SECTION 23 74 13
PACKAGED ROOFTOP VENTILATION UNIT

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Furnish and install equipment and appurtenances related to the Data Center ventilation air system as specified herein, and as scheduled on the drawings. The equipment includes packaged rooftop ventilation unit (MUA) and related accessories and controls as specified in Part 2, below.

B. The scope of work includes rigging the MAU to the roof, setting, leveling, and anchoring them on factory-furnished roof curb, and connecting related ductwork and controls.

C. Provide for start-up of equipment by a qualified representative of the manufacturer, commission and test all new equipment, and provide signed, written reports as specified in Section 23 08 00.

1.2 RELATED SECTIONS

A. Section 23 08 00 – Testing, Adjusting, and Balancing

B. Section 23 00 10 – General Mechanical Requirements

C. Section 23 30 00 – Ductwork and Accessories

D. Section 23 80 13 - Provide manufacturer's support as required to coordinate with the Commissioning Agent and all commissioning efforts and paperwork for Acceptance and Integrated Systems Testing

1.3 REFERENCES

A. ANSI/NFPA 90A - Installation of Air Conditioning and Ventilation Systems

B. ASHRAE 90.1 Energy Efficient Design of New Buildings Except Low Rise Residential Buildings

C. International Energy Conservation Code 2012

D. UL - Underwriters Laboratories

1.4 QUALITY ASSURANCE

A. Conform to ANSI/NFPA 90A for the installation of all air conditioning units.

B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2016, Section 4 – "Outdoor Air Quality," Section 5 – "Systems and Equipment," Section 6 – "Ventilation Rate Procedures," and Section 7 – "Construction and startup."

1.5 SUBMITTALS

A. Submit shop drawings for packaged rooftop unit and accessories indicating dimensions, weights, mounting locations and anchoring recommendations, required clearances, field assembly requirements, locations and sizes of ductwork connections, and complete power and control wiring diagrams

B. Submit complete product data for units indicating all pertinent performance data for cooling, heating, and air flow rates. Provide fan curves, compressor data, electrical data, and certified sound measurement data for all equipment.

C. Submit sets of manufacturer's installation instructions, operation, and maintenance manuals, and list of recommended spare parts prior to shipment of equipment.

D. Provide full parts and labor warranty for a period of not less than one year from the date of start up for all equipment, with a five-year warranty on compressors.

PART 2 - PRODUCTS

2.1 PACKAGED ROOFTOP VENTILATION UNIT

A. General

1. The unit shall be down discharge airflow. Cooling performance shall be rated in accordance with ARI testing procedures. The unit shall be factory assembled, internally wired, fully charged with R-410A, and 100 percent run tested control sequence checkout before leaving the factory.
2. Units shall be ETL listed and labeled, classified in accordance to UL 1995/CAN/CSA No. 236-M40 for Central Cooling Air Conditioners.

B. Casing

1. Unit casing shall be constructed of zinc coated, heavy gauge, and galvanized steel. Exterior surfaces shall be phosphatized and finished with a weather-resistant baked enamel finish. Unit's surface shall be tested 1000 hours in a salt spray test in compliance with ASTM B45. Unit shall have a two inch thick antimicrobial Insulation. All insulation edges shall be captured or sealed. Casing shall be 2-inch, double wall construction.
2. The base pan shall have no penetrations within the perimeter of the curb.
3. The top cover shall be one piece construction or, where seams exist, it shall be double-hemmed and gasket-sealed. The ribbed top adds extra strength and enhances water removal from unit top
4. Furnish modulating outside air/return air with economizer controller.

C. Sensors

1. A factory installed combination outdoor air sensor located in the outdoor air hood will sense both outdoor air temperature and relative humidity. A factory installed discharge air sensing tube will sense the supply air temperature and relative humidity downstream of the indoor fan section.

D. Indoor Fans

1. Supply fan motor shall be direct drive type with factory installed Variable Speed Drive.

E. Evaporator Coil

1. Internally finned, 5/16 inch copper tubes mechanically bonded to a configured aluminum plate. The evaporator coil shall be leak tested to 500 psig and pressure tested to 500 psig.
2. A stainless steel double-sloped condensate drain pan with provision for through the unit wall condensate drain.
3. Evaporator coil shall have six interlaced rows for sensible and latent cooling.

F. Hot Gas Reheat

1. Furnish a modulating hot-gas reheat coil located on the leaving air side of the evaporator coil pre-piped and circuited with a low pressure switch.

G. Compressors

1. Compressors shall be direct-drive, hermetic, scroll type with centrifugal oil pumps. Motors shall be suction gas-cooled and shall have a voltage utilization range of plus or minus 10 percent of unit nameplate voltage.
   a. One compressor shall be digital scroll.

2. Internal overloads shall be provided with the scroll compressors. Crankcase heaters shall be included.

H. Condensers

1. Air Cooled condenser coil shall have a series of flat tubes containing a series of multiple, parallel flow micro-channels layered between the refrigerant manifolds. Coil construction shall consist of aluminum alloys for fins, tubes, and manifolds.

I. Capacity Control

1. Service pressure ports, and refrigerant line filter driers are factory-installed as standard. An area shall be provided for replacement suction line driers.
2. Capacity is controlled by Adiabatic Proportional Regulator (APR) installed on the lead circuit.

J. Unit Controls

1. Unit is completely factory wired with necessary controls and contactor pressure lugs for power wiring. Units will provide an external location for mounting fused disconnect device. Micro-processor controller is furnished for all 24 volt control functions. The resident control algorithms will make all heating, cooling and/or ventilating decisions in response to electronic signals from sensors measuring outdoor temperature and humidity as well as indoor temperature. The control algorithm maintains accurate temperature control, minimizes drift from set point and provides better building comfort. A centralized micro-processor will provide anti-short cycle timing for a higher level of machine protection. Terminals are provided for a field installed dry contact or switch closure to put the unit in the Occupied or Unoccupied modes.
2. Controller shall include BACnet communication with BMS and display screen.
3. Refer to Owner furnished document in Appendix A, DLR Data Center – Liebert DSE Systems – Data Center & Electrical Room – Sequence of Operations – Release dated 04/01/16, Version 2.1, attached to this specification for specific controls sequences.

K. Filters

1. Aluminum mesh filters shall be installed on the intake of the unit. In addition, one row of 2 inch MERV-13 rated filters (80 percent) shall be installed upstream to the evaporator coil.

L. Hail Guard

1. Hail guards shall be installed on the outside of the condenser coil. The guards shall consist of perforated metal, of the same gauge and color as the unit itself. Airflow through the hail guards shall not be restricted due to location or size of the perforations. Guards shall be removable to accommodate coil cleaning.

M. Electric Heater

1. Furnish electric resistance heating coil. Heaters shall meet the requirements of the National Electrical Code and shall be listed by Underwriters Laboratories for zero clearance to combustible surfaces and for use with heat pumps and air conditioning equipment.
2. Heating elements shall be open coil, 80% nickel, 20% chromium, Grade A resistance wire. Coil shall be machine crimped into stainless steel terminals extending at last 1 inch into the air stream and all terminal hardware shall be stainless steel. Coil shall be supported by ceramic bushings staked into supporting brackets.
3. Heater frames and terminal boxes shall be corrosion resistant steel. The terminal box shall be NEMA 1 construction and shall be provided with a hinged, latching cover.

4. Heater shall be furnished with a disc type, automatic reset thermal cutout for primary over temperature protection. Heater shall be furnished with disc type, load-carrying manual reset thermal cutouts, factory wired in series with heater stages for secondary protection.
5. Control will be SCR.

N. Miscellaneous Options and Accessories

1. Furnish low ambient operation capability.

O. Communications: As a minimum, provide a network interface card for the MAU, capable of communicating all operating conditions, set points, and alarms to the BMS. Coordinate with the BMS vendor to provide information in MODbus protocol, which is standard protocol used by the BMS.

P. Electrical: MUA shall be 460V, 3 Phase, 60 Hz.

Q. Powered convenience outlet for each unit shall be by electrical contractor.

2.2 ROOFTOP UNIT SCHEDULE

A. Furnish rooftop unit as scheduled on drawings.

PART 3 - EXECUTION

3.1 PREPARATION

A. Verify that roof and structure is ready to receive work and opening dimensions are as indicated on shop drawings. Install roof curb and ductwork prior to installation of unit.

B. Verify that proper power supply is available

3.2 INSTALLATION AND START UP

A. Install unit in accordance with manufacturer's instructions. Coordinate installation of rooftop air conditioning unit with roof work.

B. Verify roof curb cavity has been insulated as called for on M201 and in section 23 07 00.

C. Set and level unit on roof curb after ductwork connections are complete. Provide condensate drain with cleanable trap for each unit, discharging onto splash pad on roof.

D. Arrange and pay for the services of a qualified representative of the manufacturer to start up and commission all new rooftop air conditioning units, and to provide a written start up report for each unit.

3.3 INTEGRATED SYSTEMS TESTING

A. Provide support for Integrated Systems Testing (Commissioning Level 5) in addition to and after successful completion of Acceptance Testing (Level 4). Provide for one 12-hour day for the MAU.

END OF SECTION