

SECTION 23 74 13
PACKAGE OUTDOOR CENTRAL STATION AIR HANDLER UNIT

PART 1 - GENERAL

1.1 SUBMITTALS

- A. **Product Data:** Include manufacturer's technical data for each RTU, including rated capacities, dimensions, required clearances, characteristics, furnished specialties, and accessories.
- B. **Shop Drawings:** Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 1. **Wiring Diagrams:** Power, signal, and control wiring.
- C. **Operation and maintenance data.**
- D. **Warranty.**

1.2 QUALITY ASSURANCE

- A. **ARI Compliance:**
 - 1. Comply with ARI 210/240 and ARI 340/360 for testing and rating energy efficiencies for RTUs.
 - 2. Comply with ARI 270 for testing and rating sound performance for RTUs.
- B. **ASHRAE Compliance:**
 - 1. Comply with ASHRAE 15 for refrigerant system safety.
 - 2. Comply with ASHRAE 33 for methods of testing cooling and heating coils.
 - 3. Comply with ASHRAE/IESNA 90.1 for minimum efficiency of heating and cooling.
- C. **NFPA Compliance:** Comply with NFPA 90A and NFPA 90B.
- D. **UL Compliance:** Comply with UL 1995.
- E. **Electrical Components, Devices, and Accessories:** Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.3 WARRANTY

- A. **Special Warranty:** Manufacturer's standard form in which manufacturer agrees to replace components of RTUs that fail in materials or workmanship within specified warranty period.
 - 1. **Warranty Period for Compressors:** Manufacturer's standard, but not less than 5 years from date of Substantial Completion.

2. Warranty Period for Gas Furnace Heat Exchangers: Manufacturer's standard, but not less than 10 years from date of Substantial Completion.
3. Warranty Period for Solid-State Ignition Modules: Manufacturer's standard, but not less than 1 years from date of Substantial Completion.
4. Warranty Period for Control Boards: Manufacturer's standard, but not less than 3 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 Manufacturer

- A. Carrier
- B. Trane
- C. Daiken

2.02 General Description

- A. Unit shall be factory assembled and tested including helium leak testing of the coils, pressure testing of the refrigeration circuit, and run testing of the completed unit. Run test report shall be supplied with the unit in the controls compartment's literature pocket.
- B. Unit shall have decals and tags to indicate lifting and rigging, service areas, and caution areas for safety and to assist service personnel.
- C. Unit components shall be labeled, including pipe stub outs, refrigeration system components, and electrical and controls components.
- D. Estimated sound power levels (dB) shall be shown on the unit ratings sheet.
- E. Installation, Operation, and Maintenance manual shall be supplied within the unit.
- F. Laminated color-coded wiring diagram shall match factory installed wiring and be provided in both point-to-point and ladder form and affixed to the interior of the control compartment's hinged access door.
- G. Unit nameplate shall be provided in two locations on the unit, affixed to the exterior of the unit and affixed to the interior of the control compartment's hinged access door.

2.03 Construction

- A. All cabinet walls, access doors and roof shall be fabricated of rigid, impact resistant, double wall, high performance composite panels with G90 galvanized steel on both sides and a closed cell polyurethane foam interior core.
- B. Foam shall have a minimum density of 2 pounds/cubic foot and shall be tested in accordance with ASTM D-1929 for a minimum flash ignition temperature of 610°F.
- C. Panel deflection shall not exceed L/240 ratio at 125% of design static pressure, maximum 8 inches of positive or negative static pressure. Deflection shall be measured at the midpoint of the panel height and width.

- D. Cabinet leakage rate shall not exceed 1% when tested at 6 inches of static pressure.
- E. Insulation shall have an R-value of 13.
- F. All cabinet walls, access doors and roof shall have a thermal break with no metal path to inside to outside.
- G. Units with cooling coils shall include double sloped 304 stainless steel drain pans and a factory provided p-trap, for field installation.
- H. Roof of the air tunnel shall be sloped to provide complete drainage.
- I. Unit shall have rain break overhangs above access doors.
- J. Exterior paint finish shall be capable of withstanding at least 2500 hours, with no visible corrosive effects, when tested in a salt spray and fog atmosphere in accordance with ASTM B 117-95 test procedure.
- K. Access to filters, dampers, economizers, cooling coils, power exhaust and return blowers, controls, compressors, and heaters shall be through hinged access doors with quarter turn, zinc cast, lockable handles. Full length stainless steel piano hinges shall be included on the doors.
- L. All openings through the base pan of the unit shall have upturned flanges of at least 0.5 inches in height around the opening through the base pan.
- M. Unit shall include lifting lugs on the top of the unit.
- N. Units shall be selected for low sound.
- O. Unit shall be provided with humidity and enthalpy sensors.
- P. Unit shall include interior corrosion protection which shall be capable of withstanding at least 2500 hours, with no visible corrosive effects, when tested in a salt spray and fog atmosphere in accordance with ASTM B 117-95 test procedure. Air tunnel, blowers, dampers, and economizer shall all include the corrosion protection.
- Q. The return air shall have a CO2 sensor in it.

2.04 Electrical

- 1. Unit shall be provided with factory installed and factory wired, non-fused disconnect switch in the unit control panel.
- 2. Unit shall be provided with factory installed and factory wired 115V, 13 amp GFI outlet with outlet disconnect switch in the unit control panel.
- 3. Unit shall be provided with phase and brown out protection which shuts down all motors in the unit if the electrical phases are more that 10% out of balance on voltage, the voltage is more that 10% under design voltage, or on phase reversal.

2.05 Supply Blowers

- A. Unit shall include direct drive, propeller supply fans.
- B. Blowers and motors shall be dynamically balanced and mounted on rubber isolators.
- C. Motors shall be premium efficiency ODP with ball bearings rated for 200,000 hours service with external lubrication points. Variable frequency drive(s) shall be factory wired and mounted in the unit.
- D. The indoor fans motors shall have grounding rings.
- E. The VFD shall have a bypass on it.
- F. The motor shall be totally enclosed.

2.06 Cooling Coils

- A. Evaporator Coil(s)
 - 1. Coils shall be designed for use with R-32 or R-454B refrigerant and constructed of copper tubes with aluminum fins mechanically bonded to the tubes and galvanized steel end casings. Fin design shall be sine wave rippled.
 - 2. Coils shall have interlaced circuitry and shall be 6 row high capacity.
 - 3. Coils shall be helium leak tested.
 - 4. Coil shall be furnished with a factory installed thermostatic expansion valve.

2.07 Refrigeration System

- A. Unit shall be factory charged with R-32 or R454B refrigerant.
- B. Compressors shall be digital scroll type with thermal overload protection, independently circuited, and carry a 5 year non-prorated warranty.
- C. Compressors shall be mounted in an isolated service compartment which can be accessed without affecting unit operation. Lockable hinged compressor access doors shall be fabricated of double wall, high performance composite panels with an R-value of 13 to prevent the transmission of noise outside the cabinet.
- D. Compressors shall be isolated from the base pan with the compressor manufacturer's recommended rubber vibration isolators, to reduce any transmission of noise from the compressor into the building area.
- E. Each refrigeration circuit shall be equipped with thermostatic expansion valve type refrigerant flow control.
- F. Each refrigeration circuit shall be equipped with automatic reset low pressure and manual reset high pressure refrigerant safety controls, Schrader type service

fittings on both the high pressure and low pressure sides, and factory installed liquid line filter driers.

- G. Digital scroll compressors: Unit shall include a modulating capacity scroll compressor on the first refrigeration circuit which shall be capable of modulation from 10-100% of its capacity.

2.08 Condensers

A. Air-Cooled Condenser

1. Condenser fans shall be vertical discharge axial flow direct drive fans.
2. Coils shall be designed for use with R-454B or R-32 refrigerant and constructed of copper tubes with aluminum fins mechanically bonded to the tubes and galvanized steel end casings. Fin design shall be sine wave rippled.
3. Coils shall be designed for a minimum of 10 degrees of refrigerant sub-cooling.
4. Coils shall be helium leak tested.
5. Fans shall be low sound condensing fans.
6. The fans shall be capable of multi-zone variable air volume duct pressure.

2.09 Gas Heating

- A. Unit shall include a natural gas furnace with 2 or 4 stages of capacity.
- B. Aluminized steel heat exchanger furnaces shall carry a 15 year non-prorated warranty.
- C. Gas furnace shall consist of aluminized steel heat exchangers with multiple concavities, an induced draft blower, and an electronic pressure switch to lockout the gas valve until the combustion chamber is purged and combustion airflow is established.
- D. Furnace shall include a gas ignition system consisting of an electronic igniter to a pilot system, which will be continuous when the heater is operating, but will shut off the pilot when heating is not required.
- E. Unit shall have gas supply piping entrances in the unit base for through-the-curb gas piping and in the outside cabinet wall for across the roof gas piping.

2.10 Filters

1. Unit shall include a MERV 8, 2 inch thick, permanent filter frame with replaceable media, upstream of the cooling coil.
2. Unit shall include a clogged filter switch

2.11 Outside Air

1. Unit shall include 0-100% modulating damper consisting of a motor operated outside air damper and return air damper assembly constructed of extruded aluminum, hollow core, airfoil blades with rubber edge seals and aluminum end seals. Damper blades shall be gear driven and designed to have no more than 15 CFM of leakage per sq. ft. of damper area when subjected to 2 inches w.g. air pressure differential across the damper. Damper assembly shall be controlled by a (DDC) actuator. Unit shall include outside air opening bird screen, outside air hood with rain lip, and barometric relief dampers.
2. Units shall be equipped with an outside air measurement station as provided by the manufacturer.

Unit shall be furnished with return air CO₂ override.

2.12 Controls

A. Factory Installed and Factory Provided Controller

1. Unit controller shall be capable of controlling all features and options of the unit. Controller shall be factory installed in the unit controls compartment and factory tested. Controller is configurable for standalone control or integrated third party control.
2. A field installed supply air temperature sensor shall be furnished for installation by contractor.
3. Controller shall have an onboard clock and calendar functions that allow for occupancy scheduling.
4. Controller shall include non-volatile memory to retain all programmed values without the use of a battery, in the event of a power failure.
5. Controller shall contain diagnostics to indicate controller power, communications, unit alarms, and sensor failures.
6. Controller capable of the following:
 - a. Average up to 3 space temperature/humidity sensors
 - b. Interlock with up to 4 exhaust fans with incremental adjustable outside air damper positions
 - c. Minimum outside air damper with CO₂ override
 - d. Control up to 2 heat reclaim stages

Inputs:

- 1) Heat 1 Mode Enable (*HEAT RECLAIM*)
- 2) Heat 2 Mode Enable (*GAS HEAT ENABLE*)
- 3) Cooling Mode Enable
- 4) Dehumidification Mode Enable
- 5) System Enable
- 6) Occupied
- 7) Outside air damper

Outputs:

- 8) Heating Fail
- 9) Cooling Fail
- 10) Airflow/fan Fail
- 11) Dirty Filter Alarm
- 12) Heat Reclaim Alarm
- 12) Heat Reclaim Enable Stage 1
- 13) Heat Reclaim Enable stage 2

2.14 Curbs

- A. Curbs shall to be fully gasketed between the curb top and unit bottom with the curb providing full perimeter support, cross structure support and air seal for the unit. Curb gasket shall be furnished within the control compartment of the rooftop unit to be mounted on the curb immediately before mounting of the rooftop unit.
- B. The curb shall be provided by vibroacoustic or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Roof Curb: Install on roof structure or concrete base, level and secure, according to ARI Guideline B. Install RTUs on curbs and coordinate roof penetrations and flashing with roof construction specified in Division 07 Section "Roof Accessories." Secure RTUs to upper curb rail, and secure curb base to roof framing or concrete base with anchor bolts.
- B. Install condensate drain, minimum connection size, with trap and indirect connection to nearest roof drain or area drain.
- C. Install piping adjacent to RTUs to allow service and maintenance.
 - 1. Gas Piping: Comply with applicable requirements in Division 23 Section "Facility Natural-Gas Piping." Connect gas piping to burner, full size of gas train inlet, and connect with union and shutoff valve with sufficient clearance for burner removal and service.
- D. Duct installation requirements are specified in other Division 23 Sections. Drawings indicate the general arrangement of ducts. The following are specific connection requirements:
 - 1. Install ducts to termination at top of roof curb.
 - 2. Remove roof decking only as required for passage of ducts. Do not cut out decking under entire roof curb.
 - 3. Connect supply ducts to RTUs with flexible duct connectors specified in Division 23 Section "Air Duct Accessories."
 - 4. Install return-air duct continuously through roof structure.

3.2 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing. Report results in writing.
- B. Tests and Inspections:
 - 1. After installing RTUs and after electrical circuitry has been energized, test units for compliance with requirements.
 - 2. Inspect for and remove shipping bolts, blocks, and tie-down straps.
 - 3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 4. Test and adjust controls and safeties. Replace damage and malfunctioning controls and equipment.
- C. Remove and replace malfunctioning units and retest as specified above.

3.3 CLEANING AND ADJUSTING

After completing system installation and testing, adjusting, and balancing RTU and air-distribution systems, clean filter housings and install new filters.

END OF SECTION 237413