System:
 - a. Enable pre-heat system only under one of following conditions:
 - 1) At least one programmable thermostat is in occupied mode and outside air temperature is below setpoint, adjustable.
 - 2) Aquastat at pre-heat coil senses temperature below setpoint, adjustable, and outside air temperature is below setpoint, adjustable.
 - b. Preheat boiler shall operate under its own safety and operating controls to maintain fluid temperature setpoint, adjustable. Flow switch installed in boiler shall prove flow before boiler will operate.
 - c. Interlock circulating pump with boiler low voltage control panel. When boiler is enabled, pump shall be activated and run continuously. When boiler is disabled, circulating pump shall continue to run long enough to dissipate residual heat in boiler heat exchanger. Length of run time shall be sufficient to prevent tripping high water temperature alarm.
 - d. When multiple boilers are used, sequencing control panel shall be enabled or disabled in accordance with paragraph >a=. Sequencing control panel shall then enable or disable boilers and shall determine firing order of boilers and staging sequence. Also, interlock circulating pump with sequencing control panel.
 - e. Outdoor Air Damper Operation:
 - 1) Outdoor Air Pre-Heat Coil Serving Multiple Furnaces: Damper operates at full open position when at least one programmable thermostat in zones served is in occupied mode. Damper shall remain closed when all thermostats in zone served are in unoccupied mode.
 - 2) Outdoor Air Pre-Heat Coil Serving Single Furnace: Damper operates at full open position when programmable thermostat serving furnace is in occupied mode. Damper shall remain closed when thermostat is in unoccupied mode.
 - f. Three-way control valve shall modulate to maintain outdoor air pre-heat coil discharge air temperature at setpoint, adjustable.
9. De-humidification System:
 - a. Each de-humidification system shall operate independently.
 - b. Humidistat on de-humidification system shall activate system to maintain humidity setpoint, adjustable, in occupied space.
 - c. Systems Using CO₂ sensor to Control Outside Air Damper Operation:

- 1) Minimum outside air damper, spring return type, shall open in occupied mode only when CO₂ sensor setpoint of 1200 ppm is reached. Damper shall close if CO₂ level drops below 1100 ppm.
- 2) Damper shall remain closed in un-occupied mode.
- d. Set thermostat setpoint at 65 percent Relative Humidity (RH).
- e. Occupied Operations:
 - 1) When humidity falls below RH setpoint, thermostat shall provide 24vac circuit through Y3/W4 contact which shall signal normal operation.
 - 2) When humidity exceeds RH setpoint, thermostat shall de-energize Y3/W4 contact removing signal from equipment DHUM contact. Thermostat RH setpoint shall be configured to adjust down 4 degrees. Equipment shall run with fan in low speed and compressor in low capacity. System shall continue to run until humidity is lowered to 60 percent RH at which time 24vac will be restored to DHUM to resume normal system operation.
- f. Unoccupied Operations:
 - 1) When humidity falls below 65 percent RH, thermostat shall provide NC 24vac signal through Y3/W4 contact to furnace DHUM terminal for normal operations.
 - 2) When humidity exceeds 65 percent RH, Y3/W4 contact opens removing signal from furnace DHUM terminal which signals equipment to operate in dehumidification mode. Thermostat will lower setpoint by 4 degrees. RP-5DH shall energize system fans which will run in low speed. RP panel shall lockout all but one condensing unit, normally unit D, which shall operate in low capacity during unoccupied mode. System shall continue to run in this mode until humidity is lowered to 60 percent RH at which time 24vac shall be restored through Y3/W4 to DHUM relay to resume normal operations.

PART 3 - EXECUTION

3.1 ACCEPTABLE INSTALLERS

A. Approved HVAC Sub-Contractors are as follows.

1. Honeywell – Authorized Control Integrator (ACI)
 - a. Hamlin Air Conditioning & Sheet Metal, Inc., 4023 475 Industrial Blvd., Macon, GA 31210, (478) 477-5506.
 - b. McKennys, Inc., 1056 Moreland Industrial Blvd. SE, Atlanta, GA 30316, (404) 622-5000.
 - c. Southeastern Temperature Controls, Inc., 320 Applegate Lane, PO Box 670, Pelham, AL 35124, (205) 985-8700.
2. Honeywell – Automation Control Specialist (ACS)
 - a. A & A Electric, 3699 BC Grant Road, Cornelia, GA 30531, (706) 778-7306.
 - b. AirCond, 400 Lake Ridge Drive, Smyrna, GA 30082, (770) 444-3355.
 - c. Comfort Systems USA (Atlanta), Inc., 2275 Northwest Parkway SE, Suite 105 Bldg 3, Marietta, GA 30067, (770) 952-7324.
 - d. Gold Mech, 1559 Broad Street, Augusta, GA 30904, (706) 724-4653.
 - e. HVAC Environmental Solutions, 2979 Pacific Drive, Norcross, GA 30071, (678) 990-1565.
 - f. Midatech, Inc., 3826 Creek View Cir., Loganville, GA 30052-5267, (770) 554-5225.

- g. Shumate Mechanical, 2805 Premiere Parkway, Duluth GA 30097, (678) 748-6283.
 - h. Waypoint Systems, 1455 Old Alabama Road, Suite 105, Roswell, GA 30076, (770) 649-6099.
 - i. Williams Electric, 1019 S Jeff Davis Drive, Fayetteville, GA 30215-6819, (678) 489-6004.
3. Honeywell – Commercial Comfort & Energy Specialist (CCES)
- a. Hawaiian Air, 3285 Broadnax Mill Road, Loganville, GA 30052, (770) 554-2535.

3.2 INSTALLATION

- A. Interface With Other Work:
- 1. Calibrate room thermostats as required during air test and balance. Insulate sensor J-box with fiberglass insulation; expandable/ foam insulation is NOT acceptable
 - 2. Instruct air test and balance personnel in proper use and setting of control system components.
 - 3. Install low voltage electrical wiring in accordance with Division 26 of these Specifications.
- B. Communication Cable:
- 1. Network communicating thermostats and WebStat Building Manager together with specified communicating cable.
 - 2. Do not bundle communication cables with cables of other systems. Maintain 12 inches minimum distance from wires of other systems, except communication cable may cross other low-voltage wiring if done perpendicularly.
- C. Safety Controls: Interlock duct smoke detectors to keep heating, cooling, and system fan from operating when detector is energized.
- D. Mount damper actuators and actuator linkages external of airflow. Make certain dampers operate freely without binding or with actuator housing moving.
- E. Paste copy of record control wiring diagram on back of relay panel door cover for each multiple furnace system.

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service:
- 1. Calibrate, adjust, and set controls for proper operation, operate systems, and be prepared to prove operation of any part of control system. This work is to be completed before pre-substantial completion inspection.
 - 2. Test each individual heating, cooling, and damper control for proper operation using control system.

3.4 SYSTEM STARTUP

- A. For systems with WebStat Building Manager.
- 1. Contractor is responsible for a fully functioning control system accessible via internet web browser. Contractor is responsible to coordinate Network start up with assistance from local IT technician. Local IT technician shall provide Static, IP address, Network Mask, Default Gateway, Primary DNS Server, Local Host Name, Local Domain Name.
 - 2. Contractor is responsible configuring all thermostats with proper zone names, zone scheduling, proper Church conference / holiday scheduling, all to be coordinated with local FM manager. Set

proper clock setting including day/month/year. Use WebStat as network time master from "System" tab in WebStat.

3. Set remote sensor to T7771.
4. Set remote humidity to none unless using remote humidity sensor on DH systems.
5. Set Occupancy sensor to None.
6. Set Discharge Air Temp sensor to Remote.
7. Set Heating / Cooling to proper stages
8. Set heat cycle rates to 9 cph and cooling to 4 cph. Set discharge high limit to 110 degrees but do not activate (check) the high limit option. This is only to be used later by owner if equipment experiences issues with system overshoot.
9. Set Aux relay to "Time of Day".
10. Set fan switch operation to "ON".
11. Set minimum UnOcc start time for all days. No days shall be scheduled Unconfigured.
12. Set occupied start times to match meeting start times; provided by local FM manager.
13. Place all zone over-ride durations to 1 hour except for Bishop and Stake area which shall be set to 2 hours.
14. Set Occupied default heating setpoints to 70 degrees, cooling setpoints to 74 degrees.
15. Set UnOccupied default heating setpoint to 60 degrees, cooling setpoints to 90 degrees.
16. Set each zone to applicable Holiday scheduling for General & Stake Conferences.

B. WebStat settings

1. Obtain from IT a LAN / WAN SMTP email server name for system alarming; where applicable.
2. Create alarm setpoint of 55 degrees low limit / 92 degrees high limit for all zones.
3. Create separate Administrative User level for Local FM Manager.

3.5 ADJUSTING

- A. Program minimum of one day's operation into thermostat memory function.

3.6 CLOSEOUT ACTIVITIES

A. Instruction Of Owner:

1. Include as part of training required in Section 23 0501, following training:
 - a. Training shall be by personnel of installing company and utilize operator's manuals and as-built documentation.
 - b. Provide training in two sessions including WebStat for up to six hours total. First session will occur between system completion and Substantial Completion. Second session will occur within 45 days of Substantial Completion when agreed upon by Owner.
 - c. Training shall include sequence of operation review, selection of displays, modification of schedules and setpoints, troubleshooting of sensors, etc, as follows:
 - 1) Control System Overview:
 - a) Show access to system through both individual thermostats and Internet browser via WebStat and how network works. Demonstrate scheduling for Stake and General Conferences.
 - 2) Thermostat Programming From Keypad: Instructions on developing setpoints and schedules and adjusting local zone temperatures.
 - 3) Thermostat Operation:
 - a) Identify and explain use of buttons on thermostat face, I.E. 'i' or information button, warmer button, and cooler button.
 - b) Identify and explain buttons under thermostat cover.
 - c) Provide training for Thermostat Palm Program.
 - 4) WebStat training with local Facilities Manager during two sessions.
 - a) Review all features accessible from the Overview tab including individual zone details, setpoints and fan, show schedule, edit configuration.
 - b) Review all features accessible from schedules including multiple schedules, zone assignments, holiday scheduling/ conference scheduling.
 - c) Review alarm configurations, alarm assignments, alarm priority.

- d) Review user levels and creating users.
- e) Review thermostat editing and configuration. Explain each thermostat programming option. Explain download pending, download, & commissioning.
- f) Review System backup configuration, restore configuration, reboot WebStat, Network Time Master, time and date setting and Local Weather option. No OAT is associated.
- g) Review system User Log in and User Log Out process.

END OF SECTION

SECTION 23 5417**GAS-FIRED FURNACES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install horizontal/vertical gas-fired condensing furnaces as described in Contract Documents.
- B. Related Sections:
 - 1. Section 23 0501: Common HVAC Requirements.
 - 2. Section 23 1123: Liquid Propane Gas Piping System.
 - 3. Section 23 2300: Refrigerant Piping System.
 - 4. Section 23 4100: Air Filters.

1.2 SUBMITTALS

- A. Informational Submittals:
 - 1. Manufacturer Reports: Equipment check-out sheets.

1.3 WARRANTY

- A. Provide 15 year minimum limited warranty of heat exchanger and 5 year limited warranty on parts.

PART 2 - PRODUCTS**2.1 ASSEMBLIES**

- A. Manufacturer:
 - 1. Manufacturer List:
 - a. Carrier Corporation: Carrier National: Steven L. Ament 317-240-2938 steve.l.ament@carrier.utc.com Carrier Utah: Matt Smith 801-224-1020 msmith@mtncom.net
 - b. Lennox Industries: For pricing and information contact Lennox National Account @ 1-800-367-6285.
 - c. Trane: Trent Hunt 801-486-0500, trenthunt@trane.com.
 - d. York International: David E. Carey 405-419-6536 david.e.carey@jci.com.
- B. Performance
 - 1. Design Criteria: Rated at 93 percent minimum AFUE (Annual Fuel Utilization Efficiency) calculated in accordance with DOE test procedures.
- C. Manufactured Units:
 - 1. Furnaces:
 - a. Factory assembled units certified by AGA complete with blower section, furnace section, steel casing, piped, and wired.
 - b. Blower section shall consist of cabinet, blower, and motor.
 - 1) Cabinet shall be of 22 ga minimum cold rolled steel and have finish coat of baked-on enamel.
 - 2) Blower shall be Class 1, full DIDW, statically and dynamically balanced.
 - c. Automatic controls shall consist of:

- 1) Manual gas shut-off valve.
- 2) Operating automatic gas valve.
- 3) Solid-state type fan and thermal limit controls.
- 4) 24-volt transformer.
- 5) Hot surface ignition system.
- d. Blower shall be driven by multi-speed direct driven motor.
- e. Furnace section shall be enclosed in 22 ga minimum enameled steel casing lined with foil covered insulation.
- f. Heat Exchanger: Aluminized steel.
- g. Gas Burners: Aluminized steel.
- h. PVC intake of outside air and PVC combustion product exhaust, with sealed combustion, direct vent system.
- i. Concentric roof termination kit for roof mounting.
- j. Approved Products:
 - 1) Standard Furnaces:
 - a) Carrier: 58MXB.
 - b) Lennox: G51MP.
 - c) Trane: TUX1/TDX1 or TUH1/TDH1.
 - d) York: TG9S.
 - 2) Two Stage Heat / Dehumidification Furnaces with ECM motor:
 - a) Carrier: 58MVB.
 - b) Lennox: G61MPV.
 - c) Trane: TUX2/TDX2 or TUH2/TDH2.
 - d) York: TM9V.
2. Cooling Coil:
 - a. Cooling coil shall consist of heavy gauge steel cabinet with baked-on enamel finish to match furnace.
 - 1) Coil shall have aluminum fins bonded to seamless copper or aluminum tubing.
 - 2) Coil shall be ARI rated. Provide drain pans with connections at one end.
 - 3) Use thermal expansion valve.
 - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories.
 - 1) Horizontal:
 - a) Carrier: CNPHP.
 - b) Lennox: CH33.
 - c) Trane: 4TXC.
 - d) York: MC.
 - 2) Vertical:
 - a) Carrier: CNPVP.
 - b) Lennox: CX34.
 - c) Trane: 4TXC.
 - d) York: FC.

2.2 ACCESSORY PRODUCTS

- A. Build filter frame external to furnace as detailed on Drawings.
- B. Vibration Isolators:
 1. Horizontal Installation:
 - a. Neoprene hanger type with load of 75 lbs maximum.
 - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories.
 - 1) RH by Kinetics Noise Control, Dublin, OH www.kineticsnoise.com.
 - 2) Mason Industries, Hauppauge, NY www.mason-ind.com.
 - 3) RH by Vibration Mounting & Controls, Bloomingdale, NJ www.vmc-kdc.com.
 2. Vertical Installation: 4 inches square by 1/2 inch thick minimum neoprene type vibration isolation pads.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Install vibration isolator on each hanger rod supporting horizontal furnace and under each corner of vertical furnace.

3.2 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service:
 - 1. Furnace distributor's technical service representative shall:
 - a. Verify proper liquid propane orifice size.
 - b. Clock gas meter for rated input.
 - c. Verify and set gas pressure at furnace.
 - d. Check and measure temperature rise.
 - e. Check safety controls for proper operation.
 - f. Check combustion vent sizes and combustion air sizes.
 - 2. In addition, furnace installer shall start up, check out, and adjust furnaces using equipment check-out sheet provided by Manufacturer. Complete and sign all items on sheet.

END OF SECTION

SECTION 23 6213**AIR-COOLED REFRIGERANT CONDENSERS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install condensing units as described in contract documents.
- B. Related Sections:
 - 1. Section 23 0501: Common HVAC Requirements.
 - 2. Section 23 2300: Refrigerant Piping System.

1.2 SUBMITTALS

- A. Informational Submittals:
 - 1. Tests and Evaluation Reports:
 - a. Manufacturer Reports: Equipment check-out sheets.
 - 2. Qualification Statements:
 - a. Technician certificate for use of CFC, HFC, and HCFC refrigerants.

1.3 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies: Each unit shall be UL / ULC labeled.
- B. Qualifications: Section 01 4301 applies, but is not limited to the following.
 - 1. Installer: Refrigerant piping shall be installed by refrigeration contractor licensed by State and by technicians certified in use of CFC and HCFC refrigerants.

1.4 WARRANTY

- A. Manufacturer's Warranty:
 - 1. Provide 10 year limited warranty on compressor and 5 year limited warranty on parts from date of 'start-up'. Record 'start-up' date on warranty certificate for each unit.

PART 2 - PRODUCTS**2.1 OWNER-FURNISHED PRODUCTS**

- A. Manufacturer:
 - 1. Manufacturer Contact List:
 - a. Carrier Corporation: Carrier National: Steven L. Ament 317-240-2938. steve.l.ament@carrier.utc.com Carrier Utah: Matt Smith 801-224-1020 msmith@mtncom.net.
 - b. Lennox Industries: For pricing and information call Lennox National Account @ 1-800-367-6285.
 - c. Trane: Trent Hunt 801-486-0500, trenthunt@trane.com.
 - d. York International: David E. Carey 405-419-6536 david.e.carey@jci.com.
- B. Performance:

1. Capacities: SEER rating as defined by ARI shall be 13.0 or greater

C. Manufactured Units:

1. Condensing Units:

- a. General:

- 1) Units shall be operable down to 0 deg F outdoor temperature when outside winter design temperature is below 35 deg F.
 - 2) Use R-410a refrigerant.
 - 3) Only one liquid line, one suction line, and one power connection shall be made to each compressor. Provide charging valves.

- b. Condenser Coils:

- 1) Aluminum plate fins mechanically bonded to seamless copper tubes or 'Spine Fin' trade mark system which has aluminum fins epoxy bonded to aluminum tubes or micro-channel.
 - 2) Provide coil guard for unit.

- c. Fans:

- 1) Direct driven propeller type.
 - 2) Fan motor shall be single or two speed, thermostatically controlled, permanently lubricated, and designed with permanent protection.
 - 3) Motors shall be resiliently mounted.
 - 4) Each fan shall have a safety guard.

- d. Compressor:

- 1) Each condenser unit shall have only one compressor.
 - 2) Design with following features:
 - a) Externally mounted brass service valves with charging connections.
 - b) Crankcase heater.
 - c) Resilient rubber mounts.
 - d) Compressor motor-overload protection.
 - e) Single speed.

- e. Controls:

- 1) Factory wired and located in separate enclosure.
 - 2) Following three paragraphs may not be factory installed and will therefore have to be field installed.
 - 3) Safety devices:
 - a) High and low pressure cutout.
 - b) Condenser fan motor-overload devices.
 - 4) Anti-cycle timers to prevent units from starting up again for five minutes after any power interruption.
 - 5) Head pressure type low ambient kit.

- f. Casing:

- 1) Fully weatherproof for outdoor installation. Finish shall be weather resistant.

- g. Openings shall be provided for power and refrigerant connections.

- h. Panels shall be removable for servicing.

- i. Approved Products:

- 1) Standard:
 - a) Carrier: 24ACB3.
 - b) Lennox: XC13.
 - c) Trane: 4TTB3.
 - d) York: YCHD or YCJD.
 - 2) Dehumidification: (Two Speed Compressor and SEER 15)
 - a) Lennox: XC16.
 - b) Trane: 4TTX6.
 - c) York: CZE.
 - 3) Economizer: (Two Speed Compressor and SEER 16-18)
 - a) Lennox: XC16.
 - b) Trane: 4TTX6.
 - c) York: CZH.

2.2 ACCESSORIES

- A. Vibration Isolators: 4 inches (100 mm) square by ¾ inches (19 mm) thick minimum neoprene type vibration isolation pads.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Set condensing units level on concrete slab, securing to slab through manufacturer's mounting holes inside manufacturer's housing.
- B. Do not use capillary tube and piston type refrigerant metering devices.

3.2 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service:
 - 1. Condensing units shall be started up, checked out, and adjusted by condensing unit installer.
 - 2. Use equipment checkout sheet provided by Manufacturer. Complete and sign all items on sheet.

END OF SECTION