

## SECTION 15787

### DUCTLESS AIR CONDITIONING UNITS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Ductless Air Conditioning Units.
- B. Ductless Heat Pumps.
- C. Controls and Control Panels.

##### 1.02 REFERENCES

- A. ANSI/ASME - Boilers and Pressure Vessels Code.
- B. ANSI/NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- C. ANSI/NFPA 90A - Installation of Air Conditioning and Ventilation Systems.
- D. UL - Underwriters' Laboratories.
- E. NFPA 70 - National Electric Code.

##### 1.03 REGULATORY REQUIREMENTS

- A. Conform to ANSI/NFPA 90A for the installation of Computer Room air conditioning units.

##### 1.04 SUBMITTALS

- A. Submit Shop Drawings and product data under provisions of Section 01300.
- B. Submit product data for manufactured products and assemblies required for this project.
- C. Indicate water, drain, electrical and refrigeration rough-in connections on Shop Drawings or product data.
- D. Submit manufacturer's installation instructions under provisions of Section 01300.

##### 1.05 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Section 01700.
- B. Include manufacturer's descriptive literature, operating instructions, installation instructions and maintenance and repair data.

#### PART 2 PRODUCTS

##### 2.01 DUCTLESS AIR CONDITIONING UNITS

- A. Manufacturers:
  - 1. Mitsubishi model PK.
  - 2. Sanyo.

B. General

1. The system to consist of a compact wall-mounted packaged evaporator section and matching air-cooled outdoor unit.
2. The units shall be listed by Electrical Testing Laboratories (ETL) and bear the ETL label.
3. Wiring shall be in accordance with the National Electrical Code (N.E.C.).
4. The units shall be rated in accordance with ARI Standard 210 and bear the ARI label.
5. A full charge of R-22 for refrigerant tubing shall be provided in the condensing unit. Tubing length shall be provided as required (coordinate with Drawings). A holding charge shall be provided in the evaporator.
6. Unit shall be U.L. approved and shall bear a U.L. label.

C. Warranty

1. The units shall have a manufacturer's warranty for a period of one (1) year from date of substantial completion.
2. The compressor shall have a warranty of six (6) years from date of substantial completion.
3. If, during the warranty period, any part should fail to function properly due to defects in workmanship or material, it shall be replaced or repaired.

D. Indoor unit

1. The indoor unit shall be completely factory assembled and wired.
2. The casing shall have a white finish.
3. The evaporator fan shall be a high performance, forward curve line flow fan direct driven by a single motor. The fan shall be statically and dynamically balanced and run on permanently lubricated bearings. The fan shall consist of two (2) speeds, high and low.
4. An adjustable change vane shall be provided with the ability to direct the air flow from horizontal to vertical. An adjustable guide vane shall be provided to manually change the air direction from left to right.
5. The evaporator coil shall be of nonferrous construction with smooth plate fins bonded to copper tubing. The tubing shall have inner grooves for high efficiency heat exchange. Tube joints shall be brazed with phoscopper or silver alloy. The coils shall be pressure tested at the factory.
6. A condensate pan with drain shall be provided under the coil.
7. A condensate pump shall be provided. The condensate pump shall fit within the evaporator housing and shall be completely concealed. The pump shall be supplied by the air conditioning unit manufacturer and shall be field installed in accordance with manufacturer's recommendations.
8. The unit shall be powered from the outdoor unit.
9. The unit shall include washable filters.
10. The Indoor Unit electrical power shall be 115 volts, 1 phase, 60 Hz.

E. System control

1. The control system shall consist of two (2) microprocessors interconnected by a multi-wire cable. One microprocessor shall be factory wired and located within the indoor unit. It shall have the capability of sensing room temperature and indoor coil temperature; receive and process commands from the remote controller; and control the outdoor unit.
2. The microprocessor within the wall-mounted remote monitor and controller shall display setpoint and room temperature; provide two (2) manually selected modes of cooling, normal and economy operation at 2° above setpoint; provide continuous or automatic start/stop of system operation; night setback operation of 4° above setpoint; and manual or automatic fan speed control. Automatic fan speed control shall be based upon the temperature difference between setpoint and room temperature maintaining lowest speed possible.

F. Outdoor unit

1. The outdoor unit shall be completely factory assembled, piped, wired, and shall carry a complete refrigerant charge.
2. The casing shall be fabricated of galvanized steel, bonderized and finished with baked enamel.

3. The unit shall be furnished with a direct drive, propeller type fan arranged for horizontal discharge.
4. The motor shall have inherent protection, be of the permanently lubricated type and resiliently mounted for quiet operation.
5. The fan shall be provided with a raised wire guard to prevent contact with moving parts.
6. The compressor shall be of the high-performance serviceable rotary type with crankcase heater, accumulator and internal thermal overloads. The compressor shall be internally isolated with rubber mounts so as to avoid the transmission of vibration.
7. The refrigeration system shall have the capability to operate with a maximum height difference of 130 feet and overall refrigerant tubing length of 130 feet between indoor and outdoor sections without the need for line size changes, traps, or additional oil. Refrigerant flow from the condenser to be controlled by means of a capillary tube.
8. The condenser coil shall be of nonferrous construction with smooth plate fins bonded to copper tubing. The tubing shall have inner grooves for high efficiency heat exchange. The coil shall be protected with an integral metal guard.
9. The unit shall be controlled by the microprocessor located in the matching indoor unit. The outdoor unit electrical power shall be 208 volts, 1 phase, 60 hertz.
10. The unit shall be capable of low ambient operation, with outside air temperature as low as 0°F with no reduction in capacity and -20 °F with a slight reduction in capacity.

G. Refrigerant piping:

1. Unit shall be provided with pre-charged and pre-insulated line sets as recommended by the manufacturer.

## 2.02 DUCTLESS HEAT PUMPS

A. Manufacturers:

1. Mitsubishi Model MSH-3
2. Sanyo.

B. General:

1. The system shall consist of a slim silhouette, compact wall-mounted evaporator section with electric booster head and wireless controller. And matching air-cooled horizontal discharge, single phase outdoor unit.
2. The units shall be listed by Electrical Laboratories (ETL) and bear the ETL label.
3. All wiring shall be in accordance with the National Electric Code (N.E.C).
4. The units shall be rated in accordance with ARI Standard 210 and bear the ARI label.
5. A full charge of R-22 for 25 feet of refrigerant tubing shall be provided in the condensing unit.
6. A dry air holding charge shall be provided in the evaporator.
7. Unit shall be stored and handled according to the manufacturer's recommendation.

C. Warranty:

1. The units shall have a manufacturer's warranty for a period of one (1) year from date of installation. The compressor shall have a warranty of six (6) years from date of installation. If, during this period, any part should fail to function properly due to defects in workmanship or material, it shall be replaced or repaired.

D. Indoor Unit:

1. The indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, control circuit board and fan motor. The unit shall have a self-diagnostic function 3-minute time delay mechanism, an auto restart function, an emergency operation function and a test run switch. Indoor unit and refrigerant pipes will be charged with dry air instead of R22 before shipment from the factory.
2. Unit Cabinet:
  - a. The casing shall have a white finish.
  - b. Multi-directional drain and refrigerant piping offering four (4) directions for refrigerant piping and two (2) directions for draining shall be standard.

- c. There shall be a separate back plate which secures the unit firmly to the wall.
  - 3. Fan:
    - a. The evaporator fan shall be an assembly with a line-flow fan direct driven by a single motor.
    - b. The fan shall be statically and dynamically balanced and run on a motor with permanently lubricated bearings.
    - c. A manual adjustable guide vane shall be provided with the ability to change the airflow from side to side (left to right).
    - d. A motorized air sweep flow louver shall provide an automatic change in airflow by directing the air up and down to provide for uniform air distribution.
    - e. The indoor fan shall consist of three speeds, high, medium and low.
  - 4. Filter:
    - a. Return air shall be filtered by means of an easily removable washable filter.
  - 5. Coil:
    - a. The evaporator coil shall be of nonferrous construction with smooth plate fins on copper tubing.
    - b. The tubing shall have inner grooves for high-efficiency heat exchange.
    - c. All tube joints shall be brazed with phosphor copper or silver alloy.
    - d. The coils shall be pressure tested at the factory.
    - e. A condensate pan and drain shall be provided under the coil.
  - 6. Electrical:
    - a. The unit electrical power shall be 115 volts, 1 phase, 60 Hz.
    - b. The system shall be capable of satisfactory operation within voltage limits of 103 volts to 127 volts.
  - 7. Control:
    - a. This unit shall have a wireless controller to perform input functions necessary to operate the system.
    - b. The controller shall consist of a Power On/Off switch, mode selector, temperature setting, timer control, fan speed select and auto vane selector.
    - c. The indoor unit shall have self-diagnostic function, test run switching and check mode switching.
    - d. Temperature changes shall be by 2°F increments with a range of 65-87°F.
    - e. The microprocessor located in the indoor unit shall have the capability of sensing return air temperature and indoor coil temperature, receiving and processing commands from the wireless controller, providing emergency operation and controlling the outdoor unit.
    - f. The control voltage between the indoor unit and the outdoor unit shall be 12 volts, DC.
    - g. The system shall be capable of automatic restart when power is restored after power interruption.
    - h. Control system shall control the continued operation of the air sweep louvers, as well as provide on/off and system/mode function switching.
- E. Outdoor Unit:
- 1. The outdoor unit is designed specifically for use with indoor units. These units are equipped with a circuit board that interfaces to the MSH indoor unit and perform all functions necessary for operation. The unit must have a powder coated finish. The outdoor unit shall be completely factory assembled, piped and wired. Each unit must be run tested at the factory.
  - 2. Unit Cabinet:
    - a. The casing shall be fabricated of galvanized steel, bonderized and finished with a powder coated baked enamel.
  - 3. Fan:
    - a. The unit shall be furnished with a direct drive propeller type fan.
    - b. The motor shall have inherent protection, and have permanently lubricated bearings.
    - c. The fan motor shall be mounted for quiet operation.
    - d. The fan shall be provided with a raised guard to prevent contact with moving parts.
    - e. The outdoor unit shall have a horizontal discharge airflow.
  - 4. Coil:
    - a. The condenser coil shall be of non-ferrous construction with lanced or corrugated plate

- fins on copper tubing.
- b. The coil shall be protected with an integral metal guard.
- c. Refrigerant flow from the condenser shall be controlled by means of a metering orifice.
- 5. Compressor:
  - a. The compressor shall be of a high performance hermetic inverter driven rotary type.
  - b. The outdoor unit shall have an accumulator.
  - c. The compressor will be equipped with an internal thermal overload.
  - d. The outdoor unit must have the ability to operate with a maximum height difference of 25 feet and have refrigerant tubing length of 49 feet between indoor and outdoor units without the need for line size changes, traps or additional oil.
  - e. The compressor shall be mounted to avoid the transmission of vibration.
- 6. Electrical:
  - a. The unit electrical power shall be 208/230 volts, 1 phase, 60 hertz.
  - b. The unit shall be capable of satisfactory operation within voltage limits of 103 volts to 127 volts.
  - c. The outdoor unit shall be controlled by the microprocessor located in the indoor unit.
  - d. The control voltage between the indoor unit and the outdoor unit shall be 12 volts, DC.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify that system is located per Drawings.
- B. Verify that proper power supply is available.

#### 3.02 INSTALLATION

- A. Install units and refrigerant piping in accordance with manufacturer's instructions.
- B. The air-cooled condensing unit shall be mounted 24" above the Roof.
- C. Install condensing unit so that fan blows in the same direction as the prevailing winds.

END OF SECTION