

**Wake County Public School System
JCPS CONTROL REPLACEMENTS – PACKAGE 3**

ADDENDUM NO. 3

DATE: June 21, 2023

PROJECT: Johnston County Public Schools
Control Replacements – Package 3

OWNER: Johnston County Public Schools
601-A West Market Street, Smithfield, NC 27577

ENGINEER: Dewberry Engineers Inc.
2610 Wycliff Road, Suite 410, Raleigh, NC 27607

This Addendum, applicable to the work designated herein, shall be understood to be and is an Addendum to the contract documents and, as such, shall become a part of and included in the contract.

Drawings:

1. None.

Specifications:

1. Specification 236213 – Package Rooftop unit – Revised Header and Footer
2. Specification 238219 – Fan Coil Unit – Revised Header and Footer

Contractor Questions:

1. None.

Attached Documents:

1. Specification 236213 – Package Rooftop Unit
2. Specification 238219 – Fan Coil Unit

End of Addendum No. 3

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SECTION 23 62 13 – PACKAGED ROOFTOP UNITS

PART 1 - GENERAL

1.1. SUMMARY

- A. Section includes packaged rooftop style units.

1.2. PERFORMANCE REQUIREMENTS

- A. Cooling efficiencies shall be based on AHRI Standard 340-360.
- B. Structural Performance: Casing panels shall be self-supporting and capable of withstanding 133 percent of internal static pressures indicated, without panel joints exceeding a deflection of L/200 where "L" is the unsupported span length within completed casings.

1.3. SUBMITTALS

- A. Product Submittals: For each air-handling unit indicated, provide unit dimensions and weight; cabinet material, metal thickness, finishes, insulation, and accessories; certified fan-performance curves with system operating conditions indicated; certified fan-sound power ratings; fan construction and accessories; motor ratings, electrical characteristics, and motor accessories; certified coil-performance ratings with system operating conditions indicated; dampers including housings, linkages, and operators; and filters with performance characteristics.
 - 1. Coordination Drawings: Floor plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved: mechanical equipment layout and relationships between components and adjacent structural, electrical and mechanical elements; support location, type, and weight; and field measurements.
- B. Close-Out Submittals:
 - 1. Operation and Maintenance Data: For packaged rooftop units to include in emergency, operation, and maintenance manuals.

1.4. QUALITY ASSURANCE

- A. Efficiencies shall comply with the State Energy Conservation Code.
- B. Electrical Components, Devices and Accessories: UL listed and labeled as defined by NFPA 70, the National Electric Code, or equivalent by a qualified testing agency marked for the intended location and application and accepted by the Authority Having Jurisdiction and Engineer.

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- C. Mechanical Equipment and Materials: UL listed and labeled as defined by State Building Codes or equivalent by a qualified testing agency marked for the intended location and application and accepted by the Authority Having Jurisdiction and Engineer.
- D. Testing and listing laboratories of mechanical and electrical equipment shall be accredited by the North Carolina Building Code Council (NCBCC).

1.5. COORDINATION

- A. Package Rooftop Unit manufacturer is responsible for coordination of package controls with building control system contractor.
- B. Coordinate sizes, weights (operational and shipping) and locations of supports and opening with the actual equipment provided, including:

1.6. WARRANTY

- A. Warranty: Parts and labor warranty of 1 year for the entire unit; Parts only warranty of 3 years for the control board; 5 years for the compressors, and 10 years for the heat exchanger from the date of Owner Acceptance.

1.7. EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Filters: Two set(s) for each packaged rooftop unit.

PART 2 - PRODUCTS

2.1. MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide product by one of the following:
 - 1. Electric Cooling , 12.5 to 25 tons:
 - a. Carrier (WeatherMaker series).
 - b. Daikin/McQuay (Maverick I series).
 - c. Trane Company (Voyager 2 series).

2.2. GENERAL

- A. Description: Packaged high efficiency heating and cooling units specifically designed for outdoor installation on a roof curb or concrete pad and completely factory-assembled and

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tested. All units shall be UL approved and comply with seismic requirements. Units shall be compliant with NC Energy Code minimum efficiencies.

2.3. UNIT CASINGS

- A. Casing Fabrication: Factory-fabricated and constructed wall, roof and floor single-wall galvanized steel casing panels with 1/2-inch (R-4) closed-cell insulation with foil-faced interior finish and sealed edges within formed galvanized steel channel framing. No through-metal casing thermal breaks. All joints shall be water-resistant sealed.
- B. Casing Finish: Factory-applied prime-coat and thermosetting top-coat enamel rated for a minimum of 500 hours consecutive salt-spray test per ASTM B117.
- C. Access Doors: Hinged access panels. Factory-fabricated double wall, to match casing and insulation materials, finish and performance and suitable for unit pressure and leakage classification.
 - 1. Door Hinges, Latches and Handles: Minimum of two ball-bearing or piano hinges, two wedge-lever latches and steel quarter-turn handles.
 - 2. Door Gaskets: Neoprene gasket around entire perimeter of door frames.
- D. Condensate Drain Pans: Factory-fabricated, insulated, stainless steel, water-tight sealed, minimum 2-inches deep drain pans sloped in two directions to collect condensate from cooling coils (including coil piping connections, coil headers and return bends) and humidifiers and direct water toward drain connection. Pan shall extend downstream of coil face to comply with ASHRAE 62.1. Drain connection shall be on the bottom side and at the lowest point on the pan. Units with stacked coils shall have an intermediate drain pan to collect condensate from top coil.
- E. Base Rails: Galvanized or stainless steel rails, to match the exterior casing material, for mounting on roof curb or pad as indicated.
- F. Lifting and Handling Provisions: Factory-installed shipping skids and lifting lugs.
- G. Roof Curbs: Factory-fabricated, insulated, full-perimeter curb of sheet metal, minimum 14-inches high, with neoprene sealing strip, and welded Z-bar flashing. Fully insulate the internal perimeter of the curb with 2-inches (R-10) of polyisocyanurate board insulation. Insulation shall be mechanically fastened to the sheet metal. Comply with requirements in "The NRCA Roofing Manual."
 - 1. Vibration Isolation: Curbs shall be isolated. Refer to Section 230548.
- H. Intake and Discharge Hoods: Factory-fabricated, galvanized steel intake and discharge weather hoods with bird screen and finish to match unit casing.
- I. Intake and Discharge Louvers: Galvanized steel intake and discharge louvers with bird screen and finish to match unit casing. Louvers shall be rated for the beginning of water penetration of 0.01 ounce/sqft. free area at 1000 fpm or higher.
- J. Hail Guard: Provide Condenser coil hail guard.
- K. Provide perimeter base rail with forklift slots and/or lifting holes to facilitate rigging.

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2.4. FAN, DRIVE AND MOTOR SECTION

- A. Unit shall be equipped with supply, return and exhaust / relief air fans and capable of control functions as indicated.
- B. Fan and Drive Assemblies: Statically and dynamically balanced and designed for continuous operation at maximum-rated fan speed and motor horsepower. Shafts shall be designed for continuous operation at maximum-rated fan speed and motor horsepower, and with field-adjustable alignment.
 - 1. Fans shall be variable speed for VAV operation.
- C. Centrifugal Fan Housings: Formed and reinforced steel panels to form curved scroll housings with shaped cutoff and spun-metal inlet bell. Attach housing to fan-section casing with metal-edged flexible duct connector complying with Section 233300.
- D. Fan Wheels:
 - 1. Forward-Curved, Centrifugal Fan Wheels: Inlet flange, backplate, and shallow blades with inlet and tip curved forward in direction of airflow and mechanically fastened to flange and backplate; cast-steel hub swaged to backplate and fastened to shaft with set screws.
 - 2. Backward-Inclined, Centrifugal Fan Wheels: Single-width-single-inlet and double-width-double-inlet construction with curved inlet flange, backplate, backward-inclined blades welded or riveted to flange and backplate; cast-iron or cast-steel hub riveted to backplate and fastened to shaft with set screws.
- E. Fan Shaft Bearings:
 - 1. Grease-Lubricated Bearings: Self-aligning, pillow-block-type, ball or roller bearings, L50 rated for 200,000 hours with adapter mount and two-piece, cast-iron housing with grease lines extended to outside unit.
- F. Direct Drive fan and motor capable of variable speed with ECM or VFD.
- G. Internal Vibration Isolation: Fans shall be factory mounted with manufacturer's standard vibration isolation mounting devices having a minimum static deflection of 1 inch.
- H. Variable Speed Drives: Comply with the requirements of Section 230514. Drives manufactured by the air handling unit manufacturer are also acceptable in addition to the manufacturers listed in Section 230514.
- I. Motors: Comply with requirements of Section 230513.

2.5. REFRIGERATION SYSTEM

- A. Description: High Efficiency factory assembled and tested, air cooled; consisting of compressors, condenser coils, condenser fans and motors, and controls.
 - 1. Minimum SEER 14 efficiency.

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- B. Compressor: Direct-drive, hermetic scroll-type compressors designed for service with crankcase sight glass, crankcase heater, and backseating service access valves on suction and discharge ports.
 - 1. Capacity Control: Hot-gas bypass valves, piping and controls.
 - 2. Capacity Control: Variable speed compressor for capacity control with continuous dehumidification on a single compressor.
- C. Refrigerant: R-454B, R-513A, R-410A, or R-134A.
- D. Condenser Coil: Seamless copper-tube, aluminum-fin coil, including sub-cooling circuit and backseating liquid-line service access valve. Factory pressure test coils, then dehydrate by drawing a vacuum and fill with a holding charge of nitrogen or refrigerant. Provide with condenser coil hail guard and factory-applied corrosion resistant coating rated for a minimum of 5,000 hours consecutive salt-spray test per ASTM B117.
- E. Condenser Fans: Propeller-type vertical discharge; direct-driven, permanently lubricated, ball-bearing motors for each fan, dynamically and statically balanced fan assemblies.
- F. Operating and Safety Controls:
 - 1. Manual-reset, high-pressure cutout switches.
 - 2. Automatic-reset, low-pressure cutout switches.
 - 3. Low-oil-pressure cutout switch.
 - 4. Compressor-winding thermostat cutout switch.
 - 5. Three-leg, compressor-overload protection.
 - 6. Magnetic contactors for compressor and condenser fan motors.
 - 7. Timer to prevent excessive compressor cycling.

2.6. COOLING COILS

- A. Cooling Coils: Provide coil types in positions indicated. Comply with requirements of Section 238216. Coils shall comply with AHRI 410.

2.7. AIR FILTRATION SECTION

- A. Filters: Filter sections shall be designed for the indicated filter types and orientations. Where not indicated, provide housings and frames for angled 2-inch deep MERV 13 filters.
- B. Filter Holding Frames: Provide filter holding frames arranged for flat or angled orientation, with access doors on both sides of unit. Filters shall be removable from either side.

2.8. DAMPERS

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- A. Provide economizer with powered relief where required for code compliance. Barometric economizer is not allowed. Where economizer is not required, provide motorized 2 position outdoor air damper.
- B. Outdoor- and Return-Air Mixing Dampers: Parallel-blade, aluminum dampers mechanically fastened to cadmium-plated steel operating rod in reinforced cabinet. Connect operating rods with common linkage and interconnect linkages so dampers operate simultaneously.
- C. Isolation Dampers: Comply with Section 233300.
- D. Leakage Rate: Damper leakage rate shall not exceed 2 percent of air quantity at 2000-fpm face velocity through damper and 4-inch wg pressure differential based on AMCA 500.
- E. Damper Operators: Comply with Section 239010.

2.9. ELECTRICAL SYSTEM

- A. Power Supply: Single-point external power connection with a unit-mounted non-fused disconnect switch. Minimum withstand rating shall be as required by electrical power distribution system, but not less than 65,000A at 480V.
- B. Disconnect Switch: Provide separate unit mounted disconnect switch complying with Section 230511.
- C. Factory-installed wiring outside of enclosures shall be in metal raceway except make terminal connections with not more than a 24-inch length of liquid-tight or flexible metallic conduit.
- D. Factory installed and wired, and functionally tested at factory before shipment.
- E. Provide factory installed convenience outlet (powered). Coordinate with electrical contractor.
- F. Variable Frequency Controllers: Variable frequency drives shall be mounted within dedicated pre-manufactured casing compartment. They shall not be installed outdoors without supplemental cooling. Comply with the requirements of Section 230514.

2.10. CONTROLS

- A. Packaged Controls: Standalone and microprocessor based, with all memory stored in nonvolatile memory so that reprogramming is not required on loss of electrical power. Control status display shall be factory mounted to the unit. Sensors, transmitters, relays, switches, detectors, operators, actuators, and valves shall be manufacturer's standard items to accomplish indicated control functions. Control equipment and control valves as specified in Section 239010.
 - 1. Standalone control sequences shall include (where applicable):
 - a. Single-zone, constant volume air flow.
 - b. Single-zone, variable volume air flow.
 - c. Discharge temperature / multi-zone, variable volume air flow.

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- d. Low ambient operation down to 0 deg F.
 - e. Enthalpy economizer.
 - f. Dry bulb economizer.
 - g. Modulating relief air flow.
 - h. Cycled constant relief air flow.
 - i. Powered relief modulation.
 - j. Ventilation demand based on carbon dioxide levels.
 - k. Ventilation override mode (for smoke purge, pressurization and exhaust modes).
 - l. Refrigerant coil defrost mode.
 - m. Dehumidification mode.
 - n. Condensate drain pan overflow switch safety.
- B. BAS Interface: Factory-installed hardware and software to enable the BAS to monitor, control, and display packaged rooftop status and alarms.
- 1. BACnet per ASHRAE 135 communication interface with the BAS shall enable the BAS operator to remotely control and monitor the packaged rooftop units from an operator workstation. All control features and monitoring points displayed locally at packaged rooftop unit control panels shall be available through the BAS.
- C. Control Dampers: Refer to Section 233300.
- D. Damper Operators: Refer to Section 239000.
- E. Smoke Detector: Installed in the return air stream with a field connection to the building fire alarm system.

2.11. SOURCE QUALITY CONTROL

- A. Fan Sound-Power Level Ratings: Comply with AMCA 300 and 301. Fans shall bear AMCA-certified sound ratings seal.
- B. Fan Performance Rating: Factory test fan performance for airflow, pressure, power, air density, rotation speed, and efficiency. Rate performance according to AMCA 210.
- C. Refrigerant Coils: Factory tested to 450 psig according to AHRI 410 and ASHRAE 33.

PART 3 - EXECUTION

3.1. EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

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- B. Examine casing insulation materials and filter media before unit installation. Reject insulation materials and filter media that are wet, moisture damaged, or mold damaged.
- C. Examine roughing-in for steam, hydronic, and condensate drainage piping systems and electrical services to verify actual locations of connections before installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2. INSTALLATION

- A. Equipment Mounting:
 - 1. Install units at grade on cast-in-place concrete equipment bases.
 - 2. Comply with requirements for vibration isolation and wind and seismic control devices specified in Section 230548.
- B. Arrange installation of units to provide access space around units for service and maintenance.
- C. Do not operate fan system until filters (temporary or permanent) are in place. Replace temporary filters used during construction and testing, with new, clean filters.
- D. Install filter-gage, static-pressure taps upstream and downstream of filters. Provide filter gages on filter banks, installed with separate static-pressure taps upstream and downstream of filters.

3.3. CONNECTIONS

- A. Comply with requirements for piping specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect condensate drain pans and extend to nearest drain. Construct deep trap at connection to drain pan and install cleanouts at changes in direction.
- C. Connect duct to units with flexible connections. Comply with requirements in Section 233300.

3.4. FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- B. Packaged rooftop unit or components will be considered defective if unit or components do not pass tests and inspections.
- C. Prepare test and inspection reports.

3.5. STARTUP SERVICE

- A. Provide manufacturer startup.

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- B. Perform startup service per manufacturer's recommendations.
- C. Test all components and controls to verify they operate as intended.

3.6. ADJUSTING

- A. Adjust damper linkages for proper damper operation.
- B. Comply with requirements in Section 230593 for air system testing, adjusting, and balancing.
- C. Replace fan and motor pulleys as required to achieve design airflow. Coordinate with the TAB Contractor.

3.7. CLEANING

- A. After completing system installation and testing, adjusting, and balancing packaged rooftop unit and air-distribution systems and after completing startup service, clean units internally to remove foreign material and construction dirt and dust. Clean fan wheels, cabinets, dampers, coils, and filter housings, and install new, clean filters.

3.8. DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain packaged rooftop units.

END OF SECTION

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SECTION 23 82 19 – FAN COIL UNITS

PART 1 - GENERAL

1.1. SUMMARY

- A. Section includes fan coil units.

1.2. SUBMITTALS

- A. Product Submittals: For each type of product, including rated capacities, operating characteristics, and furnished specialties and accessories.
 - 1. Paint Samples: For units with factory-applied color finishes.
 - 2. Seismic Qualification Certificates: Provide certification for the equipment and its components and accessories that they have been tested and meet the requirements for use in seismic applications in accordance with International Building Code.
- B. Close-Out Submittals:
 - 1. Operation and Maintenance Data: For fan coil units to include in emergency, operation, and maintenance manuals, including maintenance schedules and repair part lists for motors, coils, integral controls, and filters.

1.3. MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fan Coil Unit Filters: Furnish one spare filters for each filter installed.
 - 2. Fan Belts: Furnish one spare fan belts for each unit installed.

1.4. QUALITY ASSURANCE

- A. Electrical Components, Devices and Accessories: UL listed and labeled as defined by NFPA 70, the National Electric Code, or equivalent by a qualified testing agency marked for the intended location and application and accepted by the Authority Having Jurisdiction and Engineer.
- B. Mechanical Equipment and Materials: UL listed and labeled as defined by State Building Codes or equivalent by a qualified testing agency marked for the intended location and application and accepted by the Authority Having Jurisdiction and Engineer.

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- C. Testing and listing laboratories of mechanical and electrical equipment shall be accredited by the North Carolina Building Code Council (NCBCC).

1.5. COORDINATION

- A. Coordinate layout and installation of fan coil units and suspension system components with other construction that penetrates or is supported by ceilings, including light fixtures, HVAC equipment, fire-suppression-system components, and partition assemblies.

PART 2 - PRODUCTS

2.1. GENERAL REQUIREMENTS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Airtherm
 - 2. Carrier
 - 3. Daikin/McQuay
 - 4. Greenheck
 - 5. Johnson Controls/York
 - 6. Trane
- B. Factory-packaged and tested units rated according to AHRI 440, ASHRAE 33 and UL 1995.
- C. Coil Section Insulation: 1/2-inch thick, coated glass fiber, foil-covered closed-cell foam or matte-finish closed-cell foam complying with ASTM C 1071 and attached with adhesive complying with ASTM C 916.
 - 1. Surface-Burning Characteristics: Insulation and adhesive shall have a combined maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84 by a qualified testing agency.
- D. Heating and Cooling Coils: Provide units with coil types indicated in the documents.
 - 1. Coil Configuration: Dual coil units shall have separate heating and cooling coils with the heating coil in the reheat position regardless of control sequence.
 - 2. Hydronic Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch, rated for a minimum working pressure of 200 psig and a maximum entering-water temperature of 220 deg F. Include manual air vent and drain valve.

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- E. Hydronic Piping Package: Factory-fabricated coil piping packages with Type L copper tube with wrought-copper fittings and brazed joints. Label piping to indicate service, inlet, and outlet.
 - 1. Control Valves: Two or three-way control valves with modulating actuators as indicated on the drawings.
 - 2. Isolation Valves: Ball valves.
 - 3. Balancing Valves: Calibrating manual balancing valves.
 - 4. Balancing Valves: Automatic balancing valves.
 - 5. Y-Pattern Strainers: Install with 1/2-inch NPS hose-end ball valve blowdown valve in drain connection.
 - 6. Hose Kits: 24-inch long hoses with minimum diameter to match unit piping connections rated for minimum 400-psig working pressure and operating temperatures from 35 to 210 deg F.
 - 7. Wrought-Copper Unions
- F. Drain Pans: ABS plastic or stainless steel main drain pans with drain piping connections fabricated to comply with ASHRAE 62.1.
 - 1. Integral Condensate Pump: Provide units with integral condensate pumps where gravity drainage cannot be achieved.
 - 2. Auxiliary Drain Pans: ABS plastic or stainless steel auxiliary pans shall be provided when factory-fabricated piping packages are included or when otherwise indicated in the documents.
 - 3. Condensate Drain Pan Overflow Safety Switch: Low-voltage, float-type safety switch designed for condensate drain pan high-level alarm for unit shutdown and alarming. Switch shall shutdown unit when condensate levels in the drain pan reach the high-level mark. Little Giant Pump/Franklin Electric (ACS series) or equal.
 - a. Switches installed above ceilings shall be rated for plenum use and comply with UL 508.
- G. Filters: 1-inch, MERV-8 complying with Section 234100.
- H. Electrical Connection: Factory wired motors and controls for a single point electrical connection.
- I. DDC Controls: Controls shall be field installed by the building automation system (BAS) installer. Refer to Sequences of Operation and Section 230900 for requirements.
- J. Packaged Electronic Controls: Factory-installed pre-programmed unit-mounted controls with 24V control-voltage transformer, data entry and access point and volatile-memory backup. Input data includes room temperature, and humidity set points and occupied and unoccupied periods. Output data includes room temperature and humidity, supply-air temperature, entering-water temperature,

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operating mode, and status. Controls shall modulate heating and cooling coil capacities, start/stop fan, open/close outside air dampers, monitor space temperatures and humidity, and maintain occupied/unoccupied schedules.

1. Manual Control: Analog-type wall-mounted electronic thermostat with heat-cool-off switch; fan on-auto switch; high-medium-low fan speed switch; and adjustable deadband; exposed space and set point temperatures and humidity.
2. Automatic Control: Microprocessor-type wall-mounted electronic thermostat with digital display that uses proportional integral (PI) algorithms for precise control. Thermostat shall have automatic heat-cool changeover; fan on-auto selection; high-medium-low fan speed selection; adjustable deadband; exposed space and set point temperatures and humidity; occupied/unoccupied schedule; and unoccupied-period override push button.
 - a. Building Automation System (BAS) Interface Requirements: Provide BACnet interface between packaged controls and the BAS. The interface shall include fan start/stop, fan speed, fan failure alarm, heating and cooling status, damper open/close, temperature and humidity set points and deadbands. Refer to control sequences of operation and Section 230900 for further requirements.

2.2. HORIZONTAL AND VERTICAL FAN COIL UNITS

- A. Fan Coil Unit Configurations: Provide unit configurations as indicated in the documents.
 1. Vertical Types:
 - a. Fully exposed, wall-mounted with flat or sloped top.
 - b. Semi-recessed in wall cavity.
 - c. Fully-recessed in wall cavity.
- B. Chassis: Minimum 18-gauge thick galvanized steel. Floor-mounted units shall have leveling screws. Exposed unit surfaces shall have a baked powder-coat finish and removable access panel. Finish shall be one of the manufacturer's standard or published optional colors as selected by the Owner/Engineer.
 1. Horizontal Unit Bottom Panels: Fastened to unit with cam fasteners and hinge and attached with safety chain; with integral stamped grilles.
 2. Vertical Unit Front Panels: Removable, steel, with integral stamped discharge grille and channel-formed edges, cam fasteners, and insulation on back of panel.
 3. Grilles: Supply and return grille orientations as indicated.
- C. Fan and Motor: Removable fan and motor board. Motors shall be permanently-lubricated, multispeed; resiliently mounted on motor board that comply with Section 230513. Connect motor to chassis wiring with plug connection.

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1. Direct-Driven Fans: Double width, forward curved, centrifugal; with permanently lubricated, multispeed motor resiliently mounted in the fan inlet. Aluminum or painted-steel wheels, and painted-steel or galvanized-steel fan scrolls.

2.3. VERTICAL-STACK FAN COIL UNITS

PART 3 - EXECUTION

3.1. EXAMINATION

- A. Examine areas, with Installer present, to receive fan coil units for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for piping and electrical connections to verify actual locations before fan coil unit installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2. INSTALLATION

- A. Install fan coil units level and plumb.
- B. Install fan coil units to comply with NFPA 90A.
- C. Suspend fan coil units from structure with elastomeric hangers.
- D. Verify locations of thermostats, humidistats, and other exposed control sensors with drawings and room details before installation. Install devices 48-inches above finished floor.
- E. Install new filters in each fan coil unit within two weeks after Owner Acceptance.

3.3. CONNECTIONS

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties. Specific connection requirements are as follows:
 1. Install piping adjacent to machine to allow service and maintenance.
 2. Connect piping to fan coil unit factory hydronic piping package. Install piping package if shipped loose.
 3. Connect condensate drain to indirect waste.
 - a. Install condensate trap of adequate depth to seal against fan pressure. Install cleanouts in piping at changes of direction.

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- B. Connect supply-air and return-air ducts to fan coil units with flexible duct connectors specified in Section 233300 "Air Duct Accessories."
- C. Ground and connect equipment according to comply with NFPA 70 and Division 26.

3.4. FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 2. Operate electric heating elements through each stage to verify proper operation and electrical connections.
 - 3. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.
- B. Remove and replace malfunctioning units and retest as specified above.
- C. Prepare test and inspection reports.

3.5. ADJUSTING

- A. Adjust initial temperature and humidity set points.
- B. Replace fan and motor pulleys as required to achieve design airflow. Coordinate with the TAB Contractor.

3.6. DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain fan coil units.

END OF SECTION