

SECTION 23 81 00
DECENTRALIZED UNITARY HVAC EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies self-contained 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 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.
- B. 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.
- C. Section 23 07 11, HVAC, PLUMBING, AND BOILER PLANT INSULATION: Requirements for piping insulation.
- D. Section 23 36 00, AIR TERMINAL UNITS: Requirements for other similar units.
- E. Section 23 73 00, INDOOR CENTRAL-STATION AIR-HANDLING UNITS: Requirements for air handling units using chilled water and steam coils.
- F. Section 23 40 00, HVAC AIR CLEANING DEVICES: Requirements for air filtration.
- J. 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) Self-contained units
 - 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.
- B. Certification: Submit proof of specified ARI Certification.
- C. 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).
- D. Operating and Maintenance Manual: Submit three copies of Operating and Maintenance manual to Resident Engineer 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. Military Specifications (Mil. Specs.):
 - MIL-PRF-26915D-06.....Primer Coating, for Steel Surfaces
- C. Air-Conditioning and Refrigeration Institute (ARI):
 - 210/240-06.....Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment
 - 270-95.....Sound Rating of Outdoor Unitary Equipment
 - 340/360-04.....Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment
- D. Air Movement and Control Association (AMCA):
 - 210-99.....Laboratory Methods of Testing Fans for Aerodynamic Performance Rating (ANSI)
 - 410-96.....Recommended Safety Practices for Users and Installers of Industrial and Commercial Fans
- E. American National Standards Institute (ANSI):

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)

- F. American Society of Heating, Refrigerating, and Air-Conditioning
Engineers (ASHRAE):
2004 Handbook.....HVAC Systems and Equipment
15-04.....Safety Standard for Refrigeration Systems (ANSI)
- G. American Society of Testing and Materials (ASTM):
B117-03.....Standard Practice for Operating Salt Spray (Fog)
Apparatus
- H. National Electrical Manufacturer's Association (NEMA):
MG 1-06.....Motors and Generators (ANSI)
ICS 1-00 (R2005).....Industrial Controls and Systems: General
Requirements
- I. National Fire Protection Association (NFPA) Publications:
90A-02.....Standard for the Installation of Air-
Conditioning and Ventilating Systems

PART 2 - PRODUCTS

2.1 SELF-CONTAINED AIR CONDITIONERS

- A. Description: The self contained air conditioner shall be an AIR COOLED PACKAGED TYPE with a self-contained, factory assembled, charged, and tested refrigeration system. No refrigerant piping shall be required. The unit shall contain an evaporator and condenser section. The unit shall be factory assembled and wired consisting of the following:
1. Cabinet.
 2. Compressor.
 3. Evaporator fan.
 4. Evaporator coil,
 5. Integral air-cooled condenser.
 6. Air filters.
 7. Controls.
 8. Full charge of refrigerant and oil.
- B. Cabinet Frame and Panels: Structural-steel frame with 14 gauge galvanized-steel panels with baked-enamel finish in color selected by Architect, and with access doors or panels.
1. Insulation: Minimum 13-mm (1/2-inch) thick, duct liner on cabinet interior and control panel.
 2. Drain Pan: Stainless steel complying with ASHRAE 62.1-2004.

3. Isolation: Spring isolators for mounting under base of unit, with minimum static deflection of 25 mm (1 inch).
4. Corrosion-Resistant Treatment: Phenolic coating on unit interior and exterior.
6. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
- C. Evaporator Fan: Galvanized steel, double-width, double-inlet, forward-curved centrifugal fan; statically and dynamically balanced. Direct drive, with fan mounted on permanently lubricated bearings and having cast-iron or steel sheaves, dynamically balanced, bored to fit shafts and keyed. Motor sheaves shall be variable and adjustable pitch selected so required rpm are obtained when set at middle position. Fan and motor shall be resiliently mounted with ratings as recommended by the manufacturer with a minimum of one and one-half times nameplate rating of motor. Bearings shall be grease lubricated with grease lines extended to exterior of unit.
- D. Fan Motors: Comply with requirements in Section 23 05 12, GENERAL MOTOR REQUIREMENTS FOR HVAC AND STEAM GENERATION EQUIPMENT.
- E. Isolation: Mount fan and motor on common sub-base and mount assembly on spring isolators with minimum static deflection of 25 mm (1 inch) unless otherwise indicated.
- F. Compressor Hermetically sealed, scroll, 3600 rpm maximum, and resiliently mounted with positive lubrication and internal motor overload protection. Provide 5 year warranty on compressor
- G. Evaporator Coil: Direct-Expansion Coil: Seamless copper tubes expanded into aluminum fins:
 1. Corrosion-Resistant Treatment: Phenolic coating applied with multiple dips and baked.
- H. Refrigerant Circuits: A separate circuit for each compressor, with externally equalized thermal-expansion valve with filter-dryer, sight glass, high-pressure relief valve, and charging valves.
- I. Integral Air-Cooled Condenser for Units 52.8 kW (15 tons) and Smaller. Factory assembled and tested; consisting of condenser coil, fans and motors, and cabinet:
 1. Condenser Coil: Aluminum-fin copper tube with integral subcooler; leak tested to 2930 kPa (425 psig).
 2. Condenser Fan: Direct-drive propeller type with permanently lubricated motor with built-in thermal-overload protection.

J. Refrigeration System: Factory assembled and tested, and charged with refrigerant; and consisting of piping and accessories connecting compressor, evaporator coil, and condenser coil, and including the following:

1. Expansion valve with replaceable thermostatic element.
2. Refrigerant dryer.
3. High-pressure switch.
4. Low-pressure switch.
5. Thermostat for coil freeze-up protection during low-ambient temperature operation or loss of air.
6. Low-ambient switch.
7. Brass service valves installed in discharge and liquid lines.
8. R-22, R-407C or R-410A refrigerant unless otherwise indicated.

K. Air Filters:

1. Extended-Surface, Disposable Panel Filters: 50 mm (2 inch) thick, dry, filters with fibrous media material formed into deep-V-shaped pleats and held by self-supporting wire grid holding frames, with nonflammable cardboard media and media-grid frame.
3. Filter Efficiency: MERV rating of 8 or higher according to ASHRAE 52.2.
4. Air-Pressure Switch: Indicates dirty filters.

L. Controls:

1. Control Package: Factory wired, including contactor, high- and low-pressure cutouts, internal-winding thermostat for compressor, control-circuit transformer, and noncycling reset relay.
2. Time-Delay Relay: Five-minute delay to prevent compressor cycling.
3. Microprocessor Control Panel: Control unit functions, including refrigeration and safety controls, supply-fan motor speed, compressors and air-cooled condenser. Time-of-day control shall cycle unit on and off Night-heat and morning warm-up cycle.
4. Panel-mounted indication of the operating status system diagnostics and safety alarms, supply-air temperature set point, zone heating-temperature set point, supply-air pressure set point, economizer minimum position set point, supply-air pressure, and high-limit set point. Time-of-day control shall cycle unit on and off and night-heat and morning warm-up cycle.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install units level and plumb maintaining manufacturer's recommended clearances and tolerances.
- B. 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
- C. 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. Concrete, reinforcement, and formwork are specified in Section 03 30 00, CAST-IN-PLACE CONCRETE. Coordinate anchor installation with concrete base.

3.2 CONNECTIONS

- A. Verify condensate drainage requirements.
- B. Install condensate drain, minimum connection size, with trap and indirect connection to nearest floor drain.
- C. Install piping adjacent to units to allow service and maintenance.
- D. Ground equipment and install power wiring, switches, and controls for self contained systems.
- E. Install ducts to the units with flexible duct connections.

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.

3.7 INSTRUCTIONS

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

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