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Letter of Transmittal

TO: **Plan Holders**

FROM: **Travis Petitjean**

DATE: **01/26/2022**

SUBJECT: Addendum 1
HVAC Replacement for JL Lomax Elementary School
Valdosta City School System

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HVAC REPLACEMENT FOR
JL LOMAX ELEMENTARY SCHOOL
1450 HOWELL ROAD
VALDOSTA, GA 31601
VALDOSTA CITY SCHOOL SYSTEM

ADDENDUM NO. 1
January 26, 2022

REVISIONS TO THE SPECIFICATIONS:

1. Section 233300 Duct Accessories:
    a. Delete in its entirety and replace with the attached Section 233300 Duct Accessories.

2. Section 233813 Range Hood Systems:
    a. Delete in its entirety and replace with the attached Section 233813 Range Hood Systems.

3. Section 237432 Packaged Dedicated Outside Air Units:
    a. Delete in its entirety and replace with the attached Section 237432 Packaged Dedicated Outside Air Units.

4. Section 238126 Split System Heat Pumps and Air Conditioners:
    a. Delete in its entirety and replace with the attached Section 238126 Split System Heat Pumps and Air Conditioners.

REVISIONS TO THE DRAWINGS:

5. Sheet M0030:
    a. Detail 11 (Clarification):
        i. The intent is for new grilles to be installed at each wall mounted heat pump. The note below the Grille Sizes schedule indicates such.

END

SECTION 233300

DUCT ACCESSORIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract apply to this Section.

1.02 SUMMARY

A. This Section includes the following:
   1. Backdraft dampers.
   2. Manual volume control dampers.
   3. Fire and smoke dampers.
   4. Turning vanes.
   5. Duct-mounted access doors and panels.
   6. Flexible connectors.
   7. Flexible ducts.
   8. Pre-insulated, outdoor ductwork.
   9. Accessories hardware.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Division 23 Section "Diffusers, Registers, Grilles and Louvers" for diffusers, registers, and grilles.
   2. Division 23 Section "Air Terminals" for constant and variable air volume units.
   3. Division 23 Section "Controls Systems Equipment" for HVAC control devices.

1.03 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract.

B. Product data including details for materials, dimensions of individual components, profiles, and finishes for the following items:
   1. Backdraft dampers.
   2. Manual volume control dampers.
   3. Fire and smoke dampers.
   4. Duct-mounted access panels and doors.
   5. Flexible ducts.
   6. Pre-insulated, outdoor ductwork.

C. Shop drawings from manufacturer detailing assemblies. Include dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection. Detail the following:
   1. Special fittings and volume control damper installation (both manual and automatic) details.
   2. Fire and smoke damper installations, including sleeves and duct-mounted access door and panel installations.

D. Product Certification: Submit certified test data on dynamic insertion loss; self-noise power levels; and airflow performance data, static pressure loss, and dimensions and weights.

E. Maintenance data for volume control devices, fire dampers, and smoke dampers

1.04 QUALITY ASSURANCE

A. NFPA Compliance: Comply with the following NFPA Standards:
   1. NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems."

2. NFPA 90B, "Standard for the Installation of Warm Air Heating and Air Conditioning Systems."

B. U.L. Listing: Pre-insulated, outdoor ductwork shall meet U.L. 181, U.L. 723, and U.L. 94 Standards.

1.05 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Warranty: A written warranty, executed by the manufacturer and signed by the Contractor, agreeing to replace components that fail in materials or workmanship, within the specified warranty period, provided manufacturer's written instructions for installation, operation, and maintenance have been followed.

1. Warranty Period, pre-insulated, outdoor ductwork and finish: Manufacturer’s standard but not less than 10 years for all system components.

1.06 DELIVERY, STORAGE AND HANDLING

A. Protect items from damage during shipping, storage and handling.

B. Where possible, store products inside and protect from weather. Where necessary to store outside, store above grade and enclose with a vented waterproof wrapping.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Pre-insulated, outdoor ductwork systems and components:
   a. Thermaduct, LLC
   b. Q-Duct
   c. Kingspan Kool Duct
   d. Dual-Tech

2.02 BACKDRAFT DAMPERS

A. Description: Suitable for horizontal or vertical installation.
B. Frame: 18-gage galvanized steel, with welded corners and mounting flange.
C. Blades: 0.025-inch-thick roll-formed aluminum.
D. Blades: 0.050-inch-thick 6063T extruded aluminum.
E. Blade Seals: Neoprene.
F. Blade Axles: Galvanized steel.
G. Tie Bars and Brackets: Galvanized steel.
H. Return Spring: Adjustable tension.
I. Chain Operator: 15-foot long galvanized-steel sash chain and pulley.
J. Wing-Nut Operator: Galvanized steel, with 1/4-inch galvanized-steel rod.

2.03 MANUAL VOLUME CONTROL DAMPERS

A. General: Provide factory-fabricated volume-control dampers, complete with required hardware and accessories. Stiffen damper blades to provide stability under operating conditions. Provide locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper

components to seal duct consistent with pressure class. Provide end bearings or other seals for ducts with pressure classifications of 3 inches or higher. Extend axles full length of damper blades. Provide bearings at both ends of operating shaft.

B. Standard Volume Control Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, standard leakage rating, with linkage outside of air stream, and suitable for horizontal or vertical applications.
   1. Steel Frames: Hat-shaped, galvanized-steel channels, minimum of 16 gage, and with mitered and welded corners. Provide frames with flanges where indicated for attaching to walls. Provide flangeless frames where indicated for installation in ducts.
      a. Roll-Formed Steel Blades: 16-gage galvanized steel.
      b. Blade Axles: Galvanized steel.
      c. Tie Bars and Brackets: Galvanized steel.

C. Low-Leakage Volume Control Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, low-leakage rating, and suitable for horizontal or vertical applications. Leakage shall be less than 10 cfm at 3.0 inches differential static pressure.
   1. Aluminum Frames: Hat-shaped, 0.063-inch-thick, 6063T extruded aluminum channels. Provide frames with flanges where indicated for attaching to walls. Provide flangeless frames where indicated for installation in ducts.
   2. Extruded Aluminum Blades: 0.050-inch-thick 6063T extruded aluminum.
   3. Blade Seals: Neoprene.
   4. Blade Axles: Nonferrous.
   5. Tie Bars and Brackets: Aluminum.

D. Jackshaft: 1-inch-diameter, galvanized-steel pipe or 1/2" square galvanized bar stock rotating within a pipe bearing assembly mounted on supports at each mullion and at each end of multiple damper assemblies. Provide appropriate length and number of mounting to connect linkage of each damper of a multiple damper assembly. Cut groove in the end of the shaft parallel with damper blades.

E. Damper Control Hardware: Zinc-plated, die-cast core with a heavy-gage dial and handle made of 3/32-inch-thick zinc-plated steel, and a 3/4-inch hexagon locking nut. Provide center hole to suit damper operating rod size. Provide elevated platform for insulated duct mounting.

2.04 FIRE DAMPERS

A. General: UL labeled according to UL Standard 555 "Standard for Fire Dampers." Ratings shall be for dynamic system operation at 350º temperature.
   1. Dampers used in low pressure systems shall be rated for 2000 fpm velocity and 4" wg pressure.
   2. Dampers used in medium pressure systems (VAV supply and medium pressure exhaust) shall be rated for 3000 fpm and 8" wg pressure.

B. Fire Rating: 1-1/2 or 3 hours, as indicated by wall ratings on Architectural Plans.

C. Frame: Type B (blades outside airstream); fabricated with roll-formed, 21-gage, galvanized-steel; with mitered and interlocking corners. Furnish multi-blade dampers where required by code.

D. Mounting Sleeve: Factory-installed or field-installed galvanized steel.
   1. Minimum Thickness: 0.056-inch (16-gage) or 0.138-inch (10-gage) thick as indicated, and length to suit application.
   2. Exception: Furnish narrow frame damper without sleeve in applications where damper is mounted in rated partition behind supply/return register.

E. Mounting Orientation: Vertical or horizontal as indicated.

F. Blades: Roll-formed, interlocking, 21-gage galvanized steel. In place of interlocking blades, provide full-length, 21-gage, galvanized-steel blade connectors.
G. Fusible Link: Replaceable, 165 deg F rated.

2.05 CEILING FIRE DAMPERS
A. General: UL listed and labeled; comply with the construction details for the tested floor/roof-ceiling assemblies as indicated in the UL Fire Resistance Directory.
B. Frame: 20-gage, rectangular or round, galvanized steel; style to suit ceiling construction.
C. Blades: 22-gage galvanized steel with non-asbestos refractory insulation.
D. Volume Control Adjustment: Provide UL-labeled, fusible volume control adjustment.
E. Fusible Link: Replaceable, 165 deg F rated.

2.06 SMOKE AND FIRE/SMOKE DAMPERS
A. General: UL-labeled according to UL Standard 555S, "Standard for Leakage Rated Dampers for Use in Smoke Control Systems." Combination fire and smoke dampers shall also be UL-labeled for 1-1/2-hour rating according to UL Standard 555 "Standard for Fire Dampers with a Class II leakage rating." Dampers shall be tested at a 350E air temperature.
1. Dampers used in low pressure systems shall be rated for 2000 fpm velocity and 4" wg pressure.
2. Dampers used in medium pressure systems (VAV supply and medium pressure exhaust) shall be rated for 3000 fpm and 8" wg pressure.
B. Fusible Link: Replaceable, 165 deg F rated as indicated (fire/smoke dampers only.)
C. Frame and Blades: 16-gage galvanized steel.
D. Mounting Sleeve: Factory-installed, 18-gage galvanized steel, length to suit wall or floor application.
E. Pneumatic (electric) actuator with end switch. All actuators shall be factory mounted outside of the airstream. Furnish damper end switch for control interlocks

2.07 TURNING VANES
A. Fabricate turning vanes according to SMACNA HVAC Duct Construction Standards, Figures 2-2 through 2-7.
B. Manufactured Turning Vanes: Fabricate of 1-1/2-inch-wide, curved blades set at 3/4 inch on center, support with bars perpendicular to blades set at 2 inches on center and set into side strips suitable for mounting in ducts.
C. Acoustic Turning Vanes: Fabricate of airfoil-shaped aluminum extrusions with perforated faces and fiber glass fill.

2.08 DUCT-MOUNTED ACCESS DOORS AND PANELS
A. General: Provide construction and airtightness suitable for duct pressure class.
B. Frame: Galvanized sheet steel. Provide with bend-over tabs and foam gaskets.
C. Door: Double-wall, galvanized sheet metal construction with insulation fill and thickness, number of locks as indicated for duct pressure class. Provide vision panel where indicated. Provide cam latches.
D. Seal around frame attachment to duct and door to frame with neoprene or foam rubber seals.
E. Insulation: 1-inch-thick fiber glass or polystyrene foam board.

2.09 FLEXIBLE CONNECTORS
A. General: Flame-retarded or noncombustible fabrics, coatings, and adhesives complying with UL Standard 181, Class 1.

B. Standard Metal-Edged Connectors: Factory-fabricated with a strip of fabric 3-1/2 inches wide attached to 2 strips of 2-3/4-inch-wide, 24-gage, galvanized sheet steel or 0.032-inch aluminum sheets. Select metal compatible with connected duct system. Fold and crimp metal edge strips onto fabric as illustrated in SMACNA HVAC Duct Standard, 3rd Edition, Figure 7-8.

C. Extra-Wide Metal-Edged Connectors: Factory-fabricated with a strip of fabric 5-3/4 inches wide attached to 2 strips of 2-3/4-inch-wide, 24-gage, galvanized sheet steel or 0.032-inch aluminum sheets. Select metal compatible with connected duct system. Fold and crimp metal edge strips onto fabric as illustrated in SMACNA HVAC Duct Standard, 1st Edition, Figure 2-19.

D. Transverse Metal-Edged Connectors: Factory-fabricated with a strip of fabric 3-1/2 inches wide attached to 2 strips of 4-3/8-inch-wide, 24-gage, galvanized sheet steel or 0.032-inch aluminum sheets. Select metal compatible with connected duct system. Fold and crimp metal edge strips onto fabric as illustrated in SMACNA HVAC Duct Standard, 1st Edition, Figure 2-19.

E. Conventional, Indoor System Flexible Connectors Fabric: Glass fabric double coated with polychloroprene.
   1. Minimum Weight: 26 oz./sq. yd.
   2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.

F. Conventional, Outdoor System Flexible Connectors Fabric: Glass fabric double coated with Du Pont's HYPALON or other synthetic-rubber weatherproof coating resistant to the sun's ultraviolet rays and ozone environment.
   1. Minimum Weight: 26 oz./sq. yd.
   2. Tensile Strength: 530 lbf/inch in the warp and 440 lbf/inch in the filling.

2.10 FLEXIBLE DUCTS

A. General: Comply with UL 181, Class 1.

B. Flexible Ducts - Uninsulated: Spiral-wound steel spring with flameproof vinyl sheathing.

C. Flexible Ducts - Uninsulated: Corrugated aluminum.

D. Flexible Ducts - Insulated: Factory-fabricated, insulated, round duct, with an outer jacket enclosing 1-1/2-inch-thick, glass fiber insulation around a continuous inner liner.
   1. Reinforcement: Steel-wire helix encapsulated in the inner liner.
   2. Outer Jacket: Glass-reinforced, silver mylar.
   3. Inner Liner: Polyethylene film.
   4. Pressure Rating: 10-inches wg, positive.
   5. R value = 6.0

E. Woven Polypropylene Hanging Strap:
   1. Hanging straps shall be manufactured of woven polypropylene 1¾" wide and having a minimum 400-pound tensile strength.
   2. Strap material shall have a maximum flame spread index of 25 and a maximum smoke developed index of 50.
   3. Strap material shall be manufactured for flexible HVAC duct support and shall be installed in accordance with the manufacturer's instructions and SMACNA standards.
   4. Straps shall be used on flexible ducts only, and not on rigid ductwork.

2.11 ACCESSORIES HARDWARE

A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket and a flat mounting gasket. Size to allow insertion of pitot tube and other testing instruments and provide in length to suit duct insulation thickness.

B. Splitter Damper Accessories: Zinc-plated damper blade bracket, 1/4-inch, zinc-plated operating rod, and a duct-mounted, ball-joint bracket with flat rubber gasket and square-head set screw.

C. Flexible Duct Clamps: Stainless steel band with cadmium-plated hex screw to tighten band with a worm-gear action. Provide in sizes from 3 to 18 inches to suit duct size.

D. Adhesives: High strength, quick setting, neoprene based, waterproof and resistant to gasoline and grease.

2.12 PRE-INSULATED, OUTDOOR DUCTWORK

A. Double-layered duct system constructed of rigid thermoset phenolic internal insulation layer factory bonded to PVDF coated exterior aluminum shell.
   1. Insulation Thermal Resistance: R-16 (Double-layer is acceptable.)
   2. Insulation Density: 3.0 pounds/cubic foot, minimum.
   3. Shell Color: Selected by Architect from manufacturer's optional finish chart. Color family will be green.
   4. Exterior Shell: 0.032" minimum thickness.
   5. Temperature Limits: -15°F to 185°F.

B. Internal insulation surface shall have similar friction characteristics as galvanized sheet metal.

C. System shall be designed for 3-inch water gage positive or negative static pressure.

D. Internal seams shall be welded or cohesively bonded. Individual duct pieces shall be flanged and bolted together with internal gasket material. Flanges shall be covered with additional shell material and stuffed with fiberglass insulation per Manufacturer's requirements to maintain protective, water-tight coating.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of duct accessories. Do not proceed with installation until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Install duct accessories according to manufacturer's installation instructions and applicable portions of details of construction as shown in SMACNA standards.

B. Install volume control dampers in lined duct with methods to avoid damage to liner and to avoid erosion of duct liner.

C. Provide test holes at fan inlet and outlet and elsewhere as indicated.

D. Install fire and smoke dampers according to the manufacturer's UL-approved printed instructions.

E. Install fusible links in fire dampers.

F. Label access doors according to Division 23 Section "Mechanical Identification."

3.03 ADJUSTING

A. Adjust duct accessories for proper settings.

B. Adjust fire and smoke dampers for proper action.

C. Final positioning of manual dampers is specified in Division 23 Section "Testing, Adjusting, and Balancing."

END OF SECTION 233300

SECTION 233813

RANGE HOOD SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS
- A. Drawings and general provisions of the Contract apply to this Section.

1.02 SUMMARY
- A. This Section includes kitchen range hoods.
- B. Related Sections: The following sections contain requirements that relate to this Section:
  1. Division 23 sections for hangers and supports.
  2. Division 23 sections for metal ductwork.
  3. Division 26 sections for miscellaneous electrical sections.

1.03 SUBMITTALS
- A. General: Submit each item in this Article according to the Conditions of the Contract.
- B. Product data for each range hood, including the following:
  1. Unit Weight.
  2. Furnished Accessories.
  3. Installation and Startup Instructions.
- C. Shop drawings detailing fabrication and installation of range hood, including plans, elevations, sections, component details, attachments, and other construction elements. Include the following:
  1. Dimensions.
  2. Weight loadings and distribution.
  3. Clearances for maintenance and operation.
  4. Size and location of field connections.
  5. Mounting details.
  6. Wiring diagrams.
- D. Maintenance data for each hood system to include in the Operating and Maintenance Manual.
- E. Certification letter from the manufacturer stating that the rangehood system has been through startup procedures and that it is functioning properly.

1.04 QUALITY ASSURANCE
- A. Manufacturer Qualifications: Firm experienced in manufacturing range hood systems similar to those indicated for this Project and that have a record of successful in-service performance.
- B. Installer Qualifications: Engage an experienced installer who has successfully installed similar range hoods.
- C. U.L. Listing: Hood shall bear the U.L. Listed nameplate in accordance with U.L. 710.
- D. NFPA Compliance: Hood shall be constructed in accordance with NFPA Standard 96 requirements and 120-3-3 modifications to NFPA-96.
- E. NSF Compliance: Hood shall bear the National Sanitation Foundation seal of approval.
- F. Fire suppression installer shall have a pre-engineered kitchen fire suppression system license.

1.05 DELIVERY, STORAGE AND HANDLING
- A. Packing and Shipping: Protect hood system and components from damage by factory packing.

B. Acceptance on Site: Reject any damaged hood system upon arrival.
C. Storage and Protection: Store hood system and components to prevent damage, and protect from weather, dirt, fumes, water, and construction debris. Store indoors where possible.
D. Handling: Handle hood systems and components according to manufacturer's instructions.

1.06 WARRANTY
A. Written manufacturer's warranty covering parts and labor for product failures within 12 months of installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS
A. Manufacturers: Subject to compliance with requirements, provide products by the following manufacturers:
1. Commercial Range Hood Systems:
a. Captive Aire
b. Gaylord
c. Grease Master
d. Greenheck/Accurex

2.02 HOOD ACCESSORIES
A. The existing hood shall remain. Provide the following accessories as specified:
1. External Supply Plenum: All Type 304 stainless steel construction (18-gauge min.) No. 3 finish interior and exterior where exposed to view.
2. Provide, from the hood manufacturer, Type 304 stainless steel, 18-gauge No. 3 finish enclosure panels between top of hood system assembly and finished ceiling.
3. Grease gutters shall be furnished and pitched to drain to a removable metal container with capacity not exceeding one gallon.
4. Fan and light controls shall be remote wall mounted as indicated on the drawings. Provide separate switching for airflow and lights.
5. Complete drawings of the system installation including the hood(s), exhaust duct(s), and appliances, along with the interface of the fire extinguishing system detectors, piping, nozzles, fuel shut-off devices, agent storage container(s), and manual actuation device(s) shall be submitted to the authority having jurisdiction.
6. Temperature sensor and fan delay relay shall be installed in exhaust duct collar of hood to turn on exhaust fan when setpoint is reached. Sensor shall be rated for 120 volts. Control panel for the temperature interlock shall be pre-insulated on the hood and wired to the sensor.
7. The variable speed prewired remote control center shall include, but not be limited to, an integral master disconnect switch with fuse blocks for main power connection, and distribution terminal control strip for control wiring connection. All electrical components shall be UL Listed or classified where applicable and wired in compliance with the National Electrical Code. Wiring shall be complete, requiring only one-point field connection to power controls and lights.

2.03 FAN COMPENENTS
A. Provide separate exhaust and supply fan components of size and capacity as indicated on the plans. The assemblies shall include the following:

1. Hinged up-blast exhaust fan shall be constructed of aluminum and shall conform to AMCA, U.L. 762 Listed for use with restaurant exhaust applications. Fan shall have grease drain container with tight fitting lid.
2. Supply air fan package shall be constructed of weatherproof baked enamel finished 16-gauge galvanized steel. Supply fan shall be forward curved centrifugal type with adjustable belt drive and mounted on vibration isolators. Fan wheel shall be constructed of galvanized steel and fan bearings shall be sized for an average life of 200,000 hours. The inlet shall contain a bird screen and 1-inch washable U.L. Listed aluminum filters sized for 500 fpm max. face velocity. Provide motorized 2-position multi-shutter outside air damper. Filters shall be easily removable. Shop drawings submittal shall include fan curves. Access panels shall be side access. (Top access is not acceptable.)
3. Factory wiring shall be provided in conduit conforming to NFPA Standard 70 and designed to withstand effects of heat, vapor and grease on the equipment. Wiring shall include control wiring to conduit to the opening in top of canopy, connecting wiring and conduit from master electric control panel to supply and exhaust fans.
4. The installer shall certify to the authority having jurisdiction that the installation is in complete agreement with the terms of the listing and the manufacturer's instructions and/or approved design.
5. Contractor shall submit a layout of the hood, fan package and connecting ductwork. Structural steel and ceiling height locations will be indicated on drawings.
6. Hood, grease extractors and ducts shall have a clearance of at least 18 inches to combustible material. See NFPA 96 Appendix for protection required to reduce the clearance to combustibles. See other sections of this specification for grease duct wrap specifications.

PART 3 - EXECUTION

3.01 INSTALLATION AND CERTIFICATION:

A. Installation:

1. Installation shall be in strict accordance with the manufacturer's printed Installation Instructions.
2. All wiring and conduit associated with the control of rangehood system fans and devices shall be provided under this Division. This includes wiring between the remote-control panel at the fan package, the switch panel in the kitchen space, and the temperature interlock control panel.
3. Installation of system shall be made only by persons properly trained and qualified to install the specific system being provided. System shall be installed, inspected, and tested by manufacturer's Authorized Representative. Training shall be by the manufacturer of the equipment being installed.
4. The installer shall submit a Letter of Certification to the State Fire Marshal (with copy to the Architect) that the installation is in complete agreement with the terms of the listing and the manufacturer's instructions and/or approved design.

END OF SECTION 233813

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SECTION 237432

PACKAGED DEDICATED OUTSIDE AIR UNITS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS
- A. Drawings and general provisions of the Contract apply to this Section.

1.02 SUMMARY
- A. This Section includes dehumidification units used for swimming pool room dehumidification and packaged makeup air units.
- B. Related Sections include the following:
  1. Division 23 Section "Mechanical Vibration Controls and Seismic Restraints" for manufactured isolation bases.
  2. Division 23 Section "Control Systems Equipment" for temperature-control devices, and control wiring and control devices connected to packaged makeup air units.

1.03 SUBMITTALS
- A. Product Data: Include manufacturer's technical data for each model indicated, including rated capacities of selected model clearly indicated; dimensions; required clearances; shipping, installed, and operating weights; furnished specialties; accessories; and installation and startup instructions.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection. Detail mounting, securing, and flashing of roof curb to roof structure. Indicate coordinating requirements with roof membrane system.
  1. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring.
- C. Commissioning Reports: Indicate results of startup and testing commissioning requirements. Submit copies of checklists.
- D. Maintenance Data: For equipment to include in the operations and maintenance manuals.
- E. Warranties: Special warranties specified in this Section.

1.04 QUALITY ASSURANCE
- A. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Code for Mechanical Refrigeration."
- B. Listing and Labeling: Provide electrically operated components specified in this Section that are listed and labeled.
  1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.
- C. Comply with NFPA 70.

1.05 DELIVERY, STORAGE, AND HANDLING
- A. Deliver units as factory-assembled units with protective crating and covering.
- B. Coordinate delivery of units in sufficient time to allow movement into building.
- C. Handle units to comply with manufacturer's written rigging and installation instructions for unloading and moving to final location.

1.06 COORDINATION
- A. Coordinate installation of pads and equipment supports

1.07 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Warranty: A written warranty, executed by the manufacturer and signed by the Contractor, agreeing to replace components that fail in materials or workmanship, within the specified warranty period, provided manufacturer's written instructions for installation, operation, and maintenance have been followed.

1. Warranty Period, Compressors: Manufacturer's standard, but not less than 5 years after date of Material Completion.

1.08 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.

1. Filters: Three (3) sets of filters for each unit.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Dedicated Outside Air Units:
   a. Greenheck (Owner preferred)
   b. Trane Co. (The)
   c. Valent

2.02 PACKAGED DEDICATED OUTSIDE AIR UNITS

A. Unit Description:

1. Unit shall be a packaged rooftop unit specifically designed for 100% outdoor applications. Unit shall be completely factory-assembled, tested, internally wired, fully charged, and shipped in one piece. Unit(s) shall consist of insulated weather-tight casing with outdoor intake hood, compressors, air-cooled condenser coils, condenser fans, evaporator coils, supply fan, motors and drives, unit controls, condenser reheat coil, gas-fired heat and filters.
2. Unit shall be single piece construction as manufactured at the factory. Packaged units shall be constructed for installation on a roof curb.
3. Unit shall be factory run tested to include the operation of all fans, compressors, heat exchangers, safeties, limits, and control sequences.

B. Unit Casing:

1. Cabinet: Outer casing shall be 18-gauge minimum A60 galvanneal steel painted with baked industrial enamel finish. Internal casing shall be 24-gauge minimum G90 galvanized steel except for motor supports, which shall be 14-gauge minimum G90 galvanized steel. Panels shall be insulated with 2" thick fiberglass insulation or 2" spray foam insulation.
2. Access panels/doors: Unit shall be equipped with insulated, hinged doors or removable access panels to provide easy access to all major components. Doors and access panels shall be fabricated of 18 gauge minimum painted galvannealed steel.
3. Control Panel: the unit control panel section shall be laid out to provide separation high and low voltage components per UL requirements. The control panels shall also be fully gasketed, hinged and provided with quick release latch and door for easy access.

C. Electrical:
   1. Provide a factory-installed non-fused disconnect switch which satisfies NEC requirements for a service disconnect switch. Disconnect handle shall be accessible through the control box door such that high voltage power must be off before door can be opened.
   2. Provide a factory installed 115V convenience outlet capable of ground fault protection.

D. Air Filters: Filters shall mount integral within unit casing and be accessible through hinged access panels. Filters shall be 2-inch thick pleated media throwaway filter, MERV-8 efficiency.

E. Fans - Supply: Supply fan blower assembly shall consist of an electric motor and direct-drive fan. Assembly shall be mounted on heavy gauge galvanized steel rails mounted on 1.125" thick neoprene vibration isolators. Blower motor shall be capable of continuous speed modulation and controlled by a VFD.

F. Electric Heat: Manufacturer's standard construction, factory wired for single-point wiring connection with over-current and over-heat protection devices.

G. Evaporator Coil Section:
   1. Provide two individual evaporator coils with heavy duty aluminum fins mechanically bonded to copper tubes and mounted to a single coil and support. Evaporator coils shall be independently circuited to optimize cooling and drying capacity at full and part load conditions. Coils shall also utilize internally enhanced tubing for maximum efficiency.
   2. Provide a thermostatic expansion valve (TXV) for each refrigerant circuit. Factory pressure and leak test call at 390 psig.
   3. Provide drain pan pitched in two planes that is fully drainable. Drain pan shall be double-wall foamed in place assembly constructed of stainless steel. Evaporator coils to be mounted above drain pan to allow the drain pan to be fully inspected and cleaned.

H. Condenser Reheat Coil Section:
   1. Provide reheat coil for recovered hot refrigerant gas with heavy duty aluminum fins mechanically bonded to copper tubes. Factory pressurize and leak test to 390 psig.
   2. Provide integral subcooling circuit to prevent premature refrigerant flashing and to ensure maximum operating efficiency.
   3. Reheat coil system to provide modulating reheat capacity between the reheat coil and matching outdoor condenser coil as required per the supply air temperature setpoint via the unit micro processor.
   4. Reheat coil to be factory installed in unit with adequate spacing away from upstream evaporator coils to prevent entrained moisture from reentering the reheated supply air.

I. Condenser Section:
   1. Provide heavy duty aluminum fins mechanically bonded to copper tubes. Factory pressurize and leak test to 390 psig.
   2. Provide sub-cooling circuit(s) integral with condenser coils to maximize operating efficiency and prevent premature refrigerant flashing.
   3. Provide direct drive fans with steel blades and three phase motors. Fans shall be statistically and dynamically balanced. Motors shall be permanently lubricated with built in current and thermal overload protection and have weather tight slingers over motor bearings.
   4. Provide factory-installed louvered seal coil guards around perimeter of condensing section to protect the condenser coils, refrigerant piping and control components. Louvered panels shall be fabricated from minimum 20-gauge galvanized steel and be rigid enough to provide permanent protection for shipping and pre/post-installation.

J. Refrigeration system:
   1. Compressor: Hermetic inverter scroll compressor with isolated mounting and electric crankcase heater.
   2. Provide thermostatic temperature motor winding control for protection against excessive temperature caused by over/under-voltage operation or loss of charge. Provide high-and-low pressure cutouts.
   3. Provide integral coil frost protection based on refrigerant circuit suction temperature.

K. Outdoor Air Section:
   1. Provide 100% outdoor air via a fully integrated factory installed 100% modulating outdoor air damper. Damper operation shall be through microprocessor-based controls and shall remain open at 100% when the building is occupied for required ventilation.
   2. Provide spring return motor for outside air damper closure during unit shutdown or power interruption.
   3. Outdoor air inlet hood to be factory installed with bird screen.

L. Dampers:
   1. Provide low leakage dampers.
   2. Outside air damper shall be parallel blades. A modulating damper actuator shall be factory installed and controlled via the unit microprocessor.

M. DDC Microprocessor Controls: The unit shall be controlled by a factory-installed microprocessor programmable controller (DDC) capable of controlling the unit as a stand-alone system and capable of interface with the owner's facility management system through a factory provided BACNet interface. The unit controller shall incorporate an integral LCD screen providing text readouts of status and have a built-in keypad to permit access of read-out screens without the use of ancillary equipment, devices, or software

PART 3 - EXECUTION

3.01 PREPARATION

A. Provide all labor, refrigerant, and material required for a complete installation. Work to be performed shall be in accord with local codes, regulations, and OSHA standards.

3.02 DELIVERY, STORAGE AND HANDLING

A. Provide a suitable space for the equipment with proper access and entries. Store in a clean, dry place and protect from the outdoor environment. Handle with care to avoid damage.

3.03 INSTALLATION

A. Install unit per plans and manufacturer's installation recommendations.

3.04 FIELD QUALITY CONTROL

A. Clean, check and perform all preliminary start-up procedures before final operation of the unit, per manufacturer's recommendations.

B. Provide complete operation/maintenance manuals (in English) and include the following minimum lists: parts list, electrical and control drawings, and refrigeration piping drawings. Manufacturer's representative shall instruct owners/operators of the unit regarding its functions and sequence of operation.

3.05 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel as specified below:

1. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventative maintenance.
2. Review data in the maintenance manuals.
3. Schedule training with Owner, through the Design Professional, with at least 7 day's advance notice.

END OF SECTION 237432

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SECTION 238126

SPLIT SYSTEM HEAT PUMPS AND AIR CONDITIONERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS
- A. Drawings and general provisions of the Contract apply to this Section.

1.02 SUMMARY
- A. This Section includes split system heat pump units and related components.

1.03 SUBMITTALS
- A. Product Data: Include manufacturer's technical data for each model indicated, including rated capacities of selected model clearly indicated; dimensions; required clearances; shipping, installed, and operating weights; furnished specialties; accessories; and installation and startup instructions.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection.
  1. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring.
  2. Refrigerant piping schematics showing sizes and accessories.
- C. Commissioning Reports: Indicate results of startup and testing commissioning requirements. Submit copies of checklists.
- D. Maintenance Data: For equipment to include in the maintenance manuals.
- E. Warranties: Special warranties specified in this Section.

1.04 QUALITY ASSURANCE
- A. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Code for Mechanical Refrigeration."
- B. Energy Efficiency Ratio: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."
- C. Coefficient of Performance: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."
- D. Listing and Labeling: Provide electrically operated components specified in this Section that are listed and labeled.
  1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.
- E. Comply with NFPA 70.

1.05 DELIVERY, STORAGE, AND HANDLING
- A. Deliver indoor and outdoor units as factory-assembled units with protective crating and covering.
- B. Coordinate delivery of units in sufficient time to allow movement into building.
- C. Handle units to comply with manufacturer's written rigging and installation instructions for unloading and moving to final location.

1.06 COORDINATION
- A. Coordinate installation of concrete pads and equipment supports

1.07 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Warranty: A written warranty, executed by the manufacturer and signed by the Contractor, agreeing to replace components that fail in materials or workmanship, within the specified warranty period, provided manufacturer's written instructions for installation, operation, and maintenance have been followed.

1. Warranty Period, Compressors: Manufacturer’s standard, but not less than 5 years after date of Material Completion.

1.08 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.

1. Filters: Three sets of filters for each unit.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ducted Split Systems:
   a. Carrier Corp.; Carrier Air Conditioning Div. (Owner preferred)
   b. Lennox Industries Inc.
   c. Daikin.
   d. Trane Company (The); North American Commercial Group.
2. Ductless Split Systems:
   a. Carrier Corp. (Owner preferred)
   b. Daikin
   c. Mitsubishi
   d. Samsung
   e. Trane

2.02 DUCTED SPLIT SYSTEM HEAT PUMP AND AIR CONDITIONERS

A. Unit shall be of size, type and capacity as indicated on the Drawings.

B. Outdoor units shall be constructed of heavy gauge galvanized steel cabinet with weather resistant baked enamel finish. The unit shall contain hermetic compressor with high-and-low pressure protection, crankcase heater and compressor overload protection. Refrigerant circuit shall include vapor and liquid line back-seating type service valves with gauge ports, filter and factory furnished holding charge of R-410a. Compressors shall have a 5-year warranty. The outdoor coils shall be all-aluminum, fully brazed with flat micro-channel tubes. The outdoor coil shall have expansion valve refrigerant control during heating operation, and automatic temperature/pressure actuated defrost control system. Condenser fans shall be direct drive, vertical discharge type. Controls shall be factory wired and readily accessible. Compressors shall2.4 have 24-volt control transformer and magnetic contactor.

1. When the unit listed in the Equipment Schedule or the unit that is the "Basis of Design" has multiple compressors, "equal" equipment with a single unloading compressor will not be acceptable.
2. Tandem compressors (two compressors driven by a single motor) will not be acceptable.

3. Provide condenser coil guard. Guard shall have unit manufacturer's approval for installation on unit. Factory installed guards may be used if, in the opinion of the Engineer, it is equivalent to shop fabricated guard described above.
4. Provide the following accessories:
    a. 5-Minute Anti-Recycle Timer
    b. Hard Start Kit for Single Phase Units
    c. Crankcase Heater (Where recommended by equipment manufacturer.)
    d. Defrost Thermostat for Indoor Coil
    e. Room Thermostat
    f. Condenser Coil Guard
    g. Where filter frame is not integral to unit, provide accessory frame meeting specification below.
    h. Low Ambient Controls
    i. Outdoor air thermostat to prevent resistance heat from energizing above 45ºF (adj.)

C. Where 230-volt nameplate rated condensing units are to operate on a 208-volt system, a Buck and Boost transformer shall be furnished. Equipment vendor shall select transformer and shall include his calculations and selection with the equipment submittal.

D. Indoor units shall be constructed of heavy gauge steel with baked enamel finish and shall be internally lined with faced fiberglass insulation. Air handler shall be provided with a low voltage terminal board and fan motor relay. Blower shall be belt or direct driven. Belt driven fan shall have a variable pitch drive pulley. Direct drive motors shall have a minimum of three speeds. Evaporator coil shall have expansion device, check valve and defrost thermostat accessory. Indoor unit shall be complete with filter rack and 1-inch thick (min.) disposable filter(s). Filter(s) shall be furnished with frames. Unframed hogs-hair filter(s) are not acceptable.

E. Auxiliary electric heaters shall be of size and capacity and furnished with stages indicated on the drawings. Heater shall be designed specifically for the indoor unit and shall meet all requirements of the National Electric Code and Underwriters Laboratories and shall be so stamped.

2.03 DUCTLESS SPLIT SYSTEMS

A. Provide a split system heat pump and air conditioning units utilizing outdoor condenser and indoor evaporator connected by copper refrigerant tubing with flare type fittings. Outdoor unit shall contain sufficient R-410a to charge complete system. The condenser shall be equipped with an inverter-driven compressor and external brass service valves and charging port. Indoor unit shall be equipped with electric resistance back-up heater (where indicated.) The outdoor condenser shall have a capillary tube metering device located internally. Evaporator and condenser coils shall be constructed with aluminum fins mechanically bonded to copper tubes. The system shall bear the AHRI Certification symbol.

B. Indoor unit shall be mounted as indicated on the Drawings. Controls shall be integral type IC thermostat with settings for multiple speeds and automatic position, 12-hour timer with ON/OFF settings, night set-back and energy saver position. Furnish hard-wired remote-control panel. Cooling and heating capacities and electrical characteristics shall be as shown on the Drawings.

C. Provide disconnect device for indoor unit when power is supplied by outdoor unit. Furnish low ambient controls and condenser coil guards unless indicated otherwise.

D. Where indicated on the drawings, provide condensate drainage pump with reservoir mounted below wall-hung indoor cassette units. Pump shall be mounted in a factory-made reservoir enclosure and shall be powered from the indoor unit circuit. Pump shall be self-priming. Pump shall be equivalent to the Blue Diamond Microblue with fascia kit, Rector seal Mini White, or Aspen Mini Blanc with opaque reservoirs.

2.04 REFRIGERANT PIPE SIZE

A. Pipe sizes shown on the drawings are for estimating purposes only. Final pipe sizes shall be selected by the manufacturer and shall be included in the submittal data. Accessories (larger crankcase heaters, liquid line solenoid valve, oversize suction accumulators, wind baffles, etc.) required or recommended by the equipment manufacturer shall be provided at no additional cost.

2.05 EMERGENCY DRAIN PAN

A. Provide 22-gauge galvanized emergency drain pan under all air handling units having water or drain connections. Drain pan shall extend 6" beyond unit on all sides, shall have 2" high hemmed sides. All seams and joints shall be soldered liquid tight. Exception: Emergency drain pans are not required for exposed ductless split systems.

B. Furnish float switch in the emergency drain pan which de-energize the associated HVAC system when moisture is present.

C. Drain pan shall include a ¾" drain connection, ball valve, and drain pipe routed to floor drain.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine installation locations for compliance with requirements for conditions affecting installation and performance of units. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install units according to manufacturer's written instructions.

B. Furnish float switch for unit shutdown interlock.

3.03 CONNECTIONS

A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate the general arrangement of piping, fittings, and specialties. The following are specific connection requirements:

1. Install piping to allow service and maintenance.

B. Duct installation requirements are specified in other Division 23 Sections. Drawings indicate the general arrangement of ducts. Furnish flexible connections at all unit connections.

C. Electrical: Conform to applicable requirements in Division 26 Sections.

D. Ground equipment.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.04 COMMISSIONING

A. Verify that installation is as indicated and specified.

B. Complete manufacturer's installation and startup checks and perform the following:

1. Level unit on support structure.
2. Inspect for visible damage to unit casing.
3. Inspect for visible damage to compressor, air-cooled condenser coil, and fans.
4. Verify that clearances have been provided for servicing.
5. Check that labels are clearly visible.
6. Verify that controls are connected and operable.
7. Remove shipping bolts, blocks, and tie-down straps.

8. Verify that filters are installed.
9. Adjust vibration isolators.
10. Check acoustic insulation.

C. Lubricate bearings on fan.

D. Check fan-wheel rotation for correct direction without vibration and binding.

E. Adjust fan belts to proper alignment and tension.

F. Start unit according to manufacturer's written instructions.
1. Perform starting of refrigeration in summer only.
2. Complete startup sheets and attach copy with Contractor's startup report.

G. Check and record performance of interlocks and protection devices; verify sequences.

H. Operate unit for an initial period as recommended or required by manufacturer.

I. Calibrate thermostats.

J. Check internal isolators.

K. Check controls for correct sequencing of heating, refrigeration, and normal and emergency shutdown.

L. Simulate maximum cooling demand and check the following:
1. Compressor refrigerant suction and hot-gas pressures.
2. Short circuiting air through condenser or from condenser to outside-air intake.

M. After starting and performance testing, change filters, vacuum heat exchanger and cooling and condenser coils, lubricate bearings and adjust belt tension.

3.05 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel as specified below:
1. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance.
2. Review data in the maintenance manuals.
3. Schedule training with Owner, through the Design Professional, with at least 7 days' advance notice.
4. Provide letter from factory service representative stating that equipment is installed and operating as per manufacturer’s recommendations.

END OF SECTION 238126

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