

SECTION 237413.10 - PACKAGED ROOFTOP UNIT

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment, and services as required for the complete installation as shown on the Contract Documents.

1.2 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.

1.3 QUALIFICATIONS

- A. Complete unit and accessories shall comply with the New York State Energy Conservation Construction Code. Unit shall have UL and AGA label.

1.4 MANUFACTURER'S WARRANTY

- A. Provide parts warranty (excluding refrigerant) for one year from start-up or 18 months from shipment, whichever occurs first.
- B. Provide five (5) year extended warranty for compressors.
- C. Provide five (5) year heat exchanger limited warranty.

PART 2 - PRODUCTS

2.1 PACKAGED ROOFTOP UNITS

- A. General:
 - 1. Units shall conform to ANSI Z21.47/UL1995 for construction of packaged air conditioner.
 - 2. 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.
 - 3. Units furnished and installed shall be packaged rooftops as scheduled on contract documents and these specifications. Cooling capacity ratings shall be based on

ARI Standard 210. Units shall consist of insulated weather-tight casing with compressors, air-cooled condenser coil, condenser fans, evaporator coil, return-air filters, supply motors and unit controls and drives.

4. Units shall be 100% factory run tested and fully charged with R-410A.
5. Units shall have labels, decals, and/or tags to aid in the service of the unit and indicate caution areas.
6. Units shall be dedicated down flow or dedicated horizontal airflow as manufactured.
7. Wiring internal to the unit shall be colored and numbered for identification.

B. Unit Casing:

1. Cabinet: Galvanized steel, phosphatized, and finished with an air-dry paint coating with removable access panels. Structural members shall be 18-gauge with access doors and removable panels of minimum 20 gauge.
2. Units cabinet surface shall be tested 1000 hours in salt spray test in compliance with ASTM B117.
3. Cabinet construction shall allow for all service/maintenance from one side of the unit.
4. Cabinet top cover shall be one-piece construction or where seams exist, it shall be double-hemmed and gasket-sealed.
5. 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. Access panels shall be hinged.
6. Units base pan shall have a raised 1-1/8 in. high lip around the supply and return openings for water integrity.
7. Insulation: Provide 1/2 in. thick fiberglass insulation with foil face on all exterior panels in contact with the return and conditioned air stream. All edges must be captured so that there is no insulation exposed in the air stream.
8. Provide openings either on side of unit or through the base for power, control, condensate, and gas connections.
9. Provide through-the base electrical power and control service; eliminating the need for separate roof penetrations.
10. Provide through-the-base gas piping including a pre-assembled black steel piping, manual gas shutoff valve (with 1/8 in. NPT pressure tap), elbows and union.

11. The base of the unit shall have three (3) sides for forklift provisions. The base of the units shall have rigging/lifting holes for crane maneuvering.

C. Air Filters:

1. Factory installed filters shall mount integral within the unit and shall be accessible through access panels. 2 in. thick pleated MERV 8 filters shall be furnished and installed.

D. Fans and Motors:

1. Provide evaporator fan section with forward curved, double width, double inlet, centrifugal type fan.
2. Provide self-aligning, grease lubricated, ball or sleeve bearings with permanent lubrication fittings.
3. Provide units 5 tons and below with direct drive, multiple-speed, dynamically balanced supply fans.
4. Provide units 3-5 tons with belt driven supply fans with adjustable motor sheaves.
5. Provide units 6 tons and above with belt driven, supply fans with adjustable motor sheaves.
6. Outdoor and indoor fan motors shall be permanently lubricated and have internal thermal overload protection.
7. Outdoor fans shall be direct drive, statically and dynamically balanced, draw through in the vertical discharge position.
8. Provide shafts constructed of solid hot rolled steel, ground and polished, with key-way, and protectively coated with lubricating oil.

E. Gas Fired Heating Section:

1. Completely assembled and factory installed heating system shall be integral to unit, UL or CSA approved specifically for outdoor applications for use downstream from refrigerant cooling coils. Threaded connection with plug or cap provided. Provide capability for gas piping through the side of the unit.
2. Heating section shall be factory run tested prior to shipment.
3. Induced draft combustion type with direct spark ignition system, redundant main gas valve, and 2-staged heat.
4. Gas Burner Safety Controls: Provide safety controls for the proving of combustion air prior to ignition, and continuous flame supervision. Provide flame rollout switches.

5. Induced draft blower shall have combustion air proving switches and built-in thermal overload protection on fan motor.
6. Heat Exchanger: Provide tubular section type constructed from 18-gauge aluminized steel.
7. Burners: Burners shall be of the in-shot type constructed of stainless steel.
8. Limit controls: High temperature limit controls will shut off gas flow in the event of excessive temperatures resulting from restricted indoor airflow or loss of indoor airflow.

F. Evaporator Coil:

1. Provide configured aluminum fin surface mechanically bonded to copper tubing coil.
2. Provide an independent expansion device for each refrigeration circuit. Factory pressure tested at 450 psig and leak tested at 200 psig.
3. Provide factory installed thermal expansion valve (TXV) for each refrigerant circuit. Factory pressure tested at 450 psig and leak tested at 200 psig.
4. Provide a removable, reversible, cleanable double sloped drain pan for base of evaporator coil constructed of PVC

G. Condenser Section:

1. Provide internally finned seamless copper tube mechanically bonded to configured aluminum fins. Factory pressure test to 450 psig.
2. 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.
3. [Condenser coil shall be epoxy coated.]

H. Refrigeration System:

1. Compressors: 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.
2. 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.
3. Provide each unit with refrigerant circuits factory-supplied completely piped with liquid line filter-drier, suction and liquid line pressure ports.

4. Refrigeration System Options:

- a. Thermal expansion valve.
- b. Dehumidification (hot-gas reheat) option.
- c. High-pressure refrigeration control.
- d. Froststat
- e. Crankcase Heater.

I. Exhaust/Return Section

1. Provide a factory supplied field installed power exhaust assembly that shall assist the barometric relief damper in the economizer in relieving building pressurization.

J. Outdoor Air Section:

1. Provide a fully integrated field-installed 100% modulating outside air economizer with unit return and barometric relief air dampers, 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.]

K. Operating Controls:

1. 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.
2. Provide microprocessor unit-mounted DDC 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.
3. Provide factory-installed indoor evaporator defrost control to prevent compressor slugging by interrupting compressor operation.
4. Provide an anti-cycle timing and minimum on/off between stages timing in the microprocessor.
5. Economizer Preferred Cooling: Compressor operation shall be 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.

6. Control Options:
 - a. LonTalk communication interface.
 - b. Fan failure switch.
 - c. Dirty filter switch.
 - d. Supply air smoke detector.
 - e. Return air smoke detector.
 - f. Ventilation override accessory: set to 3 different pre-programmed sequences for smoke purge, pressurization, and exhaust.
- L. Staging Controls:
 1. Provide NEC Class II, electronic, adjustable zone control to maintain zone temperature setting.
 2. Provide manual/automatic changeover control with (off-heat-auto-cool), and fan control switch (auto-on).
 3. Provide controller for by-pass VAV operation on constant volume rooftop that has been tested and supplied by HVAC equipment manufacturer. If by-pass VAV dampers are substituted and are not provided by the manufacturer, then it is the responsibility of the mechanical contractor to prove to the engineer that the complete system is compatible and operates properly.
 4. Provide programmable electronic microcomputer based zone control.
- M. Roof Curb:
 1. 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
 2. Curb shall be manufactured in accordance with the National Roofing Contractors Association guidelines.
- N. Design Equipment: Trane.
- O. Make: Carrier, Daikin Applied, Trane, York.

PART 3 - EXECUTION

3.1 PACKAGED ROOFTOP UNIT

- 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.
- C. Contractor shall verify that proper power supply is available.
- D. Provide for roof openings and framing as called for. Set and secure curb to roof, and unit to curb. Shim roof curb level.
- E. Pipe coil drains to spill to roof, provide "P" trap of proper depth.
- F. Install unit in strict accordance with manufacturer's instructions.
- G. Arrange to have equipment manufacturer's technician to verify installation for compliance with manufacturer's recommendations.
- H. Arrange to have equipment manufacturer's technician perform start-up of equipment, instruct Owner's Representative in the proper operation of the equipment.

END OF SECTION