

**SECTION 23 81 00****DECENTRALIZED UNITARY HVAC EQUIPMENT****PART 1 - GENERAL****1.1 DESCRIPTION**

- A. This section specifies split-systems, air conditioners.
- B. Definitions:
  - 1. Energy Efficiency Ratio (EER): (Btu hour/Watt) is equal to the measured cooling capacity of the unit by its electrical input.
  - 2. Unitary (ARI): A Unitary Air Conditioner consists of one or more factory-made assemblies which normally include an evaporator or cooling coil, a compressor and condenser combination, and may include a heating function as well. Where such equipment is provided in more than one assembly the separated assemblies are to be designed to be used together and the requirements of rating are based upon use of matched assemblies.

**1.2 RELATED WORK**

- A. Section 01 00 00, GENERAL REQUIREMENTS: Requirements for pre-test of equipment: Seismic requirements for non-structural equipment.
- B. Section 23 05 11, COMMON WORK RESULTS FOR HVAC AND STEAM GENERATION: General mechanical requirements and items, which are common to more than one section of Division 23.
- C. Section 23 05 41, NOISE AND VIBRATION CONTROL FOR HVAC PIPING AND EQUIPMENT: Requirements for different types of vibration isolators and noise ratings in the occupied areas.
- D. Section 23 07 11, HVAC, PLUMBING, AND BOILER PLANT INSULATION: Requirements for piping insulation.
- E. Section 23 05 93, TESTING, ADJUSTING, AND BALANCING FOR HVAC: Requirements for testing and adjusting air balance.

**1.3 QUALITY ASSURANCE**

- A. Refer to specification Section 23 05 11, COMMON WORK RESULTS FOR HVAC AND STEAM GENERATION.
- B. Safety Standards: ASHRAE Standard 15, Safety Code for Mechanical Refrigeration.

**1.4 SUBMITTALS**

- A. Submit in accordance with specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES
- B. Manufacturer's literature and data:
  - 1. Sufficient information, including capacities, pressure drops and piping connections clearly presented, shall be included to determine compliance with drawings and specifications for units noted below:
    - a. Unitary air conditioners:
      - 1) Split systems
    - 2. Unit Dimensions required clearances, operating weights accessories and start-up instructions.
    - 3. Electrical requirements, wiring diagrams, interlocking and control wiring showing factory installed and portions to be field installed.
    - 4. Mounting and flashing of the roof curb to the roofing structure with coordinating requirements for the roof membrane system.
- C. Certification: Submit proof of specified ARI Certification.
- D. Performance Rating: Submit catalog selection data showing equipment ratings and compliance with required sensible-to-heat-ratio, energy efficiency ratio (EER), and coefficient of performance (COP).
- E. Operating and Maintenance Manual: Submit three copies of Operating and Maintenance manual to VA three weeks prior to final inspection.

**1.5 APPLICABLE PUBLICATIONS**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. Federal Specifications (Fed. Spec.):
  - 1. A-A-50502-90 Air conditioner (Unitary Heat Pump) Air to Air (3000-300,000 Btu)
- C. Military Specifications (Mil. Specs.):
  - 1. MIL-PRF-26915D-06 Primer Coating, for Steel Surfaces
- D. Air-Conditioning and Refrigeration Institute (ARI):
  - 1. 210/240-06 Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment
  - 2. 270-95 Sound Rating of Outdoor Unitary Equipment
  - 3. 310/380-04 Standard for Packaged Terminal Air-Conditioners and Heat Pumps (CSA-C744-04)
  - 4. 340/360-04 Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment

5. 520-04 Positive Displacement Condensing Units
- E. Air Movement and Control Association (AMCA):
1. 210-99 Laboratory Methods of Testing Fans for Aerodynamic Performance Rating (ANSI)
  2. 410-96 Recommended Safety Practices for Users and Installers of Industrial and Commercial Fans
- F. American National Standards Institute (ANSI):
1. S12.51-02 Acoustics - Determination of Sound Power Levels of Noise Sources Using Sound Pressure - Precision Method for Reverberation Rooms (same as ISO 3741:1999)
- G. American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE):
1. Handbook HVAC Systems and Equipment
  2. 15-04 Safety Standard for Refrigeration Systems (ANSI)
- H. American Society of Testing and Materials (ASTM):
1. B117-03 Standard Practice for Operating Salt Spray (Fog) Apparatus
- I. National Electrical Manufacturer's Association (NEMA):
1. 1-06 Motors and Generators (ANSI)
  2. 1-00 (R2005) Industrial Controls and Systems: General Requirements
- J. National Fire Protection Association (NFPA) Publications:
1. 90A-02 Standard for the Installation of Air-Conditioning and Ventilating Systems

## **PART 2 - PRODUCTS**

### **2.1 SPLIT-SYSTEM AIR CONDITIONERS**

- A. Description: Factory assembled and tested, floor-mounted unit, with an air-cooled remote condensing unit, and field-installed refrigeration piping. Unit shall include a electric-resistance heating coil.
- B. Concealed Evaporator Components:
1. Chassis: Galvanized steel with flanged edges, removable panels for servicing, and insulation on back of panel.
  2. Insulation: Factory-applied duct liner.
  3. Drain Pans: Galvanized steel, with connection for drain; insulated and complying with ASHRAE 62.1-2004.
  4. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.

5. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.
6. Fan Motors: Comply with requirements in Section 23 05 12, GENERAL MOTOR REQUIREMENTS FOR HVAC AND STEAM GENERATION EQUIPMENT for multi-tapped, multi-speed motors with internal thermal protection and permanent lubrication.
7. Disposable Filters: 25 mm (1 inch) thick, in fiberboard frames **with MERV rating of 6 or higher according to ASHRAE 52.2.**
8. Wiring Terminations: Connect motor to chassis wiring with plug connection.

C. Accessories:

1. Duplex, 115-V, ground-fault-interrupter outlet with 15-A overcurrent protection. Include transformer if required.
2. Low-ambient kit using **staged** condenser fans for operation down to 1.7 deg C (35 deg F).
3. Filter differential pressure switch with sensor tubing on both sides of filter. Set for final filter pressure loss.
4. Coil guards of painted, galvanized-steel wire.
5. Hail guards of galvanized steel, painted to match casing.
6. Concentric diffuser with white louvers and polished aluminum return grilles, insulated diffuser box with mounting flanges, and interior transition.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Install wind and seismic restraints according to manufacturer's written instructions.
- B. Install units level and plumb maintaining manufacturer's recommended clearances and tolerances.
- C. Install water-cooled units with thermometer and pressure gage at the water supply and return connection.
- D. Install vibration spring isolators under base of self contained unit, with minimum static deflection of 25 mm (1 inch) unless otherwise indicated. Refer to Section 23 05 41, NOISE AND VIBRATION CONTROL FOR HVAC PIPING AND EQUIPMENT
- E. Install ground-mounting, compressor-condenser components on 100 mm (4-inch) thick, reinforced concrete base; 100 mm (4 inches) larger on each side than unit.
- F. Install ground-mounting, compressor-condenser components on polyethylene mounting base.
- G. Install roof-mounting compressor-condenser components on equipment

supports. Anchor units to supports with removable, cadmium-plated fasteners.

- H. Install seismic restraints.
- I. Install compressor-condenser components on restrained, spring isolators with a minimum static deflection of 25 mm (1 inch) unless otherwise indicated. Refer to Section 23 05 41, NOISE AND VIBRATION CONTROL FOR HVAC PIPING AND EQUIPMENT.
- J. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.
- K. Install wall sleeves in finished wall assembly and weatherproof. Install and anchor wall sleeves to withstand, without damage seismic forces as required by code.

### 3.2 CONNECTIONS

- A. Verify condensate drainage requirements.
- B. Install condensate drain, minimum connection size, with trap and indirect connection to nearest roof drain or area drain.
- C. Install piping adjacent to units to allow service and maintenance.
- D. Install ducts to termination at top of roof curb. Cut roof decking only as required for passage of ducts. Do not cut out decking under entire roof curb.
- E. Connect supply ducts to units with flexible duct connectors specified in Section 23 31 00, HVAC DUCTS AND CASINGS.
- F. Install return-air duct continuously through roof structure.
- G.
- H. Ground equipment and install power wiring, switches, and controls for self contained and split systems.
- I. Connect refrigerant piping to coils with shutoff valves on the suction and liquid lines at the coil and a union or flange at each connection at the coil and condenser.
- J. Install ducts to the units with flexible duct connections.
- K. Connect piping with shutoff duty valves on the supply and return side of the coil and unions at all connections and with a throttling valve on the return piping near the coil.
- L. Connect piping with shutoff duty valves on the supply and return side of the water cooled condenser and unions at all connections and with a throttling valve on the return piping near the condenser

- M. Connect piping with shutoff duty valves and unions on the steam supply and condensate side of the steam coil. On the condensate line near the coil provide a strainer, trap and shutoff valve.

**3.3 FIELD QUALITY CONTROL**

- A. Perform tests and inspections and prepare test reports.
- B. Tests and Inspections: After installing units and after electrical circuitry has been energized, test units for compliance with requirements. Inspect for and remove shipping bolts, blocks, and tie-down straps. After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment. Remove and replace malfunctioning units and retest as specified above.

**3.4 INSTRUCTIONS**

- A. Provide services of manufacturer's technical representative for four hours to instruct VA personnel in operation and maintenance of units.

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