

SECTION 23 81 26
SPLIT-SYSTEM HEAT PUMPS

PART 1 - GENERAL

1.1 STIPULATIONS

- A. The specifications sections "General Conditions to the Construction Contract", "Special Conditions" and "Division 01 - General Requirements" form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

1.2 ADDITIONAL RELATED DOCUMENTS

- A. Division 23 Section "Refrigerant Piping" for additional requirements related to refrigerant piping.
 - 1. If any content of the "Refrigerant Piping" section conflicts with the specific requirements or recommendations of the split system manufacturer, those manufacturer's recommendations and requirements shall take precedence.
- B. Division 23 Section "Hangers and Supports for HVAC Piping and Equipment" for hangers and supports for equipment and piping.

1.3 SUMMARY

- A. This Section includes split-system heat pump units consisting of separate evaporator-fan and compressor-condenser components.
 - 1. Indoor units are designed for exposed or concealed mounting, and may be connected to ducts, or may be ductless, as indicated.
 - 2. More than one indoor unit shall be connected to and served by a single outdoor unit where shown on the Drawings.
 - 3. All indoor units matched to a common outdoor unit shall operate in a common mode, either cooling or heating.
- B. The refrigerant piping system shall be designed by a manufacturer's certified designer for the Contractor. The cost of this work shall be included in the Contractor's bid price.
- C. The Contractor is hereby advised of the fact that refrigerant piping design (sizes (if noted), quantities, etc.) indicated on Drawings is for illustrating general coordination and required routing purposes only.
 - 1. It is the Contractor's responsibility to provide a complete and functional system and to perform final pipe sizing and design the actual piping layout, including double risers, traps, and other specialties recommended or required by the equipment manufacturer or indicated in this specification or shown on the Drawings.
 - 2. This final design verification shall be performed by the Contractor as a part of the process of generating shop drawings, taking into consideration, as a minimum, the actual equipment provided, the verified elevation difference between the outdoor unit and indoor units, and the total equivalent length of piping represented on the shop drawings to ensure proper operation and compliance with warranties of connected equipment.

3. The submitted cooling and heating capacities of the indoor and outdoor units shall be corrected for the final design layout / line lengths.

1.4 ACTION SUBMITTALS

- A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.
 1. Rated capacities shall be for the complete, integrated system proposed, including the submitted evaporator coil and condensing unit.
 2. The type and mass of each system's refrigerant charge, and the ARHI gross rated cooling capacity of each system. Provide the information in tabular form.
- B. Shop Drawings:
 1. Diagram power, signal, and control wiring.
 2. Refrigerant piping diagrams and plans detailing sizes, fittings, valves and other pipeline appurtenances, and methods of support. Include a letter from the manufacturer that the work depicted on the piping shop drawings for this project meets all of the manufacturer's requirements and recommendations.
 - a. Equipment connection details: Show interface and spatial relationships between piping and equipment.
 - b. The Contractor shall submit a letter from the manufacturer of the equipment attesting that the shop drawing refrigerant piping layout, piping appurtenances, piping sizes, etc. are in accordance with the manufacturers' recommendations and requirements.
 - c. Include calculations showing that system travel distance for refrigerant piping and controls cabling are within horizontal and vertical travel distances set by manufacturer. Provide a comparison table for each system installed.

1.5 INFORMATIONAL SUBMITTALS

- A. Delegated-Design Submittal: For equipment supports indicated to comply with performance and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 1. Include design calculations for selecting vibration isolators and wind restraints.
 2. Wind-Restraint Details: Detail fabrication and attachment of wind restraints and snubbers. Show anchorage details and indicate quantity, diameter, and depth of penetration of anchors.
- B. Field quality-control test reports.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.
- B. Warranty: Special warranty specified in this Section.

1.7 QUALITY ASSURANCE

- A. The Installing Contractor shall be designated by the equipment manufacturer as a Certified Installer and shall also be certified to perform startup by the manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Minimum Energy Efficiency: Comply with ASHRAE/IESNA 90.1-2016 , "Energy Standard for Buildings except Low-Rise Residential Buildings."
- D. The system shall be rated for thermal performance and efficiency per applicable ARHI Standards.
- E. Air conditioning condensate drain pans and the inside of indoor unit surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
- F. Single Source Responsibility: A single manufacturer shall be responsible for the integrated performance of the air conditioning unit / evaporator coil and associated refrigerant condensing unit / condenser or dry cooler. The components shall be factory engineered and integrated as a single, functional system to meet the scheduled and specified performance. The field-pairing of system components provided by or through more than one manufacturer is not acceptable.

1.8 COORDINATION

- A. Coordinate size and location of concrete bases for outdoor grade mounted units. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork are specified in Division 23 Section "Common Work results for HVAC."
- B. Refer to Division 23 Section "Refrigerant Piping" for refrigerant piping materials, joining methods, and accessories.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units which fail in materials or workmanship within specified warranty period.

- 1. Warranty Period: Five (5) years from date of Substantial Completion.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in a clean and dry place.
- B. Comply with manufacturer's written rigging and installation instructions for unloading and moving to final installed location.
- C. Handle products carefully to prevent damage, breaking, denting, and scoring. Do not install damaged products.

- D. Protect products from weather, dirt, dust, water, construction debris, and physical damage.
 - 1. Retain factory-applied coverings on equipment to protect finishes during construction and remove just prior to operating unit.
 - 2. Cover unit openings before installation to prevent dirt and dust from entering inside of units. If required to remove coverings during unit installation, reapply coverings over openings after unit installation and remove just prior to operating unit.
- E. Replace installed products damaged during construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Mitsubishi
 - 2. Trane - Basis of Design
 - 3. Daikin
 - 4. Samsung
 - 5. Carrier
 - 6. LG
 - 7. Or equal as approved by the Professional.

2.2 WALL-MOUNTED DUCTLESS INDOOR UNITS

- A. General: The indoor unit shall be factory assembled, wired and run tested. The unit shall be designed for wall mounting using a separate back plate. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, refrigerant air coil, control circuit board, and fan motor. The unit shall have a supply outlet with adjustable directional louvers. The casing shall have a white finish.
 - 1. Drain Pans: Stainless steel or thermoplastic, with connection for drain and insulated. A drain pan overflow switch shall provide protection against drain pan overflow by sensing a high condensate level in the drain pan.
- B. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.
- C. Fan: Direct drive, centrifugal fan. Motor shall be multispeed with internal thermal protection and permanent lubrication.
- D. Condensate Pump: Provide a condensate pump for each unit as specified in the Article "Condensate Pumps" below in this Section.
- E. Filters: Permanent, cleanable.
- F. Electrical: Integral NEMA 1 enclosure for wiring terminations.

2.3 CONDENSATE PUMPS

- A. Indoor Units Up to 1 Ton Nominal Total Cooling Capacity: As specified immediately below for units from 1.25 to 3.5 tons capacity, but the pump shall be capable of no less than 6 feet of suction lift, and shall be rated for no less than 0.5 GPH (gallons per hour) at a suction lift of 6 feet and a discharge head of 12 feet. Pumps with integrated water detection and lacking separate suction reservoirs are also acceptable.
 - 1. Acceptable Products: Blue Diamond Pumps 'MicroBlue with reservoir', Sauermann 'Si10', 'Si20', or 'Si30', Aspen Pumps Group 'Mini Aqua' or 'Mini Orange', or approved equal.
- B. Indoor Units From 1.25 to 3.5 Tons Nominal Total Cooling Capacity: Consisting of a reservoir connected to the indoor unit condensate drain connection and a pump that can be remote mounted from the indoor unit.
 - 1. Reservoir: Condensate collection chamber with connections for tubing. Mounted inside indoor unit, incorporating an operating level sensing device and control contacts for pump operating control and high limit alarm levels.
 - 2. Pump: Positive displacement, self-priming type, suitable for water up to 104 deg. F. Capable of no less than 6 feet of suction lift. Rated for no less than 1.5 GPH (gallons per hour) at a suction lift of 6 feet and a discharge head of 20 feet. On-off control of the pump shall be from the operating level switch in the reservoir.
 - a. Mounting: Select pump to suit installation conditions and requirements. For ceiling and wall mounted units, locate pump in the ceiling space above the unit. For wall mounted units in spaces with no finished ceiling, mount the pump inside the unit or next to the unit.
 - b. Acceptable Products: Blue Diamond Pumps Inc. 'MaxiBlue with reservoir', Sauermann 'Si20' or 'Si30', or Aspen Pumps Group 'Mini Aqua' or 'Mini Orange', or approved equal.
- C. High Capacity Pump for Indoor Units From 4 to 6 Tons Nominal Total Cooling Capacity: As specified immediately above for units from 1.25 to 3.5 tons capacity, but the pump shall be capable of no less than 13 feet of suction lift, and shall be rated for no less than 3.0 GPH (gallons per hour) at a suction lift of 6 feet and a discharge head of 20 feet.
 - 1. Acceptable Product: Sauermann 'Si33', Blue Diamond 'MegaBlue with reservoir', or approved equal.
- D. Electrical: Pumps shall be powered from the respective indoor unit's low voltage terminal strip. Wire as required by the indoor unit manufacturer.
- E. High Water Shut Down Control: Wired to unit controls to shut down indoor unit in cooling mode upon reaching a high condensate level.

2.4 REFRIGERANT PIPING SPECIALTY FITTING INSULATION KITS

- A. Provide pre-formed insulation kits for insulating refrigerant piping system specialty fittings (e.g. Y-fittings) used in the piping system.

2.5 OUTDOOR AIR-SOURCE, COMPRESSOR-CONDENSER COMPONENTS

- A. Casing: Steel, finished with baked enamel in the manufacturer's standard color, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing for connecting refrigerant piping to the number of indoor units indicated on the Drawings associated with each exterior unit.
- B. Wind Resistance: The units shall be factory-engineered and tested to resist wind loads in accordance with the 2018 International Building Code and ASCE Standard 7, as per the project location, Exposure Category B, and a Building Risk Category of III, without the use of supplemental straps or hold downs.
 - 1. Units shall resist the greater of the following:
 - a. 3-Second Gust Design Wind Speed per ASCE Std. 7-2016.
 - b. 16 lb./sq. ft. multiplied by maximum area of equipment projected on vertical plane normal to wind direction, and 45 degrees either side of normal.
 - 2. Units that have been approved for use in Miami-Dade County, with a current NOA number, having successfully passed TAS 202 (Uniform Static Air Pressure Test), are also acceptable for meeting the wind resistance provisions above.
 - 3. Alternative Compliance: Equipment that cannot meet the above wind resistance requirements may be acceptable if supplemental reinforcement is field-provided / field-applied to the equipment by the installing Contractor as alternative method of compliance with the specification, however such reinforcement shall meet with the approval of the Architect / Engineer, the delegated design engineer, and the equipment manufacturer. Refer to Division 23 Section, Hangers and "Supports for HVAC Piping and Equipment" for wind restraint delegated design requirements.
- C. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
 - 1. Compressor Type: Inverter-driven scroll.
 - 2. Manual-reset high-pressure switch and automatic-reset low-pressure switch.
 - 3. Refrigerant: R-410A
- D. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with liquid subcooler.
 - 1. All-aluminum microchannel type coils consisting of a series of flat tubes containing a series of multiple, parallel-flow microchannels layered between refrigerant header manifolds are also acceptable.
- E. Fan: Aluminum or molded plastic propeller type, directly connected to motor.
 - 1. Head pressure control to modulate condenser fan motor speed for low ambient conditions.
 - 2. Raised guard to prevent contact with moving parts.
- F. Motor: Permanently lubricated, with integral thermal-overload protection.

- G. Snow and Ice Protection: Provide the following accessories for heat pump units:
1. Snow and Hail Guards: The coil air intake shall be protected with a snow and hail guard. The top of the unit shall be protected by a snow and hail hood. The hood and guards shall be manufactured from min. 20 gauge galvanized steel provided with a factory finish matching the rest of the unit.
 2. Base Pan Heaters: Electric base pan heaters shall be provided to prevent ice build-up in the bottom of the unit during operation in heating mode in cold weather. The installation shall be complete with a relay box, the heating element(s), mounting brackets, automatic controls, and all other associated items required for installation.
 - a. An automatically controlled hot gas circuit located at the bottom of the condenser coil may be provided in lieu of the electric base pane heater.
- H. Low Ambient Cooling Kit: Permits 100% of rated cooling capacity operation down to zero (0) deg. F. Include condensing unit wind baffles and all other required controls and accessories.
- I. Heat Pump Components: Reversing valve and low-temperature air cut-off thermostat.
- J. Minimum Ambient for Proper Function in Heating Mode: 5 deg. F.
- K. Cooling Mode Outdoor Ambient Temperature Tolerance Range: Construct the units to tolerate operation in an outdoor air temperature as high as 110 deg. F. Provide a high ambient package as required to accommodate this range. De-rating below the scheduled capacity and efficiency is acceptable at the high ambient temperature.
1. The outdoor ambient temperature for rating the unit capacity and efficiency shall be as scheduled on the Drawings or 95 deg. F., whichever is greater.

2.6 CONTROLS AND ACCESSORIES

- A. Room Controller / Thermostat: Wall-mounted and hard wired to the indoor unit with a user interface, to control the system, including compressor(s) and evaporator fan(s). The local zone controller shall be a Mitsubishi 'Simple MA' or approved equal. Controls shall incorporate the following additional features:
1. Liquid-crystal display indicating temperature, set-point temperature, time setting, operating mode, and fan speed.
 2. Fan-speed selection, including auto setting.
 3. The room thermostats shall be configured so that local adjustment of heating and cooling setpoints is not permitted / possible.
- B. Automatic-reset timer to prevent rapid on-off cycling of compressor.
- C. Provide a hard-start kit to enable proper startup of the compressor in accordance with the manufacturer's recommendations to suit the refrigerant line lengths of each installation of this project and the design outdoor ambient condition scheduled on the drawings or 95 degrees F., whichever is higher.
- D. DDC System Network Interface: Provide a BACnet MS/TP interface gateway for each indoor unit. The gateway shall be powered from the associated indoor unit. Coordinate requirements with the DDC system sub-contractor performing the work of Division 23 Section "Instrumentation and Control for HVAC". The interface shall provide following minimum points of interface to the DDC system for each indoor unit:

1. Read (output points from split system controls input into the DDC system):
 - a. System operating status (on off)
 - b. Heat / Cool status (for heat pumps only)
 - c. Trouble alarm fault code
 - d. Indoor unit fan speed.
 - e. Space / return air temperature.
2. Write (output points from the DDC system input into the split system controls):
 - a. System enable / disable.
 - b. Space heating temperature setpoint (heat pumps only).
 - c. Space cooling temperature setpoint.
 - d. Indoor unit fan speed.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for installation tolerances, other specific conditions, and other conditions affecting performance of split systems. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Examine products before installation. Reject products that are wet, moisture damaged, or mold damaged.
- C. Examine walls, floors, roofs, and outdoor pads for suitable conditions where equipment will be installed.
- D. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PROTECTION

- A. Protect products from moisture and water damage. Remove and replace products that are wet, moisture damaged, or mold damaged.
- B. Protect equipment from physical damage. Replace equipment with physical damage that cannot be repaired to new condition. Observable surface imperfections shall be grounds for removal and replacement.
- C. Protect equipment from electrical damage. Replace equipment suffering electrical damage.
- D. Cover and seal openings of equipment to keep inside of equipment clean. Do not remove covers until finish work is complete.

3.3 INSTALLATION

- A. Install units level and plumb, firmly anchored in locations indicated; maintain manufacturer's recommended clearances.

- B. Install indoor units using manufacturer's standard mounting devices securely fastened to building structure.
- C. Loose Components: Install components, devices, and accessories furnished by manufacturer, with equipment, that are not factory mounted.
- D. In rooms with ceilings, conceal piping and tubing, controls, and electrical power serving units above ceilings.
- E. In rooms without ceiling, arrange piping and tubing, controls, and electrical power serving units to provide a neat and finished appearance.
- F. Adjust supports of exposed and recessed units to draw units tight to adjoining surfaces.
- G. Install ground-mounted outdoor units on a concrete base. Refer to Division 23 Section "Common Work Results for HVAC" for concrete work. Provide supplemental wind restraints.
- H. Labeling: Provide equipment identification and piping labels as specified in Division 23 Section "Identification for HVAC". On indoor units in finished spaces, locate equipment labels on normally concealed surfaces. On outdoor units located at grade, locate equipment labels on the back of the units away from public view.
 - 1. Branch refrigerant piping between outdoor units and indoor units shall be labeled with the number/name of both the associated outdoor unit and the indoor unit.
 - 2. Indoor unit equipment labels shall include to which outdoor unit it is connected.
 - 3. Outdoor unit equipment labels shall include to which indoor unit(s) it is connected.

3.4 MANUFACTURER'S REPRESENTATIVE WALK-THROUGH PRIOR TO PIPING INSTALLATION

- A. Do not install refrigerant piping prior to setting all system equipment in place.
- B. After all indoor and outdoor units are set in place, the manufacturer's representative shall visit the project site to verify the final locations of all equipment and to determine the final lengths of piping between all system components.
- C. The representative shall provide final piping design drawings to the Contractor for piping installation, and this information shall be reflected in the Contractor's Field Verified Shop Drawings.

3.5 CONNECTIONS

- A. Install and connect refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.
- B. Piping connections to units provided with externally applied vibration isolation shall include flexible connectors. Conduit connections shall use flexible watertight conduit.
- C. Install piping adjacent to unit to allow service and maintenance.
- D. Install piping and tubing in concealed locations unless otherwise indicated and except in equipment rooms and service areas. Exception: Do not install piping and conduit in concrete masonry (CMU) walls.

1. Lineset Covering Systems: Provide a complete lineset covering system as specified in Division 23 Section "Refrigerant Piping" to conceal refrigerant piping, and control conduits and AC condensate piping associated with the same refrigeration / cooling equipment, where the refrigerant piping is located in a finished space below a finished ceiling , or is located outside and installed along an exterior finished wall surface.
- E. Install piping and tubing at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- F. Install groups of pipes and tubing parallel to each other, spaced to permit applying insulation with service access between insulated piping and tubing.
- G. Install sleeves for piping and tubing penetrations of walls, ceilings, and floors.
- H. Install escutcheons for piping and tubing penetrations of walls, ceilings, and floors.
- I. Add additional refrigerant and oil as required for the as-installed system.
- J. Provide power and control wiring as per the manufacturer's requirements between each indoor unit and the outdoor unit. Comply with applicable Division 26 requirements.
 1. Provide a disconnect switch at each indoor unit for any power and control wiring that is not low voltage (i.e. not 24V or less).
- K. For systems with multiple indoor units per single outdoor unit, provide isolation ball valves for zoned refrigerant isolation. Valves shall have Schrader type connections for isolating refrigerant charge and evacuation at each connected indoor unit and outdoor unit.
 1. Isolation ball valves, with Schrader connection, are required for instances of indoor unit isolation for troubleshooting, repair, or replacement without affecting the remainder of the system.
 2. Isolation ball valves with Schrader connection are also required at each field connection of piping to outdoor unit modules to isolate unit for troubleshooting, repair or replacement and as required to provide partial capacity heating/cooling in the instance of a failure of one of the multiple outdoor unit compressors.
 3. Ball valves shall be brass bodied full port type and shall be UL listed for refrigerant service. Refer to Division 23 Section "Refrigerant Piping" for additional requirements.
 - a. Valves shall be Henry Technologies USA '937' Series, or approved equal.
 4. Provide manufacturer's custom insulation kit for each valve.
- L. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
 1. Provide refrigerant piping in accordance with Division 23 Section "Refrigerant Piping."
 - a. Exception: Where refrigerant piping runs are 50 feet or less (one way) and no portion of the piping is visible in finished spaces or is located outside, the Contractor may use pre-insulated refrigerant piping line kits that use annealed temper copper tubing manufactured specifically for refrigeration service. All other runs of refrigerant piping shall use hard tempered copper tubing specified in Section 232300, "Refrigerant Piping". Line kits shall comply with the following:

- 1) Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed.
 - 2) Line kits may be used indoors only, unless additional field-applied insulation and jacketing as specified in Division 23 Section "HVAC piping Insulation" is provided.
 - 3) Lines shall be pre-insulated with EPDM-based flexible elastomeric or low density polyethylene insulation, minimum 1-inch thick. Insulation shall be plenum rated per the International Mechanical Code.
- M. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
- N. Install piping adjacent to unit to allow service and maintenance.
- O. Condensate Drain Connections: Provide a condensate drain trap on the indoor unit condensate drain connection. If the unit manufacturer does not recommend a trap, an in-line type check valve shall be provided on the drain line.
- P. Condensate Pumps: All indoor units shall be provided with a condensate pump, unless explicitly indicated otherwise.
- Q. Duct Connections: Duct installation requirements are specified in Division 23 Section "Ductwork." Drawings indicate the general arrangement of ducts. Connect supply and return ducts to ducted indoor units with flexible duct connectors. Flexible duct connectors are specified in Division 23 Section "Duct Accessories."
- R. Electrical Connections: Comply with requirements in Division 26 Sections for power wiring, switches, and motor controls. Ground equipment according to Division 26 provisions.

3.6 CLEANING

- A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Clean units to remove dirt and construction debris and repair damaged finishes.

3.7 FIELD QUALITY CONTROL, COMMISSIONING, AND START UP SERVICE

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
- B. Perform the following field tests and inspections and prepare test reports:
1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 4. The following operational tests, at the minimum, shall be performed and documented:
 - a. Cooling mode - each indoor unit.
 - b. Heating mode - each indoor unit.
 - c. Heating/cooling switch over - each indoor unit

- d. Power loss and automatic restart
- e. Condensate pump operation - each applicable unit.
- f. Verification of vane direction - each applicable indoor unit.
- g. Verification of fan speed - each indoor unit

C. Remove and replace malfunctioning units and retest as specified above.

3.8 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Client Agency's maintenance personnel to adjust, operate, and maintain units. Refer to Division 01.

END OF SECTION