# GENERAL

## section includes

### Section includes split-system air-conditioning and heat-pump units consisting of separate evaporator-fan and compressor-condenser components.

## Related Sections

### Section 23 05 13 – Electrical Requirements for Mechanical Equipment.

### Section 23 23 00 – Refrigerant Piping and Specialties.

### Section 23 09 93 – Sequence of Operation.

### Section 23 05 93 – Testing, Adjusting and Balancing.

## REFERENCES

### ARI 210 - Unitary Air-Conditioning Equipment.

### ARI 270 - Sound Rating of Outdoor Unitary Equipment.

### ASHRAE 15 - Safety Code for Mechanical Refrigeration.

### IECC and ASHRAE 90.1 - Energy Conservation in new Building Design.

## SUBMITTALS

### See Section 23 05 00.

### Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

## OPERATION AND MAINTENANCE DATA

### See Section 23 05 00.

## QUALITY ASSURANCE

### Unit shall be rated in accordance with the latest edition of ARI Standard 210.

### Unit shall be certified for capacity and efficiency, and listed in the latest ARI directory.

### Unit construction shall comply with latest edition of ANSI/ ASHRAE and with NEC.

### Unit shall be constructed in accordance with UL standards and will carry the UL label of approval.

### Air--cooled heat pump and cooling coil condenser coils will be leak tested at 150 psig and pressure tested at 450 psig.

## DELIVERY, STORAGE, AND HANDLING

### See Section 23 05 00.

### Unit shall be stored and handled according to the manufacturer’s recommendations.

## WARRANTY

### The units shall have a manufacturer’s parts and defects warranty for a period five (5) year from date of installation. The compressor shall have a warranty of seven (7) years from date of installation.

# PRODUCTS

## DUCTLESS SPLIT SYSTEM

### Indoor, wall-mounted, direct-expansion fan coil shall be matched with the commercial condensing units.

### Manufacturer: Subject to compliance with all specified requirements, provide air ductless split system units by one of the following manufacturers:

#### Mistubishi

### Indoor, direct-expansion, wall-mounted fan coil. Unit shall be complete with cooling coil, fan, fan motor, piping connectors, electrical controls, microprocessor control system, and integral temperature sensing. Unit shall be furnished with integral wall-mounting bracket and mounting hardware, and thermistor interconnection cable.

#### Unit Cabinet: Cabinet discharge and inlet grilles shall be attractively styled, high-impact polystyrene. Cabinet shall be fully insulated for improved thermal and acoustic performance.

#### Fans: Fan shall be tangential direct-drive blower type with air intake at the upper front face of the unit and discharge at the bottom front. Automatic, motor-driven vertical air sweep shall be provided standard Air sweep operation shall be user selectable. Horizontal direction may be manually adjusted (using remote controller) and vertical air sweep may be manually set.

#### Coil: Coil shall be copper tube with aluminum fins and galvanized steel tube sheets. Fins shall be bonded to the tubes by mechanical expansion. A drip pan under the coil shall have a drain connection for hose attachment to remove condensate. Condensate pan shall have internal trap and auxiliary drip pan under coil header.

#### Motors: Motors shall be open drip-proof, permanently lubricated ball bearing with inherent overload protection.

#### Controls: Controls shall consist of a microprocessor-based control system which shall control space temperature, determine optimum fan speed, and run self-diagnostics. The temperature control range shall be from 64 F to 84 F. The unit shall have the following functions as a minimum.

##### An automatic restart after power failure at the same operating conditions as at failure.

##### Temperature-sensing controls shall sense return-air temperature. Indoor-air high discharge temperature shutdown shall be provided.

##### Indoor coil freeze protection.

##### Wired controller to enter set points and operating conditions.

##### Fan only operation shall provide room air circulation when no cooling is required.

##### Diagnostics shall provide continuous checks of unit operation and warn of possible

##### malfunctions. Error messages shall be displayed at the unit and at the remote

##### controller.

##### Fan speed control shall be user-selectable: high, medium, low, or microprocessor

##### automatic operation during all operating modes.

##### A time delay shall prevent compressor restart.

##### Automatic heating-to cooling changeover to provide automatic heating and cooling operation. Control shall include deadband to prevent rapid mode cycling.

##### Demand defrost shall be provided and shall minimize defrost cycles by internally adjusting defrost timing based on frost accumulation.

##### Indoor coil high temperature protection shall be provided to detect excessive indoor discharge temperature when unit is in heat pump mode.

#### Provide hardwired thermostat with LCD display and push button controls with unit. Remote, battery powered thermostat is not acceptable.

#### Filters: Unit shall have filter track with factory-supplied cleanable filters.

#### Electrical Requirements: Refer to the schedule for electrical requirements. Power and control connections shall have terminal block connections.

#### Operating Characteristics: Refer to schedule for performance requirements.

### Condensing Units

#### Outdoor-mounted, air-cooled split system outdoor section suitable for rooftop installation.

#### Unit shall consist of a hermetic or rotary compressor, an air-cooled coil, propeller-type blow-thru outdoor fans, accumulator, full refrigerant charge, and control box. Unit shall discharge air horizontally as shown on the contract drawings. Units shall function as the outdoor component of an air-to air cooling system.

#### Units shall be used in a refrigeration circuit matched to a duct-free cooling fan coil unit.

#### Air-cooled condenser coils shall be leak tested for R-410A operating pressures with the coil submerged in water.

#### Factory assembled, single piece, air-cooled outdoor unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, compressor, full charge of R-410A refrigerant, and special features required prior to field start-up.

#### Unit Cabinet: Unit cabinet shall be constructed of galvanized steel, bonderized and coated with a baked-enamel finish.

#### Unit access panels shall be removable with minimal screws and shall provide full access to the compressor, fan, and control components.

#### Outdoor compartment shall be isolated and have an acoustic lining to assure quiet operation.

#### Fans: Outdoor fans shall be direct-drive propeller type, and shall discharge air horizontally. Fans shall blow air through the outdoor coil.

#### Outdoor fan motors shall be totally enclosed; single-phase motors with class B insulation and permanently lubricated sleeve bearings. Motor shall be protected by internal thermal overload protection.

#### Shaft shall have inherent corrosion resistance.

#### Fan blades shall be corrosion resistant and shall be statically and dynamically balanced.

#### Outdoor fan openings shall be equipped with PVC coated protection grille over fan and coil.

#### Compressor: Compressor shall be fully hermetic reciprocation or scroll type.

#### Compressor shall be equipped with oil system, operating oil charge, and motor. Internal overloads shall protect the compressor from overtemperature and overcurrent. Scroll compressors shall also have high discharge gas temperature protection if required.

#### Motor shall be NEMA rated class F, suitable for operation in a refrigerant atmosphere.

#### Reciprocating compressors shall be equipped with crankcase heaters to minimize liquid refrigerant accumulation in compressor during shutdown and to prevent refrigerant dilution of oil.

#### Compressor assembly shall be installed on rubber vibration isolators and shall have internal spring isolation. Compressors shall be single-phase or 3-phase as specified on the contract drawings.

#### Outdoor Coil: Coil shall be constructed of aluminum fins mechanically bonded to internally enhanced, seamless copper tubes, which are cleaned, dehydrated, and sealed.

#### Refrigeration Components: Refrigerant circuit components shall include brass external liquid line service valve with service gage port connections, suction line service valve with service gage connection port, service gage port connections on compressor suction and discharge lines with Schrader type fittings with brass caps, accumulator, pressure relief, and a full charge of refrigerant.

#### Controls and Safeties: Operating controls and safeties shall be factory selected, assembled, and tested. The minimum control shall include the following:

##### Time delay restart to prevent compressor reverse rotation on single-phase scroll compressors.

##### Automatic restart on power failure.

##### Safety lockout if any outdoor unit safety is open.

##### A time delay control sequence provided through the fan coil board, thermostat, or

##### controller.

##### High-pressure and liquid line low-pressure switches.

##### Liquid line low-pressure switches.

##### Automatic outdoor-fan motor protection.

#### Start capacitor and relay (single-phase units without scroll compressors).

#### The minimum safeties shall include the following:

##### System diagnostics.

##### Compressor motor current and temperature overload protection.

##### High-pressure relief.

##### Outdoor fan failure protection.

#### Electrical Requirements: Refer to schedule for electrical requirements. Unit electrical power shall be a single point connection. All power and control wiring must be installed per NEC and all local building codes. High and low voltage terminal block connections.

#### Special Features:

##### Low-Ambient Kit: Control shall regulate fan-motor cycles in Reponses to saturated

##### condensing, pressure of the unit. The control shall be capable of maintaining a condensing temperature of 100 F ± 10 F with outdoor temperatures to –20 F.

##### Installation of kit shall not require changing the outdoor-fan motor.

##### Winter Start Control: Field supplied and installed winter start control shall permit

##### start-up for cooling operation under low-load conditions and at low-ambient

##### temperatures by bypassing the low-pressure switch for a 3-minute delay period.

##### Crankcase Heater (units with scroll compressors only):

##### Unit shall be shipped with a clamp-on compressor oil sump heater.

##### Hard Start Kit: Field installed accessory start capacitor and start relay shall give a hard boost to compressor motor at each start.

# EXECUTION

## EXAMINATION

### Verify that required utilities are available, in proper location, and ready for use.

### Beginning of installation means installer accepts existing surfaces.

## INSTALLATION

### Install in accordance with manufacturer's instructions.

### Protect units with protective covers during balance of construction.

### Complete structural, mechanical, and electrical connections in accordance with manufacturer's installation instructions.

### Provide for connection to electrical service. Refer to Section 262726.

### Provide connection to refrigeration piping system and evaporators. Refer to Section 232300. Comply with ASHRAE 15.

### Furnish charge of refrigerant and oil.

## CLEANING

### After construction is completed, including painting, clean exposed surfaces of units. Vacuum clean coils and inside of cabinets.

### Touch-up marred or scratched surfaces of factory-finished cabinets, using finish materials furnished by manufacturer.

### Install new filters.

## DEMONSTRATION AND INSTRUCTIONS

### See Section 23 05 00 demonstrating installed work.

### Supply initial charge of refrigerant and oil for each refrigeration system. Replace losses of oil or refrigerant prior to end of correction period.

### Charge system with refrigerant and test entire system for leaks after completion of installation.

### Repair leaks, put system into operation, and test equipment performance.

## END OF SECTION 23 81 26