SECTION 23.74.14
PACKAGED ROOFTOP AIR CONDITIONING UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Package roof top unit.
B. Heat exchanger.
C. Refrigeration components.
D. Unit operating controls.
E. Roof curb.
F. Electrical power connections.
G. Operation and maintenance service.

1.02 RELATED SECTIONS – N/A

1.03 REFERENCES
A. NFPA 90 A & B - Installation of Air Conditioning and Ventilation Systems and Installation of Warm Air Heating and Air Conditioning Systems.
C. ARI 360 - Commercial and Industrial Unitary Air Conditioning Equipment testing and rating standard.
J. ARI 270 - Sound Rating of Outdoor Unitary Equipment.
K. ARI 370 - Sound Rating of Large Outdoor Refrigerating and Air Conditioning Equipment.

1.04 SUBMITTALS
A. Submit unit performance data including: capacity, nominal and operating performance.
B. Submit Mechanical Specifications for unit and accessories describing construction, components and options.
C. Submit shop drawings indicating overall dimensions as well as installation, operation and services clearances. Indicate lift points and recommendations and center of gravity. Indicate unit shipping, installation and operating weights including dimensions.
D. Submit data on electrical requirements and connection points. Include recommended wire and fuse sizes or MCA, sequence of operation, safety and start-up instructions.
E. Shop drawings submitted for approval shall be accompanied by a copy of the purchase agreement between the Contractor and an authorized service representative of the manufacturer for check, test and start up and first year service.
1.05 DELIVERY, STORAGE and HANDLING
A. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.
B. Protect units from physical damage. Leave factory shipping covers in place until installation.

1.06 WARRANTY
A. Provide parts warranty for one year from start-up or 18 months from shipment, whichever occurs first.
B. Provide five year extended warranty for compressors.
C. Provide five year heat exchanger limited warranty.

1.07 REGULATORY REQUIREMENTS
A. Unit shall conform to ANSI Z21.47/UL1995 for construction of packaged air conditioner.

1.08 EXTRA MATERIALS
A. Provide one set of filters.

PART 2 PRODUCTS

2.01 SUMMARY
A. The contractor shall furnish and install package rooftop unit(s) as shown and scheduled on the contract documents. The unit(s) shall be installed in accordance with this specification and perform at the specified conditions as scheduled.

2.02 GENERAL UNIT DESCRIPTION
A. Unit(s) furnished and installed shall be cooling only packaged rooftop (s) as scheduled on contract documents and these specifications. Cooling capacity ratings shall be based on ARI Standard 210. Unit(s) shall consist of insulated weather-tight casing with compressor(s), air-cooled condenser coil, condenser fans, evaporator coil, return-air filters, supply motors and unit controls and drives.
B. Unit(s) shall be 100% factory run tested and fully charged with refrigerant.
C. Unit(s) shall have labels, decals, and/or tags to aid in the service of the unit and indicate caution areas.
D. Units shall be dedicated downflow or dedicated horizontal airflow as manufactured.
E. Wiring internal to the unit shall be colored and numbered for identification.

2.03 UNIT CASING
A. Cabinet: Galvanized steel, phosphatized, and finished with an air-dry paint coating with removable access panels. Structural members shall be 16 gauge with access doors and removable panels of minimum 20 gauge.
B. Cabinet construction shall allow for all service/maintenance from one side of the unit.
C. Cabinet top cover shall be one piece construction or where seams exits, it shall be double-hemmed and gasket-sealed.
D. Access Panels: Water- and air-tight panels with handles shall provide access to filters, heating section, return air fan section, supply air fan section, evaporator coil section, and unit control section.
E. Downflow unit's base pans shall have a raised 1 1/8 inch high lip around the supply and return openings for water integrity.
G. Insulation: Provide 1/2 inch thick coated fiberglass insulation on all exterior panels in contact with the return and conditioned air stream.
H. Provide 115 volt convenience outlet, factory-installed and powered, per NEC requirements.
I. Provide openings either on side of unit or thru the base for power, control and gas connections.

J. The base of the unit shall have provisions for forklift and crane lifting

2.04 AIR FILTERS
A. Air Filters: Factory installed filters shall mount integral within the unit and shall be accessible through access panels. Two inch thick glass fiber disposable media filters shall be provided.

2.05 FANS AND MOTORS
A. Provide evaporator fan section with forward curved, double width, double inlet, centrifugal type fan.
B. Provide self-aligning, grease lubricated, ball or sleeve bearings with permanent lubrication fittings.
C. Outdoor and Indoor Fan motors shall be permanently lubricated and have internal thermal overload protection.
D. Outdoor fans shall be direct drive, statically and dynamically balanced, draw through in the vertical discharge position.
E. Provide shafts constructed of solid hot rolled steel, ground and polished, with key-way, and protectively coated with lubricating oil.
F. Provide powered exhaust fans where indicated.

2.06 EVAPORATOR COIL
A. Provide configured aluminum fin surface mechanically bonded to copper tubing coil.
B. Provide an independent expansion device for each refrigeration circuit. Factory pressure test at 450 psig and leak test at 200 psig.
C. Provide drain pan for base of evaporator coil constructed of PVC or galvanized steel with external connections.

2.07 CONDENSER SECTION
A. Provide internally finned seamless copper tube mechanically bonded to configured aluminum fins. Factory pressure test to 450 psig.
B. Provide vertical discharge, direct drive fans with aluminum blades. Fans shall be statically balanced. Motors shall be permanently lubricated, with integral thermal overload protection in a weather tight casing.

2.08 REFRIGERATION SYSTEM
A. Compressor(s): Provide scroll compressor with direct drive operating at 3600 rpm. Integral centrifugal oil pump. Provide suction gas cooled motor with winding temperature limits and compressor overloads.
B. Compressor(s): Provide direct drive, hermetic type, scroll compressor with centrifugal type oil pump. Motor shall be suction gas cooled and have internal spring isolation. Compressors shall include crankcase heaters, internal pressure relief, temperature and current sensitive overloads.
C. Units shall have cooling capabilities down to 0 degree F as standard. For field-installed low ambient accessory, the manufacturer shall provide a factory-authorized service technician that will assure proper installation and operation.
D. Provide each unit with one refrigerant circuit(s) factory-supplied completely piped with liquid line filter-drier, suction and liquid line pressure ports.

2.9 EXHAUST/RETURN SECTION
A. Provide, on downflow units above 6 1/4 tons, a factory supplied field installed power exhaust assembly that shall assist the barometric relief damper in the economizer in relieving building pressurization.
2.10 OUTDOOR AIR SECTION
A. Provide a fully integrated field-installed 100% modulating outside air economizer (when specified or required by OA cfm level) with unit return and barometric relief air dampers (downflow only, when indicated), minimum position setting, preset linkage, wiring harness with plug. Unit operation is through primary temperature controls that automatically modulate dampers to maintain space temperature conditions.
B. Provide economizer with enthalpy controls only where specified.
C. Provide adjustable minimum position control located in the economizer/outdoor air intake section of the unit.
D. Provide spring return motor for outside air damper closure during unit shutdown or power interruption.

2.11 OPERATING CONTROLS
A. Provide factory-wired roof top units with 24 volt control circuit with control transformers, contactor pressure lugs or terminal block for power wiring. Contractor to provide field-installed unit-mounted disconnect switch. Units shall have single point power connections. Field wiring of zone controls to be NEC Class II.
B. Provide microprocessor unit-mounted control which when used with an electronic zone sensor provides proportional integral room control. This UCM shall perform all unit functions by making all heating, cooling and ventilating decisions through resident software logic.
C. Provide factory-installed indoor evaporator defrost control to prevent compressor slugging by interrupting compressor operation.
D. Provide a anti-cycle timing and minimum on/off between stages timing in the microprocessor.
E. Economizer Preferred Cooling (if supplied with economizer) - Compressor operation is integrated with economizer cycle to allow mechanical cooling when economizer is not adequate to satisfy zone requirements. Compressors are enabled if space temperature is recovering to cooling setpoint at a rate of less than 0.2 degrees per minute. Compressor low ambient lockout overrides this function.

2.12 STAGING CONTROLS
A. Provide NEC Class II, electronic, adjustable zone control to maintain zone temperature setting.
B. Provide programmable electronic microcomputer based zone control.
   1. Zone control shall incorporate:
      a. Automatic changeover from heating to cooling.
      b. Set-up for at least 2 - sets of separate heating and cooling temperatures per day.
      c. Instant override of setpoint for continuous or timed period from one hour to 31 days.
      d. Switch selection features including Fahrenheit display, 12 or 24 hour clock, keyboard disable, remote sensor, fan on-auto.
   2. Zone sensor display shall be capable of:
      a. Time of day.
      b. Actual room temperature.
      c. Programmed temperature.
      d. Programmed time.
      e. Duration of timed override.
      f. Day of week.
      g. System mode indication: heating, cooling, low battery fan on.
C. Provide remote temperature sensor capability.
D. Provide mixed air sensor in supply air to close outside air damper.
2.13 ROOF CURB
   A. Contractor shall provide factory supplied roof curb, 16 gauge perimeter made of zinc coated steel with supply and return air gasketing and wood nailer strips. Ship knocked down and provided with instructions for easy assembly.
   B. Curb shall be manufactured in accordance with the National Roofing Contractors Association guidelines.

2.14 ACCESSORIES
   A. Additional factory or field installed accessories or features such as hot gas reheat coil may be required in the sequence of control or in the schedules. These accessories shall be provided in accordance with manufacturer’s recommendations.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Contractor shall verify that roof is ready to receive work and opening dimensions are as indicated on shop drawings.
   B. Contractor shall verify that proper power supply is available.

3.02 INSTALLATION
   A. Contractor shall install in accordance with manufacturer’s instructions.
   B. Mount units on factory built roof mounting frame providing watertight enclosure to protect ductwork and utility services. Install roof mounting curb level.

END OF SECTION