

SECTION 15500

SINGLE PACKAGE AIR CONDITIONING UNITS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes Single Package Air-Cooled Air Conditioners:
- B. Related Sections:
 - 1. Section 00700 "General Conditions."
 - 2. Section 00800 "Supplementary Conditions."
 - 3. Section 07800 "Roof Penetrations."
 - 4. Section 15100 "Mechanical Materials & Methods."
 - 5. Section 15600 "Ductwork."
 - 6. Section 15610 "Ductwork Accessories."
 - 7. Division 16000 "Electrical."

1.02 REFERENCES

- A. Single Package Air Conditioners Shall Comply With The Following Standards:
 - 1. ARI 210/240-89 "Unitary Air Conditioning and Air Source Heat Pump Equipment."
 - 2. ANSI/UL465-1984 "Air Conditioners, Central Cooling."
 - 3. ARI 270-84 "Sound Rating of Outdoor Unitary Equipment."

1.03 SYSTEM DESCRIPTION

- A. Performance Requirements
 - 1. Single package air conditioners shall conform to the performance requirements as scheduled on the contract documents.

1.04 SUBMITTALS

- A. Product Data:
 - 1. Roof top/outdoor single package air conditioners.
- B. Shop Drawings
 - 1. Single Package air conditioners.

1.05 DELIVERY STORAGE AND HANDLING

A. Packing and Shipping:

1. Maintain the manufacturer's packing and crating until the unit is on-site ready to be permanently installed.

B. Acceptance at Site:

1. Inspect the unit for damage as a result of shipping. Do not accept the unit if damaged and report the damage to the equipment manufacturer immediately.

C. Storage and Protection:

1. If the unit is not going to be installed for more than two weeks from the time of delivery, store the unit indoors, in the original packing and crating in an area safe from potential damaging acts to the unit. The contractor shall be responsible for any and all damage to the unit from the time of delivery until the project is accepted as complete by the owner.

1.06 WARRANTY:

A. Provide manufacturer's warranty for the following components:

1. Compressors - 5 years
2. Heat Exchangers - 10 years
3. Electric Heaters - 5 years
4. Parts - 1 year
5. Labor
 - a. compressor - 90 days
 - b. parts - 30 days

B. Warranty term shall commence from date of beneficial use of as agreed upon by the owner and contractor.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

A. York International Corporation

Special Note about York Equipment:

- 1 Contractor may purchase York Equipment through Fresenius Medical Care's national account. Contact Geoffrey Illian at 405-419-6766 for information.
- 2 Contractors shall be responsible for ordering, storage, delivery, installation, payment, etc. of equipment purchased through FMC's national accounts.

B. Carrier Corporation

C. The Trane Company

2.02 EQUIPMENT:

A. General Description:

1. Units shall be factory-assembled, single packaged, designed for outdoor installation. They shall have built-in field convertible duct connections for down discharge supply/return or horizontal discharge supply/return, and be available with factory-installed options or field-installed accessories.
2. The units shall be factory wired, piped, charged with R-22 refrigerant and factory tested prior to shipment. All unit wiring shall be both numbered and color coded. Enclosed in each unit shall be a factory test log sheet consisting of the unit tested pressures, temperatures and amps, as tested prior to shipment.
3. All units shall be manufactured in a facility certified to ISO 9001 standards, and the cooling performance shall be rated in accordance with DOE and ARI test procedures. Units shall be UL listed and classified to ANSIZ21.47 standard and UL1995/CAN/CSA No. 236-M90 conditions.
4. Hot gas bypass reheat shall be installed in units specifically located in climate zones #3 and #4 areas.

B. Unit Cabinet:

1. Unit cabinet shall be constructed of G90 galvanized steel, with exterior surfaces coated with a non-chalking, powered paint finish, certified at 750 hours salt spray test per ASTM-B117 standards.
2. Indoor blower section shall be insulated with 1" thick insulation, coated on the air side. Aluminum foil faced insulation shall be used in the furnace compartment and be fastened with rigid fasteners to prevent insulation from entering the air stream.
3. Full perimeter bases rails shall be provided to assure reliable transit of equipment, overhead rigging, for truck access and proper sealing on roof curb applications.
4. Disposable 2" filters shall be furnished and be accessible through a removable access door, sealed air tight. Units filter track shall be designed to accommodate either 1" or 2" filters.
5. Fan performance measuring ports shall be provided on the outside of the cabinet to allow accurate air measurements of evaporator fan performance without removing panels or creating air by-pass of the coils.
6. Condensate pan shall be internally sloped and conform to ASHARE 62-89 self-draining standards.

7. Unit shall incorporate a fixed outdoor air damper with an outdoor air intake opening covered with a bird screen and a rain hood painted to match the exterior of the unit.

C. Evaporator Fan Assembly:

1. Fan shall be a belt drive assembly and include an adjustable-pitch motor pulley.
2. Fan wheel shall be double-inlet type with forward-curved blades, dynamically balanced to operate smoothly throughout the entire range of operation.
3. Bearings shall be sealed and permanently lubricated for long life and no maintenance.

D. Condenser Fan Assembly:

1. The outdoor fans shall be of the direct-driven propeller type, discharge air vertically, have aluminum blades riveted to corrosion resistant steel spider brackets and shall be dynamically balanced for smooth operation.
2. The outdoor fan motor(s) shall be totally enclosed with permanently lubricated bearings, internally protected against overload conditions and staged independently.

E. Refrigerant Components:

1. Compressors:

- a. Shall be fully hermetic type, direct drive, internally protected with internal high-pressure relief and over temperature protection. The hermetic motor shall be suction-gas cooled and have a voltage range of plus or minus 10% of the unit nameplate voltage.
- b. Shall have internal spring isolation and sound muffling to minimize vibration and noise, and be externally isolated on a dedicated, independent mounting.

2. Coils:

- a. Evaporator and condenser coils shall have aluminum plate fins mechanically bonded to seamless internally-enhanced copper tubes with all joints brazed.
- b. Evaporator and condenser coils shall be of the direct expansion, draw-through design.

3. Refrigerant Circuit and Refrigerant Safety Components shall include:

- a. Metering device:

- i. 3 through 5 ton models: balanced port thermostatic expansion valve with independent circuit feed system.
 - ii. 7 1/2 through 12 1/2 ton models: independent fixed orifice expansion device.
 - iii. 15 and 20 ton models: balanced port thermostatic expansion valve with independent circuit feed system.
- b. Filter drier/strainer.
 - c. Accessible service gage connections on both suction and discharge lines to charge, evacuate, and measure refrigerant pressure during any necessary servicing or troubleshooting, without losing charge.
 - d. The refrigeration system shall provide at least 15° F of liquid sub-cooling at design conditions.
 - e. The unit shall have two independent refrigerant circuits, equally split on 50% capacity increments. (7 1/2 tons and over)

4. Unit Controls:

- a. Unit shall be complete with self contained low-voltage control circuit protected by a resettable circuit breaker fuse on the 24 volt transformer side.
- b. Unit shall incorporate a lock-out circuit which provides reset capability at the space thermostat or base unit, should any of the following standard safety devices trip and shut off compressor:
 - i. Loss-of-charge/Low-pressure switch.
 - ii. High-pressure switch
 - iii. Evaporator coil, Freeze-protection thermostat.
- c. Unit shall incorporate an automatic resetting compressor control for over temperature and over current protection.
- d. Unit shall operate with conventional thermostat designs and have a low voltage terminal strip.
- e. Anti-Recycle Timer with 5-minute off-time between compressor cycles.

F. Gas Heating Section (Gas Heat Models Only)

- 1. Shall be designed with induced draft combustion with post purge logic, energy saving direct spark ignition, and redundant main gas valve.

Ventor wheel shall be constructed of stainless steel for corrosion resistance.

- 2. The heat exchanger shall be of the tubular type, constructed of T1-40 aluminized steel for corrosion resistance.

3. Burners shall be constructed of aluminum coated steel and contain air mixture adjustments.
4. All gas piping shall enter the unit cabinet at a single location, through either the side or bottom, without any field modifications.
5. An integrated control board shall provide timed control of evaporator fan functioning and burner ignition.
6. Heating section shall be provided with the following minimum protection:
 - a. Primary and auxiliary high-temperature limit switches.
 - b. Induced draft motor speed sensor.
 - c. Flame roll out switch (automatic reset).
 - d. Flame proving controls.
7. Unit shall have two independent stages of heating capacity.

G. Electric Heating Section (Electric Heat Models Only):

1. An electric heating section, with nickel chromium elements, shall be provided as scheduled on the contract documents.
2. The heating section shall have a primary limit control and automatic reset to prevent the heating element system from operating at an excessive temperature.
3. Units with Electric Heating Sections shall be wired for a single point power supply with branch circuit fusing.

H. Unit Operating Characteristics:

1. Unit shall be capable of starting and running at 125° F outdoor temperature, exceeding maximum load criteria of ARI Standard 210/240.
2. The compressor, with standard controls, shall be capable of operation down to 45° F outdoor temperature. Accessory low ambient kit shall be provided for operation to 0° F on units serving patient care areas.
3. Unit shall be provided with fan time delay to prevent cold air delivery before heat exchanger warms up. (Gas heat only)

I. Electrical Requirements:

1. All unit power wiring shall enter unit cabinet at a single factory provided location and be capable of side or bottom entry. Separate side and bottom openings shall be provided for the control wiring.

2. All units to be supplied with a factory installed nema 4 service receptacle (120v GFIC)
- J. Outdoor Air Shall Be Made Available (by either/or as scheduled on the contract documents):
1. Electronic Enthalpy Automatic Economizer - Outdoor and return air dampers that are interlocked and positioned by a fully-modulating, spring-return damper actuator. The maximum leakage rate for the outdoor air intake dampers shall not exceed 2% when dampers are fully closed and operating against a pressure differential of 0.5 IWG. A unit-mounted potentiometer shall be provided to adjust the outdoor and return air damper assembly to take in outdoor air to meet the minimum ventilation requirement of the conditioned space during normal operation. During economizer operation, a mixed-air temperature control shall modulate the outdoor and return air damper assembly to prevent the supply air temperature from dropping below 55° F. Changeover from compressor to economizer operation shall be provided by an integral electronic enthalpy control that feeds input into the basic module. The outdoor intake opening shall be covered with a rain hood that matches the exterior of the unit. Water eliminator/filter shall be provided. Dampers shall fully close on power loss.
 2. Motorized Outdoor Air Dampers - Outdoor and return air dampers that are interlocked and positioned by a 2-position, spring-return damper actuator, The maximum leakage rate for the outdoor air intake dampers shall not exceed 2% when dampers are fully closed and operating against a pressure differential of 0.5 IWG. A unit-mounted potentiometer shall be provided to adjust the outdoor and return air damper assembly to take outdoor air to meet the ventilation requirements of the conditioned space during normal operation. Whenever the indoor fan motor is energized, the dampers open up to a pre-selected position - regardless of the outdoor air enthalpy. Dampers return to the fully closed position when the indoor fan motor is de-energized. Dampers shall fully close on power loss.

PART 3 EXECUTION

3.01 INSTALLATION

A. General:

1. Unit must be installed where condenser coil has an unlimited supply of air.
2. For ground level applications, install on a minimum 6" thick concrete pad, 6" larger than unit base rails on every side of the unit.
3. Unit must be set level to within 1/2 inch across the entire dimension of the unit.
4. Rig the unit into place only by the lifting holes in the base rails. Use spreaders longer than the width and/or length of the unit.

5. Install all field-installed parts and accessories in accordance with the manufacturer's instructions.
6. Follow manufacturer's instructions to place the unit into service. Special attention shall be given to energizing crankcase heaters prior to starting compressors.

3.02 FIELD QUALITY CONTROL

A. Tests

1. Cycle unit through all sequences of operation as recommended by the manufacturer. Check operation of all safety switches, lockouts, etc. and repair or replace any defective parts discovered.

3.03 DEMONSTRATION

- #### A. Train Owner's representatives on procedures and schedules related to start-up, shutdown, troubleshooting, servicing, and preventative maintenance of the system. Schedule training with Owner's representative through the Architect.

END OF SECTION