

SECTION 15500

HVAC SYSTEMS

PART 1 GENERAL

1.01 Not used.

1.02 SUMMARY:

- A. The Contractor shall provide HVAC Systems as shown on the drawings and as specified in this Section including, but not necessarily limited to:
 - 1 Applications and fees for all HVAC Systems permits, services, and inspections
 - 2 Rooftop mounted packaged HVAC units (RTUs).
 - 3 RTU roofcurbs with security bars, concentric transitions, sheet metal supply/return air ducts and duct extensions, concentric flush mount diffusers and condensate piping.
 - 4 RTU control interface module (Lennox ETM).
 - 5 RTU smoke detectors.
 - 6 Exhaust fans, unit heaters, and associated flues and intakes
 - 7 Electric unit heaters, including wall and door heaters where scheduled.
 - 8 Controls and wiring not otherwise furnished by PETCO's Inventory Agreement Vendor.
 - 9 Seismic Restraints (as may be required by the local jurisdiction).

1.03 RELATED WORK:

- A. Section 05500- Metal Fabrications.
- B. Section 07720- Roof Accessories.
- C. Section 15255-Seismic Restraints.
- D. Section 15300-Fire Suppression System, Section 15400-Plumbing Systems and Section 16000-Electrical Systems; related work including gas, and electrical wiring and connections to HVAC units, heaters, and exhaust fans
- E. Work by Others: The HVAC Control Panel and Control Accessories, including sensors and wiring will be provided by PETCO's Inventory Agreement Vendor. Refer to Section 16600-Energy Management System.

1.04 SUBMITTALS: Prepare submittals and Request for Substitution (if any) per Section 01340-Submittals. Submit Rooftop Unit Product Data; Ductwork Shop Drawings; Flue Vent Product Data; Grilles, Registers and Diffusers Product Data; Rooftop Unit Thermostat Product Data; Exhaust Fan Product Data; and Unit Heaters Product Data, all in sufficient detail to demonstrate compliance with the work of this Section.

1.05 QUALITY ASSURANCE:

- A. All materials, apparatus, equipment and installation must comply with the most stringent standards between applicable building and mechanical codes and ordinances, State Industrial Accident Commission, Underwriters' Laboratory and National Board of Fire Underwriters.
- B. Drawings and Coordination:

1. The Contractor shall verify the dimensions governing the mechanical work in the building. Because of the scale of the mechanical drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required to meet all conditions. The Contractor shall examine the adjoining work, on which mechanical work is dependent for proper operation, and must report any work that must be corrected.
 2. If the equipment proposed for installation requires structural, mechanical or electrical space conditions than those shown on the drawings, the Contractor shall allow for the cost of such modifications in the contract sum. No waiver of responsibility for defective work shall be accepted due to failure to record and accommodate unfavorable conditions
- C. Roof Penetrations: The Contractor shall coordinate the installation of all roof penetrations so that the roof warranty is NOT altered, modified or voided.

1.06 WARRANTY/ CLOSEOUT DOCUMENTS:

- A. Manufacturer's Warranty: The Contractor shall include a copy of the manufacturer's standard product warranties in the Building Maintenance Manuals submitted per Section 01700-Contract Closeout.
- B. Subcontractor Warranty: The Contractor shall include a copy of the HVAC subcontractor's warranty for all work provided, for a term of 1 year after the Date of Substantial Completion, in the Building Maintenance Manuals submitted per Section 01700-Contract Closeout.
- C. Building Maintenance Manuals: The Contractor shall include HVAC Systems Information per Section 01700-Contract Closeout.
- D. Project Record Drawings: The Contractor shall record all changes as the work progresses on a set of project record drawings kept at the jobsite, and shall provide Record Drawings to PETCO after the Date of Substantial Completion per Section 01700-Contract Closeout.

1.07 CLOSEOUT MAINTENANCE BY CONTRACTOR: The Contractor shall provide new, replacement, standard duty service Filters to replace the temporary filters used during construction, by the Date of Substantial Completion.

PART 2 PRODUCTS

2.01 HVAC UNITS:

- A. The rooftop mounted packaged HVAC Units (RTUs) shall be purchased by the Contractor through a PETCO Inventory Account agreement:

LENNOX NATIONAL ACCOUNTS
Contact: Steve Fricke
2100 Lake Park Blvd., Richardson TX 75080
Tel: 800-367-6285 FAX: 972-497-5018

No product/ manufacturer substitution is permitted.

- B. Lead Time: 8 to 10 weeks after credit/ account approval and execution of purchase order.
- C. The RTUs shall be furnished by the PETCO Inventory Account vendor complete with casing, refrigeration system, gas-fired heating section, fan, motor and drive, filters (two sets for each RTU), hail guard, burglar bars, economizers and barometric relief, and automatic controls.

- D The RTUs shall be furnished by the PETCO Inventory Account vendor with Roofcurbs and Security Bars unless retrofit roofcurbs are provided. If retrofit roofcurbs are provided, then the Contractor shall provided Security Bars per Section 05500-Metal Fabrications, and similar to as detailed on the drawings for other roof openings. Pressure treated wood blocking and shim material to level the roofcurbs shall be provided by the Contractor; Fire Retardant Wood shall be provided by the Contractor if so required by the local jurisdiction.
- E. The RTUs shall each be furnished with a relay to provide four (4) minute time delay between starting the first and second compressor for each unit, and a lockout timer to provide a minimum off-time of five (5) minutes between compressor cycling, and Site Controls ETM 2050 Temperature sensing control system
- F. Temperature Control shall be as follows:
- 1 Each new RTU shall be provided with factory installed Lennox temperature control system suitable for interfacing with the Energy Management System provided by PETCO's Vendor. The control system shall provide two stages of cooling and two stages of heating, adjustable anti-cycle timer, economizer control (where applicable), etc, as indicated on the drawings.
 - 2 Smoke Detection: Lennox units will be furnished with duct smoke detectors. Upon smoke detection by the rooftop units' duct mounted smoke detectors, the rooftop units must shut down with signal sent to the fire alarm control panel.
 - 3 If Lennox units are NOT provided for this project, the HVAC Contractor shall furnish and install System Sensor ionization detectors with sampling tube and auxiliary contacts. The Electrical Contractor shall provide field power wiring. No product/manufacture substitution is permitted
- G The Rooftop HVAC Units shall be furnished with disposable filters for testing and until the construction completion.
- H. The HVAC installer must be certified to handle R-410A refrigerant due to new service procedures and precautions. If not already certified, an installer can receive certification by visiting the following website: www.lennoxcommercial.com/res/pres/elearning-r410a.
- I. Equipment Operation Check (EOC):
1. An Equipment Operation Check (EOC) is to be provided to PETCO after the HVAC installation and start up is completed per the manufacturer's instruction. A Lennox representative will inspect the equipment installation and the system operation.
 2. The HVAC Subcontractor shall schedule the EOC at least three (3) weeks prior to desired inspection date, with:

LENNOX NATIONAL ACCOUNTS
Contact: Tammy Peck or Doris Stuckey
Tel: 513-761-6000
 3. Complete start up, testing & run of all units at least 24 hours prior to Equipment Operation Check
 - 4 The HVAC Subcontractor shall provide at its cost a qualified service technician to be present during the Equipment Operation Check
 5. Lennox Industries, Inc. shall provide a written copy of the EOC report to PETCO and to the HVAC Subcontractor.

6. All defects, if any, in the Lennox rooftop HVAC units, the installation and the system operation shall be corrected by the HVAC Subcontractor within 14 days after the distribution of the EOC report. The failure to identify a defect during the EOC does not relieve the Landlord/Owner and the HVAC Subcontractor of the responsibility to correct subsequently identified defects.

2.02 EXHAUST FANS:

- A. Exhaust fans shall be provided with roof curbs, bases, back draft dampers, insect screens, speed switches, and duct connections.
- B. Provide motors with flush-type mounted motor starters unless motors are provided with built-in protection.
- B. Provide Security Bars for Exhaust Fans when the roof opening (inside of roof curb) exceeds the maximum opening limits indicated on the Drawings.

2.03 GAS UNIT HEATERS: Gas Unit Heaters shall be provided complete with electric and gas controls, gas piping and safety devices.

2.04 ELECTRIC UNIT HEATERS, WALL HEATERS AND DOOR HEATERS: Units shall be provided with all electric line voltage and control connections, safety devices and mounting hardware and thermostat and control wiring.

2.05 DUCT WORK:

- A. Provide galvanized sheet metal ductwork fabricated and installed per the more stringent of ASHRAE standards, SMACNA standards, or local jurisdiction requirements. Duct sizes shown on drawings are the inside net clear dimensions from the inside face of insulation (exposed ductwork) or inside face of duct sheet metal (concealed ductwork). Fabricate ductwork of prime grade, lock forming quality galvanized steel sheets per SMACNA standards:
 1. 12" and smaller (longest side) 26 gauge.
 2. 13" through 28" (longest side) 24 gauge.
 3. 29" through 30" (longest side) 24 gauge; 1" x 1" x 1/8" angles at 5 feet O.C.
 4. 31" through 42" (longest side) 22 gauge, 1" x 1" x 1/8" angles at 5 feet O.C.
 5. 42" through 54" (longest side) 22 gauge; 1-1/2" x 1-1/2" x 1/8" angles at 4 feet O.C.
- B. Provide manually operated dampers at branch ducts, two gauges heavier than the duct in which installed, and equipped with locking quadrants. Access panels in ductwork shall be galvanized sheet steel, two gauges heavier than the duct with rolled edges, felt strips, or neoprene gasketing and attached to duct with sheet metal screws at a maximum of 6" on center.
- C. Flash all ducts passing through roof or exterior walls, and silicone caulk all joints. Seal all duct seams with tape or mastic. Support ductwork from overhead with strap iron or angles.
- D. Construct fittings, elbows and transitions to provide minimum noise and resistance. Where space permits, elbows shall have a minimum radius of 1-1/2 times the width (or depth). Transitions must be gradual with changes not to exceed 1" x 4". When structural conditions necessitate, fittings and elbows shall be made sharply but with full radius turning vanes.
- E. Provide flexible connections with 30 ounce, neoprene coated, fire retardant, waterproof and airtight glass fabric.

- F. Unions, valves, dampers and controls shall not be placed in any location that will be inaccessible after the system is complete. All damper control handles, electric controls, air controls, and other apparatus which must be located in an inaccessible location must be provided with suitable access doors or covers (fitted over a framed hole) which will permit proper operation and servicing of HVAC Systems.

2.06 DUCTWORK INSULATION:

- A. General: Provide materials complying with NFPA Bulletin 90-A, as determined by UL Method NFPA 225, ASTM E84 and local jurisdiction, flame spread rating under 25 and smoke-developed rating under 50. Acceptable Manufacturers: Owens/Corning Fiberglass, Johns-Manville, Certainteed.
- B. Exposed Ductwork: Line interior of exposed supply and return ductwork with 1" thick, 3.0 lb/cu.ft. density, black, neoprene coated fiberglass duct liner, minimum installed R-value of 4.0.
- C. Wrap exterior of rectangular concealed supply ductwork with fiberglass batt duct insulation with vapor barrier. Use bonding adhesive to prevent sagging of insulation, seal all joints, breaks and punctures with vapor barrier compound.
 - 1. Ceiling space in areas >9000 and up to 19800 HDD65: 2" thick, 1.0 lb/cu.ft. density, minimum installed R-value of 6.0
 - 2. Ceiling space all other geographic areas except >19800 HDD65: 2" thick, 0.75 lb/cu.ft. density, minimum installed R-value of 5.0
- D. Rectangular exposed, exterior ductwork shall be insulated with 1.5" thick insulation board, 6 lb./cu.ft. with ASJ or FSK Facing. Facings shall have a maximum vapor transmission rate of .02 perms. After insulation has been installed, install aluminum corner bead at the four corners of each duct. The entire assembly shall be coated with a 1/8" thick layer of fire retardant vinyl acrylic mastic. Into this layer of mastic embed 10 x 10 mesh glass fabric. Over the fabric, apply another 1/8" thick layer of insulation mastic, troweled to a smooth finish. Minimum installed R-value of 8.0.
- E. Ductwork insulation and adhesive must meet fire hazard classification NFPA 90A standards and be so labeled and have an NCR (No. 6 mounting) of at least .07.

2.07 GRILLES, REGISTERS, AND DIFFUSERS: Provide diffusers and supply, exhaust, and return air registers factory painted Color White.

2.08 EQUIPMENT BASES AND VIBRATION ISOLATION: In seismic zones requiring seismic curbs, the Contractor shall provide equipment bases and vibration isolation supports under all HVAC systems equipment. Where suitable foundations are not detailed or specified, they shall be furnished in accordance with the manufacturer's recommendations. Vibration isolation shall be provided under all equipment with moving parts such as blowers, air handling units and fans, shall be properly loaded and installed in accordance with the manufacturer's written recommendations.

2.09 GAS FLUES: Provide Gas Flues per drawings, applicable gas codes, AGA, and manufacturer's recommendations.

2.10 CONDENSATE PIPING: Provide condensate piping with P-trap to outflow onto roof surface or piping with indirect connection to storm gutters (as indicated on drawings).

2.11 GAS PIPING: Refer to Section 15400-Plumbing Systems

2.12 ELECTRICAL WIRING:

- A. Mechanical equipment having electric motors shall be furnished with all necessary control services for the protection of each motor and for automatic and/or manual control.
- B. All field line voltage wiring shall be provided by the Electrical Contractor. Sensors, thermostat and control switches shall be located as shown or directed, and all controls, relays, starters and wiring shall conform to the National Electrical Code and all local applicable requirements. All controls shall be furnished and properly identified with instruction for proper electrical connections. The responsibility for proper connections and operations of HVAC equipment, although field wired by the Electrical Contractor or the owner's vendor, is included under this Section. Verify all electrical connections before ordering any equipment.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS: The Contractor shall examine the areas and conditions under which work of this Section will be provided, shall correct conditions detrimental to the timely and proper completion of the work, and shall NOT proceed until unsatisfactory conditions are corrected.

3.02 PREPARATION: Provide sleeves, accurately dimensioned and shaped to permit passage of items of this Section. Deliver all such sleeves, with accurate setting drawings and setting information, to the trades providing the surfaces through which such items must penetrate and in a timely manner to ensure inclusion in this work.

3.03 PAINTING: Refer to Section 09900-Painting for painting of exposed overhead HVAC Systems. All exposed overhead HVAC Systems, including but not limited to access doors, pipes, conduit, junction boxes, ducts, grilles, registers, vents and similar HVAC Systems items which are not otherwise factory pre-finished or pre-painted, including those with mill or galvanized finishes, and supports typically located suspended from the exposed structure, shall be dry-fall painted to match the adjacent painted, exposed structure surfaces.

3.04 TESTING AND ADJUSTING:

- A. Test and adjust each piece of equipment and each system as required to ensure proper operation.
- B. Balancing Report: For each system, the Contractor shall include a copy of the certified Air Balancing Report in the Building Maintenance Manuals submitted to PETCO after the Date of Final Completion per Section 01700-Project Closeout. The Balancing Report shall include the following:
 - 1. Air volumes at all supply, return, and exhaust outlets.
 - 2. Total CFM supplied; Total CFM returned; Total Static Pressure at each fan and at each system; Actual CFMs; Design CFMs.
 - 3. Motor speed, fan speed, and input ampere rating for each fan.

3.05 SYSTEM TESTING AND START-UP:

- A. The Contractor shall provide System Startup for the first heating and first cooling season.
- B. System Startup of the HVAC Systems shall be for ten (10) consecutive calendar days. During this period of operation, the Contractor shall test each component for proper operation. The airflow shall be balanced, temperature controls adjusted, bearings tested and lubricated, motor loads taken, flow rate balanced and pressures checked.

- C During the ten (10) day System Startup and Test period, the Contractor shall inform designated PETCO personnel about the operation and maintenance of HVAC Systems equipment.
- D System Startup Statement: The Mechanical Contractor shall provide a signed System Startup Statement--certifying acceptance of the operation and acknowledgement of the receipt of instructions, by an authorized PETCO representative (as designated by the PETCO Project manager or the PETCO District Manager)--to the PETCO Project Manager, stating the following:

(Contractor Name), the Lennox factory representative, and (HVAC subcontractor Name), have started each and all systems; and we have demonstrated their normal operations to PETCO representative (Name); and we have instructed the PETCO representative in the operation and maintenance thereof.

Contractor Representative's Name and Signature _____

HVAC Subcontractor Representative's Name and Signature _____

Lennox Representative's Name and Signature _____

PETCO Representative's Name and Signature _____

- E. A second and third instruction meeting between the Contractor and the designated PETCO operating personnel shall be scheduled at three (3) months and eleven (11) months after the Date of Substantial Completion.
 - F. Prior to acceptance and final payment, the Contractor shall demonstrate that all HVAC equipment is functioning properly and efficiently. Sheave changes and air qualities shall be balanced by a certified Balancing Contractor (PE) for consistent temperatures throughout, controls shall be adjusted, and the system shall be placed in proper operation.
- 3.06 OPERATION INSTRUCTIONS TO PETCO: Upon completion of the entire mechanical system, and prior to acceptance by PETCO, the Contractor shall provide a qualified systems engineer and fully instruct the PETCO maintenance personnel in proper HVAC Systems operation and maintenance. The Contractor shall coordinate the scheduling of HVAC Systems instructions and notification of affected PETCO personnel.

END OF SECTION

