

SECTION 15781

PACKAGED ROOF TOP AIR CONDITIONING UNITS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Packaged roof top unit.
- B. Heat Exchanger.
- C. Refrigeration Components.
- D. Unit controls.
- E. Remote panel.
- F. Roof mounting curb and base.
- G. Maintenance service.

1.02 RELATED SECTIONS

- A. Section 15245 - Vibration Isolation.
- B. Section 15885 - Air Cleaning Devices.

1.03 REFERENCES

- A. ARI 210 - Unitary Air-Conditioning Equipment.
- B. ARI 270 - Sound Rating of Outdoor Unitary Equipment.
- C. ARI 360 - Unitary Air-Conditioning Equipment.
- D. ARI 370 - Sound Rating of Large Outdoor Refrigerating and Air Conditioning Equipment.
- E. ANSI/ASHRAE 90A - Energy Conservation in New Building Design
- F. NFPA 70 - National Electrical Code.
- G. ANSI/NFPA 90A - Installation of Air Conditioning and Ventilation Systems.

1.04 SUBMITTALS

- A. Section 01300: Procedures for submittals.
- 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. 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.

- D. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing. Submit in accordance with Section 01700 - Contract Closeout.

1.05 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

1.06 REGULATORY REQUIREMENTS

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., as suitable for the purpose specified and indicated.
- B. Unit shall conform to UL 1995/CSA 22.2 #236 for construction of packaged air conditioner and shall have UL/CSA label affixed to rooftop package.
 - 1. In the event the unit is not UL/CSA approved, the manufacturer shall, at his expense, provide for a field inspection by a UL/CSA representative to verify conformance to UL/CSA standards. If necessary, contractor shall perform required modifications to the unit to comply with UL/CSA, as directed by the UL/CSA representative, at no additional expense to the Owner.
- C. Gas-fired heating rooftop units shall conform to ANSI Z21.47 for construction of packaged air conditioner.
 - 1. In the event the unit is not CSA approved, the manufacturer must, at his expense, provide for a field inspection by a CSA representative to verify conformance to CSA standards. If necessary, contractor shall perform modifications to the unit to comply with CSA, as directed by the CSA representative, at no additional expense to the Owner.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Section 01600 - Materials and Equipment: Transport, handle, store, and protect products.
- B. Protect units from physical damage by storing off site until roof mounting curbs are in place, ready for immediate installation of units.

1.08 WARRANTY

- A. Provide a full parts warranty for one year from substantial completion.
- B. Provide five year extended warranty for compressors including materials only.
- C. Provide five year limited warranty for heat exchanger including materials only.

1.09 MAINTENANCE SERVICE

- A. Section 01700 - Contract Closeout.
- B. Furnish service and maintenance of packaged roof top units for one year from Date of Substantial Completion.
- C. Provide maintenance service with a two month interval as maximum time period between calls. Provide 24-hour emergency service on breakdowns and malfunctions.
- D. 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.

- E. Submit copy of service call work order or report, and include description of work performed.

1.10 ACOUSTICS

- A. Manufacturer of packaged rooftop equipment shall provide indoor and outdoor sound power level data across major octave band center frequencies for cataloged operating range of unit at gross cooling capacity range. Data shall be obtained in conformance with ANSI S1.32-1980, American National Standard Methods for the Determination of Sound Power Levels of Discrete Frequency and Narrow Band Noise Sources in Reverberation Rooms and per AMCA Standard 300-85 test code "Sound Rating Air Moving Devices".

1.11 EXTRA MATERIALS

- A. Section 01700 - Contract Closeout.
- B. Provide one set of filters.

PART 2 - PRODUCTS

2.01 PACKAGED ROOFTOP UNITS

- A. Approved Manufacturers:
 - 1. Trane.
 - 2. McQuay.
 - 3. Carrier.
 - 4. York.
- B. Air Conditioning Units:
 - 1. General: Roof mounted units having gas burner and electric refrigeration.
 - 2. Description: Self-contained, packaged, factory assembled and prewired, consisting of cabinet and frame, supply fan, heat exchanger and burner, controls, air filters, refrigerant cooling coil and compressor, condenser coil and condenser fan.
 - 3. Disconnect Switch: Factory mount disconnect switch in control panel.
- C. Casing:
 - 1. Unit casing shall be constructed of zinc coated, heavy gauge, galvanized steel. Exterior surfaces shall be cleaned, phosphatized, and finished with a weather-resistant baked enamel finish. Unit's surface shall be tested 1000 hours in a salt spray test in compliance with ASTM B117.
 - 2. Cabinet construction shall allow for all maintenance on one side of the unit. Service panels shall have lifting handles and be removed and reinstalled by removing only a single fastener while providing a water and air tight seal.
 - 3. All exposed vertical panels and top covers in the indoor air section shall be insulated with a cleanable foil-faced, fire-retardant, permanent, odorless glass fiber material.
 - 4. The base of the unit shall be insulated with ½ inch, 1 pound density foil-faced, closed-cell material. All insulation edges shall be either captured or sealed. The units base pan shall have no penetrations within the perimeter of the curb other than the raised 1 1/8" high downflow supply/return openings to provide an added water integrity precaution, if the condensate drain backs up. The base of the unit shall have provisions for forklift and crane lifting, with forklift capabilities on three sides of the unit.
- D. Unit Top:
 - 1. The top cover shall be one piece construction or where seams exist, it shall be double-hemmed and gasket sealed. The ribbed top adds extra strength and prevents water from pooling on unit top.

- E. Filters:
1. One inch, throwaway filters shall be standard on all 5-ton units. Two inch filters shall be factory supplied on all 6-ton units.
- F. Compressors:
1. All 3 ton standard units shall have direct-drive, hermetic, scroll type compressors with centrifugal oil pump providing positive lubrication to moving parts. Motor shall be suction gas-cooled and shall have a voltage utilization range of plus or minus 10 percent of unit nameplate voltage. Crankcase heater, internal temperature, and current-sensitive motor overloads shall be included for maximum protection. Compressors shall have internal spring isolation and sound muffling to minimize noise.
- G. Refrigerant Circuits:
1. Each refrigerant circuit offers a choice of independent fixed orifice expansion devices or thermal expansion valve. Service pressure ports, and refrigerant line filter driers are factory-installed as standard. An area shall be provided for replacement suction line driers.
- H. Evaporator and Condenser Coils:
1. Internally finned, 5/16" copper tubes mechanically bonded to a configured aluminum plate fin shall be standard. Coils shall be leak tested at the factory to ensure the pressure integrity.
 2. The evaporator coil and condenser coil shall be leak tested to 200 psig and pressure tested to 450 psig.
 3. A removable, reversible, double-sloped condensate drain pan with provision for through the base condensate drain is standard.
- I. Gas Heating Section:
1. The heating section shall have a progressive tubular heat exchanger design using stainless steel burners and corrosion-resistant steel throughout. An induced draft combustion blower shall be used to pull the combustion products through the firing tubes.
 2. The heater shall use a direct spark ignition (DSI) system. On initial call for heat, the combustion blower shall purge the heat exchanger for 20 seconds before ignition. After three unsuccessful ignition attempts, the entire heating system shall be locked out until manually reset at the thermostat/zone sensor.
 3. Units shall be suitable for use with natural gas and comply with the California requirement for low Nox emissions.
- J. Outdoor Fans:
1. The outdoor fan shall be direct-drive, statically and dynamically balanced, draw-through in the vertical discharge position. The fan motor shall be permanently lubricated and shall have built-in thermal overload protection.
- K. Indoor Fan:
1. Belt driven, FC centrifugal fans with adjustable motor sheaves. All 6-ton units shall have belt drive motors with an adjustable idler-arm assembly for quick adjustment to fan belts and motor sheaves. All motors shall be thermally protected. All indoor fan motors meet the U.S. Energy Policy Act of 1992 (EPACT).
- L. Through the Base Electrical with Disconnect Switch:
1. Provide 3-pole, molded case, disconnect switch with provisions for through the base electrical connections. The disconnect switch will be installed in the unit in a water-tight enclosure with access through a swinging door. Wiring will be provided from the switch to the unit high voltage terminal block. The switch will be UL/CSA agency recognized.
- M. Through the Base Gas Piping
1. The unit shall include a standard through the base gas provision. This option shall have all piping necessary including black steel, manual gas shut-off valve, elbows, and union. The manual shut-off valve shall include 1/8" NPT pressure tap.

- N. Economizer:
1. The assembly includes fully modulating 0-100 percent motor and dampers, minimum position setting, preset linkage, wiring harness with plug, spring return actuator and fixed dry bulb control. The barometric relief shall provide a pressure operated damper that shall be gravity closing and shall prohibit entrance of outside air during the equipment "off" cycle.
- O. Reference or Comparative Enthalpy:
1. Reference Enthalpy shall measure and communicate outdoor humidity. The unit receives and uses this information to provide improved comfort cooling while using the economizer. Comparative Enthalpy measures and communicates humidity for both outdoor and return air conditions, and return air temperature. The unit receives and uses this information to maximize use of economizer cooling, and to provide maximum occupant comfort control.
- P. Trane Communication Interface:
1. This option shall be provided to interface ReliaTel™ controlled units with the Trane Integrated Comfort™ systems.
- Q. Controls:
1. Unit shall be completely factory-wired with necessary controls and contactor pressure lugs or terminal block for power wiring. Unit shall provide an external location for mounting a fused disconnect device.
 2. Microprocessor controls provide for all 24 volt control functions. The resident control algorithms shall make all heating, cooling, and/or ventilating decisions in response to electronic signals from sensors measuring indoor and outdoor temperatures. The control algorithm maintains accurate temperature control, minimizes drift from setpoint, and provides better building comfort. A centralized Microprocessor shall provide anti-short cycle timing and time delay between compressors to provide a higher level of machine protection.
- R. Phase Monitor:
1. Phase monitor shall provide 100% protection for motors and compressors against problems caused by phase loss, phase imbalance, and phase reversal. Phase monitor is equipped with a LED that provides an ON or fault indicator.
- S. Powered or Unpowered Convenience Outlet
1. Provide a powered GFCI, 120 volt, 15 amp, 2 plug, convenience outlet. A service receptacle disconnect shall be available. The convenience outlet shall be powered from the line side of the disconnect or circuit breaker, and therefore will not be affected by the position of the disconnect or circuit breaker.
- T. Through the Base Electrical Access:
1. An electrical service entrance shall be provided allowing electrical access for both control and main power connections inside the curb and through the base of the unit.
- U. Motorized Outside Air Dampers:
1. Manually set outdoor air dampers shall provide up to 50 percent outside air. Once set, outdoor air dampers shall open to set position when indoor fan starts. The damper shall close to the full closed position when indoor fan shuts down.
- V. Roof Curb:
1. The roof curb shall be designed to mate with the unit's downflow supply and return and provide support and a water-tight installation when installed properly.
 2. The roof curb design shall allow field-fabricated rectangular supply/return ductwork to be connected directly to the curb. Curb design shall comply with NRCA requirements.
 3. Curb shall be shipped knocked down for field-assembly and shall include wood nailer strips.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Section 01040 - Coordination and Meetings: Verification of existing conditions prior to beginning work.
- B. Verify that roof is ready to receive work and opening dimensions are as indicated on Shop Drawings.
- C. 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 coordinate final location with owner/architect and electrical contractor.

3.03 MANUFACTURER'S FIELD SERVICES

- A. Prepare and start systems under provisions of Section 01400.
- B. Provide initial start-up and shut-down during first year of operation, including routine servicing and check-out.
- C. Manufacturer shall furnish a factory trained service engineer without additional charge to start the unit(s) and to coordinate interface with building's ATC system (coordinate with Section 15975). Packaged rooftop unitary manufacturers shall maintain service capabilities no more than 100 miles from the jobsite.

END OF SECTION