SECTION 23 81 40- CONDENSING UNITS & ROOFTOP AIR CONDITIONERS

PART 1 - GENERAL

1. RELATED DOCUMENTS:

    a. Drawings and general provisions of Contract, including General and Supplementary Conditions and all Specification sections, apply to work of this section.

2. SUBMITTALS:

    a. Product Data: Submit manufacturer's technical product data, including rated capacities of selected model clearly indicated, weights (shipping, installed, and operating), dimensions, required clearances, and methods of assembly of components, furnished specialties and accessories; and installation and start-up instructions.

    b. Units with humidity sensors shall utilize multiple compressors & hot gas re-heat.

    c. Design Calculations: Calculate requirements for vibration isolators and vibration isolator curbs/bases. Detail mounting, securing, and flashing of roof curb to roof structure. Indicate coordinating requirements with roof membrane system. Contractor is responsible to provide all necessary isolation devices to ensure no transmission. Refer to drawing details for additional information.

    d. Seismic Qualification Certification: Submit certification that rooftop mounted equipment (accessories and components) will withstand seismic forces as defined by the architectural drawings. Contractor is responsible for complete compliance. Drawings and installation must be prepared/inspected by a licensed structural engineer Licensed in North Carolina (seal drawings and inspection compliance report.).

3. QUALITY ASSURANCE:
    a. Manufacturer's Qualifications: Firms regularly engaged in manufacture of condensing units, of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.

    b. Codes and Standards:

        i. Capacity rating for units shall be in accordance with ARI Standard 210 "Standard for Unitary Air Conditioning Equipment".

    c. Warranty Period: 5 years from date of substantial completion or as listed in architectural specifications, warranty period.

PART 2 - PRODUCTS

1. AIR-COOLED CONDENSING UNITS/ROOFTOP UNITS:

    a. Manufacturers: Subject to compliance with requirements, provide units of one of the following:

Conventional Units	Humidity Control Units
Carrier	Valent
Daikin Applied	Munters
Trane (The) Co.	Poolpak

2. General: Factory-assembled and tested air-cooled condensing units, consisting of compressor, condenser coil, fan, motor, refrigerant reservoir, and operating controls.

3. Casing: Galvanized steel finished with electrostatically bonded epoxy paint designed for corrosive salt water atmosphere, complete with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Unit shall be complete with brass service valves, fittings, and gage ports on exterior of casing. Unit shall have minimum ½" thick insulation, foil faced or elastomeric (washable). Drain pan shall be IAQ sloped style and accessible for cleaning- stainless steel or polymer. (galvanized metal will not be accepted)

4. Compressor: Hermetically sealed, with built-in overloads and vibration isolation. Compressor motor, shall have thermal and current sensitive overload devices, internal high-pressure protection, high and low pressure cutout switches, start capacitor and relay, 2-pole contactor, crankcase heater, and temperature actuated switch and timer to prevent compressor rapid cycle.

5. Condenser: Coil shall have copper tubes and aluminum fins, or aluminum tubes and aluminum fins; complete with liquid accumulator and liquid subcooler. Aluminum propeller fan shall be direct driven, with permanently lubricated fan motor having thermal overload protection. Provide coil guards. Provide access doors to allow easy service, cleaning, and inspection of all coils. All compressors to have sound shroud.

6. Hot gas reheat: Provide HGRH coil if schedule on drawing indicates. Include controls to optimize humidity removal.

7. Gas furnaces: Provide stainless steel heat exchanger with 10-year warranty.

8. Fans: Direct drive fans are preferred. Refer to schedule and provide if basis of design is direct drive fan.

9. Accessories:

    a. Insulated suction and liquid tubing of sufficient length to connect condensing unit and evaporator coil.

10. Outside Air: Provide motorized damper to modulate open/close with unit operation. Provide full economizer and dry bulb controller with barometric pressure relief for units designated or required by code. Note- Horizontal units require field mounted barometric pressure relief.

11. Roof mounted packaged equipment requires factory provided curbs. All curbs receive sound treatment per the typical detail. Horizontal discharge packaged equipment curbs shall be equipment manufacture supplied and also require sound treatment per details.

12. Smoke Detector: Install on all units greater than 2000 cfm or unit serving exit corridors. To be provided by fire alarm contractor, installed and wired to shut fan off by mechanical contractor, wired to alarm system by electrician. Refer to section 230501.

13. Power: Provide single point power connection, control circuit transformer with built-in circuit breaker or disconnect.

14. Low Ambient Control: Provide on all units serving Computer Labs, Technology Equipment Rooms, Kitchens, or other areas with high sensible loads. Refer to schedule.

15. All service doors shall be hinged with tool less access handles. This also applies to filter access.

16. All compressors shall have soundshields.

PART 3 - EXECUTION

1. INSTALLATION:

    a. General: Install unit in accordance with manufacturers installation instructions. Install units plumb and level, firmly anchored in locations indicated, and maintain manufacturer's recommended clearances. All fenced locations shall have 4” fiber reinforced concrete inside the fenced areas (including posts) and 4” housekeeping pads for the units. Provide traps, liquid line accumulators, and solenoids as necessary for proper installation/operation. Refer to drawing details for more information.

    b. Support:

        i. Install ground-mounted units on 4" thick reinforced concrete pad, 4" larger on each side than condensing unit. Coordinate actual fence size requirements - maintain minimum service clearances. Units that require seismic restraints will require special attachment requirements. See vibration and seismic schedule.

        ii. Roof mounted equipment: Secure with hurricane clips, seismic restraints, vibration isolator, or similar approved method. Maintain all roof warranties.

2. FIELD QUALITY CONTROL:

    a. Testing:

        i. Charge systems with refrigerant and oil, and test for leaks. Repair leaks and replace lost refrigerant and oil.

3. INSTALLATION AND START-UP CHECKS:

    a. Complete installation and startup checks according to manufacturer's written instructions and do the following:

        i. Inspect for visible damage to unit casing.
        ii. Inspect for visible damage to furnace combustion chamber.
        iii. Inspect for visible damage to compressor, air-cooled outside coil, and fans.
        iv. Inspect internal insulation.
        v. Verify that labels are clearly visible.
        vi. Verify that clearances have been provided for servicing.
        vii. Verify that controls are connected and operable.
        viii. Verify that filters are installed.
        ix. Clean outside coil and inspect for construction debris.
        x. Clean furnace flue and inspect for construction debris.
        xi. Connect and purge gas line.
        xii. Adjust vibration isolators.
        xiii. Inspect operation of barometric dampers.
        xiv. Lubricate bearings on fan.
        xv. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.
        xvi. Adjust fan belts to proper alignment and tension.
        xvii. Start unit according to manufacturer's written instructions.

    b. Start refrigeration system in summer only.
    c. Complete startup sheets and attach copy with Contractor's startup report. Include outdoor temperature. Include reports in turn-over package.

d. Inspect and record performance of interlocks and protective devices; verify sequences.
e. Operate unit for an initial period as recommended or required by manufacturer.
f. Perform the following operations for both minimum and maximum firing and adjust burner for peak efficiency. Adjust pilot to stable flame.

g. Measure gas pressure on manifold.
h. Measure combustion-air temperature at inlet to combustion chamber.
i. Measure flue-gas temperature at furnace discharge.
j. Perform flue-gas analysis. Measure and record flue-gas carbon dioxide and oxygen concentration.
k. Measure supply-air temperature and volume when burner is at maximum firing rate and when burner is off. Calculate useful heat to supply air.

l. Calibrate thermostats.
m. Adjust and inspect high-temperature limits.
n. Inspect outside-air dampers for proper stroke and interlock with return-air dampers.
o. Start refrigeration system and measure and record the following:

p. Coil leaving-air, dry- and wet-bulb temperatures.
q. Coil entering-air, dry- and wet-bulb temperatures.
r. Outside-air, dry-bulb temperature.
s. Outside-air-coil, discharge-air, dry-bulb temperature.

t. Inspect controls for correct sequencing of heating, mixing dampers, refrigeration, and normal and emergency shutdown.
u. Measure and record the following minimum and maximum airflows. Plot fan volumes on fan curve.

v. Supply-air volume.
w. Return-air volume.
x. Relief-air volume.
y. Outside-air intake volume.

z. Simulate maximum cooling demand and inspect the following:

aa. Compressor refrigerant suction and hot-gas pressures.
bb. Short circuiting of air through outside coil or from outside coil to outside-air intake.

cc. Verify operation of remote panel, including pilot-light operation and failure modes. Inspect the following:

i. High-limit heat exchanger.
ii. Warm-up for morning cycle.
iii. Freezestat operation.
iv. Economizer to limited outside-air changeover.
v. Alarms.

dd. After startup and performance testing, change filters, vacuum heat exchanger and cooling and outside coils, lubricate bearings, adjust belt tension, and inspect operation of power vents.

4. ADJUSTING

a. Adjust initial temperature and humidity set points.

b. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

c. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to site outside normal occupancy hours for this purpose, without additional cost.

5. DEMONSTRATION:

a. Provide services of manufacturer's authorized service representative to provide start-up service and to instruct Owner's personnel in operation and maintenance of condensing units. Provide minimum of two (2) hour training session with Owner. Provide clean filters at final inspection.

END OF SECTION 23 81 40