SECTION 23 7413 - PACKAGED OUTDOOR CENTRAL-STATION AIR-HANDLING UNITS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Packaged roof top unit.
- B. Unit controls.
- C. Remote panel.
- D. Roof mounting curb and base.
- E. Maintenance service.

1.02 RELATED SECTIONS

A. Drawings and General Provisions of the Contract apply to this section.

1.03 REFERENCES

- A. ARI 210/240 Unitary Air-Conditioning and Air-Source Heat Pump Equipment; Air-Conditioning and Refrigeration Institute.
- B. ARI 270 Sound Rating of Outdoor Unitary Equipment; Air-Conditioning and Refrigeration Institute.
- C. NFPA 90A Standard for the Installation of Air Conditioning and Ventilation Systems; National Fire Protection Association.

1.04 PERFORMANCE REQUIREMENTS

- A. Gas Heating: As scheduled on the drawings.
- B. Cooling Capacity: As scheduled on the drawings.
- C. Supply Air Flow and Pressure: As scheduled on the drawings.
- E. Return Air Flow and Pressure: As scheduled on the drawings.
- E. Unit Sound Rating: Maximum 100 db.

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- G. Scheduled Performance:
 - 1. Cooling capacity: ARI 210/240 test conditions.
 - 2. Cooling capacity: 95 degrees F condenser ambient air.
 - 3. Sound Rating Numbers: ARI 270.
 - 4. Supply Air: Corrected to 0 feet altitude.

1.05 SUBMITTALS

- A. Product Data: Provide capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.
- B. Shop Drawings: Indicate capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.
- C. Manufacturer's Instructions: Indicate assembly, support details, connection requirements, and include start-up instructions.
- D. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.
- E. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. or testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

1.07 DELIVERY, STORAGE, AND PROTECTION

A. Protect units from physical damage by storing off site until roof mounting curbs are in place, ready for immediate installation of units.

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1.08 WARRANTY

A. Provide a five year warranty to include coverage for refrigeration compressors and gas-fired heat exchangers.

1.09 MAINTENANCE SERVICE

- A. Furnish service and maintenance of packaged roof top units for one year from Date of Substantial Completion.
- B. Provide maintenance service with a two month interval as maximum time period between calls. Provide 24-hour emergency service on breakdowns and malfunctions.
- C. Include maintenance items as outlined in manufacturer's operating and maintenance data, including minimum of six filter replacements, minimum of one fan belt replacement, and controls check-out, adjustments, and recalibration.
- D. Submit copy of service call work order or report, and include description of work performed.

1.10 EXTRA MATERIALS

A. Provide one set of filters.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. The Carrier Corporation
- B. The Trane Company
- C. York International Corporation
- D. McQuay International
- E. AAON, Inc.

2.02 AIR CONDITIONING UNITS

- A. General: Roof mounted units having gas burner and electric refrigeration.
- B. Description: Self-contained, packaged, factory assembled and prewired, consisting of cabinet and frame, supply fan, return fan, heat exchanger and burner, hot gas bypass, enthalpy wheel, controls, air filters, refrigerant cooling coil and compressor, condenser coil and condenser fan.

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- C. Electrical Characteristics:
 - 1. As scheduled on the drawings.
- D. Disconnect Switch: Factory mount disconnect switch in control panel or on equipment.

2.03 FABRICATION

- A. Cabinet: Galvanized steel with baked enamel finish, including access panels with screwdriver operated flush cam type fasteners. Structural members shall be minimum 18 gage, with access doors or panels of minimum 20 gage.
- B. Insulation: 2 inch thick neoprene coated glass fiber with edges protected from erosion.
- C. Heat Exchangers: Stainless steel, of welded construction.
- D. Supply and Return Fan: Forward curved centrifugal type, resiliently mounted with V-belt drive, adjustable variable pitch motor pulley, and rubber isolated hinge mounted high efficiency motor or direct drive as indicated. Isolate complete fan assembly.
- E. Air Filters: 2 inch thick glass fiber disposable media in metal frames.
- F. Roof Mounting Curb: 14 inches high galvanized steel, channel frame with gaskets, nailer strips.

2.04 BURNER

- A. Gas Burner: Forced draft type burner with adjustable combustion air supply, pressure regulator, gas valves, manual shut-off, intermittent spark or glow coil ignition, flame sensing device, and automatic 100 percent shutoff pilot.
- B. Gas Burner Safety Controls: Energize ignition, limit time for establishment of flame, prevent opening of gas valve until pilot flame is proven, stop gas flow on ignition failure, energize blower motor, and after air flow proven and slight delay, allow gas valve to open.
- C. High Limit Control: Temperature sensor with fixed stop at maximum permissible setting, de-energize burner on excessive bonnet temperature and energize burner when temperature drops to lower safe value.
- D. Supply Fan Control: Temperature sensor sensing bonnet temperatures and independent of burner controls, with provisions for continuous fan operation.

2.05 EVAPORATOR COIL

A. Provide copper tube aluminum fin coil assembly with galvanized drain pan and connection.

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B. Provide capillary tubes or thermostatic expansion valves for units of 6 tons (21 kW) capacity and less, and thermostatic expansion valves and alternate row circuiting for units 7.5 tons (26 kW) cooling capacity and larger.

2.06 COMPRESSOR

- A. Provide hermetic compressors, 3600 rpm maximum, resiliently mounted with positive lubrication, crankcase heater, high and low pressure safety controls, motor overload protection, suction and discharge service valves and gage ports, and filter drier.
- B. Five minute timed off circuit to delay compressor start.
- C. Outdoor thermostat to energize compressor above 35 degrees F ambient.
- D. Provide step capacity control by hot gas by-pass and cycling multi-speed compressors.

2.07 CONDENSER COIL

- A. Provide copper tube aluminum fin coil assembly with subcooling rows and coil guard.
- B. Provide direct drive propeller fans, resiliently mounted with fan guard, motor overload protection, wired to operate with compressor. Provide high efficiency fan motors.
- C. Provide refrigerant pressure switches to cycle condenser fans.

2.08 MIXED AIR CASING

- A. Dampers: Provide outside, return, and relief dampers with damper operator and control package to automatically vary outside air quantity. Outside air damper to fall to closed position. Relief dampers may be gravity balanced.
- B. Gaskets: Provide tight fitting dampers with edge gaskets.
- C. Gaskets: Provide tight fitting dampers with edge gaskets maximum leakage 5 percent at 2 inches pressure differential.
- D. Damper Operator: 24 volt with gear train sealed in oil.
- E. Damper Operator, Units 7.5 Ton (26 kW) Cooling Capacity and Larger: 24 volt with gear train sealed in oil with spring return on.
- F. Damper Operator: Pneumatic piston or gear driven type with spring return and pilot positioner.
- G. Mixed Air Controls: Maintain selected supply air temperature and return dampers to minimum position on call for heating and above 75 degrees F ambient, [or when ambient air temperature exceeds return air temperature] [or when ambient air enthalpy exceeds return air enthalpy].

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2.09 OPERATING CONTROLS

- A. Provide low voltage, adjustable room thermostat to control burner operation, compressor and condenser fan, and supply fan to maintain temperature setting.
 - 1. Include system selector switch (heat-off-cool) and fan control switch (auto-on).
 - 2. Provide double acting thermostat as indicated per schedules on the drawings.
 - 3. Locate thermostat in room as shown.
- B. Provide terminal strip on unit for connection of operating controls to remote panel [by others]. Control shall allow for two stages of heating and two stages cooling.
- C. Provide remote mounted fan control switch (on-auto).
- D. Provide low limit thermostat in supply air to close outside air damper and stop supply fan.
- E. Provide night control energized by central time clock to maintain night thermostat setting.
- F. Provide remote readout panels containing signal lights indicating system status, heating system failure, cooling system failure, and dirty filters; check switches proving signal light operations; system on-off switch, and cooling system on-off switch.
- G. Provide in panel a 7 day time clock for energizing night control, remote damper control, low limit manual reset, and remote thermostat temperature set point.

2.10 OPERATING CONTROLS - SINGLE ZONE UNITS

- A. Electric solid state microcomputer based room thermostat, located as indicated in service area with remote sensor located as indicated.
- B. Room thermostat shall incorporate:
 - 1. Automatic switching from heating to cooling.
 - 2. Preferential rate control to minimize overshoot and deviation from set point.
 - 3. Set-up for four separate temperatures per day.
 - 4. Instant override of set point for continuous or timed period from one hour to 31 days.
 - 5. Short cycle protection.
 - 6. Programming based on weekdays, Saturday and Sunday.

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- 7. Switch selection features including imperial or metric display, 12 or 24 hour clock, keyboard disable, remote sensor, fan on-auto.
- C. Room thermostat display shall include:
 - 1. Time of day.
 - 2. Actual room temperature.
 - 3. Programmed temperature.
 - 4. Programmed time.
 - 5. Duration of timed override.
 - 6. Day of week.
 - 7. System model indication: heating, cooling, auto, off, fan auto, fan on.
 - 8. Stage (heating or cooling) operation.
- D. Provide low limit thermostat in supply air to close outside air dampers and stop supply fan.

2.11 OPERATING CONTROLS - VARIABLE VOLUME UNITS

- A. Temperature transmitter located in supply air shall signal electronic logic panel to control mixing dampers and cooling in sequence. Mixing section shall operate as first stage of cooling and revert to minimum outside air above approximately 75 degrees F as determined by enthalpy of return and outdoor air.
- B. Control cooling by cycling compressors, cylinder unloading, and hot gas bypass.
- C. Control logic shall allow supply air reset under low load or airflow conditions.
- D. Seven day time clock with spring carry over (or electronic clock with battery backup) shall control unit on occupied/unoccupied schedule. At night, unit shall be off. Locate clock in remote control panel with status lights.
- E. Provide two stage morning warm-up thermostat to hold outdoor dampers closed and energize heat until return air temperature reaches set point.
- F. Provide within roof curb, by-pass dampers, bypassing air from supply fan discharge to return fan inlet to control duct static pressures. Control operation by sensing current to supply fan motor.

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PART 3 - EXECUTION

3.01 EXAMINATION

- A Verify that roof is ready to receive work and opening dimensions are as indicated on shop drawings or illustrated by the manufacturer
- B. Verify that proper power supply is available.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NFPA 90A.
- C. Mount units on factory built roof mounting curb providing watertight enclosure to protect ductwork and utility services. Install roof mounting curb level.
- D. Locate remote panels where indicated on drawings.

3.03 STARTING EQUIPMENT AND SYSTEMS

A. Provide initial start-up and shut-down during first year of operation, including routine servicing and check-out.

END OF SECTION 23 7413