



BR+A
 300 West Summit
 Office Bldg

300 West Summit Ave.
 Suite #310
 Charlotte, NC 28203

PROJECT NUMBER: 19-018
 CONSTRUCTION ISSUE: 6.20.2019

1.02INTENT
 A. It is the intent of this Section of the specifications to provide complete and operable piping systems as shown and specified which are free of leaks, properly vented, free of noise, vibration and sweating, and fabricated so as to fit the space allotted and to exhibit a minimum resistance to fluid flow. It is also the intent of this Section of the specifications to provide a complete piping insulation system which is free of gaps and tears, properly fitted and finished, free of sweating, and fabricated so as to fit the space allotted and to exhibit a negligible heat transfer.
 B. The word "piping" is defined to mean all piping, fittings, joints, hangers, coatings, valves, test and sensor wells and accessories necessary for the refrigerant piping systems described, shown and specified.

1.03GENERAL REQUIREMENTS
 A. Provide all reducing fittings, flanges, couplings and unions of the size and type of material to match the piping to each piece of equipment, valve and accessory.
 B. Union joints, couplings or flanges shall be provided in each pipe line connected to each piece of equipment and elsewhere as indicated and specified. Unions shall match the piping system in which they are installed.
 1. Unions or flanges shall be provided between all copper to steel connections in water-carrying piping. These unions shall be dielectric, insulating type.
 C. All changes in direction and branches shall be made with manufactured fittings.
 D. All pipe joints shall be cut square and all burrs shall be removed.
 E. Fabrication of a bull-head tee connection is strictly prohibited.
 F. Open ends of pipe lines not currently being handled shall be plugged during installation to keep dirt, water and foreign material out of the system.
 G. Horizontal refrigerant and drain piping shall slope down in the direction of flow at a minimum slope of 1/8" per foot of run.
 H. All insulation products installed indoors shall meet NFPA 90A, 90B and 255 requirements for Flame Spread Rating 25 and Smoke Developed Rating 50.

1.04FIRE-STOPS
 A. Where pipes pass through fire partitions, fire walls and floors, install a fire-stop that shall provide an effective barrier against the spread of fire, smoke and gases. Fire-stop material shall be packed tight and completely fill clearances between pipes and openings. Fire-stop material shall conform to the following:
 1. Fire-stopping material shall maintain its dimensions and integrity while preventing the passage of flame, smoke and gases under conditions of installation and use when exposed to the ASTM E119 time-temperature curve for a time period equivalent to the rating of the assembly penetrated. Fire-stopping material shall be noncombustible as defined by ASTM E136; and in addition for insulation materials meet point shall be a minimum of 1700 degrees F. for 1-hour protection and 1850 degrees F. for 2-hour protection. Fire-stopping material shall be Dow-Corning RTV Foam or an approved equal.
 B. The pipe, fittings and joints shall be as outlined below:

SERVICE	MATERIAL TYPE	SIZES
1. Refrigerant Suction and Liquid	1	All
2. Drain*	2	All

*Note: As an option, on cooling coil condensate drains (which are not installed in a plenum) the drain piping may be schedule 40 PVC with solvent joints, subject to advance approval by the local authority. Fittings shall meet ASTM D2466 and solvent shall meet ASTM D2554.

C. The pipe, fittings and joints shall be as outlined below:
 1. Material Type 1:
 a. Pipe - Type I hard drawn copper tubing meeting ASTM B88 or ASTM B280.
 b. Fittings - Wrought copper meeting ANSI B16.22.
 c. Joints - Silver brazed with all-fos or silver solder.
 2. Material Type 2:
 a. Pipe - Copper drainage tube DWV meeting ASTM B306.
 b. Fittings - Wrought copper solder-joint drainage fittings meeting ANSI B16.29.
 c. Joints - Soldered with a solder meeting ASTM B32.

2.01PIPE AND FITTINGS
 A. All pipe and fittings shall be products of a domestic manufacturer.
 B. Pipe and fittings shall be as listed and outlined below:
 1. Material Type 1:
 a. Pipe - Type I hard drawn copper tubing meeting ASTM B88 or ASTM B280.
 b. Fittings - Wrought copper meeting ANSI B16.22.
 c. Joints - Silver brazed with all-fos or silver solder.
 2. Material Type 2:
 a. Pipe - Copper drainage tube DWV meeting ASTM B306.
 b. Fittings - Wrought copper solder-joint drainage fittings meeting ANSI B16.29.
 c. Joints - Soldered with a solder meeting ASTM B32.

2.02 PIPE HANGERS AND SUPPORTS
 A. Pipe hangers, trapeze hangers, upper attachments, rods and other supports shall be selected based on pipe size and material contained therein. Provide all hangers, rods, turnbuckles, angles, channels and other supports to securely support the piping systems from the building structure.
 B. All materials utilized for the hanging and support of the piping systems shall be manufactured products which are specifically intended for the purpose of hanging piping systems. The use of wire, steel straps, plastic ties, etc. is strictly prohibited.
 C. Supports and hangers shall be selected to fit around the pipe (and insulation unless otherwise specified herein) and provide adequate movement for expansion of the piping systems. Anchors shall be provided to restrict and control such movement within offsets and expansion loops.
 D. All hangers and supports shall be selected at a minimum factor of safety of five based on the ultimate tensile strength of the material.
 E. Intermediate pipe supports shall be provided between building structural members so as not to exceed maximum support spacing specified and shall be structural steel angles (minimum 2 1/2" x 2 1/2" x 1/4"). In all construction, intermediate supports shall be securely clamped to steel beams and to steel joists, and in no case shall supports be attached to roof eaves.
 F. For suspending pipes from concrete beams, upper attachments shall be side beam bracket utilizing bolts in steel beams. Do not use the top portion of the beam. Where sleeves are not used, provide expansion loops between power-cable fasteners.
 G. Hanger rods for pipe hangers shall be as follows:
 HANGER ROD SIZE MINIMAL PIPE SIZE
 3/8" 2" and smaller
 1/2" 2 1/2" and larger
 H. Pipe hangers selected for supporting horizontal insulated piping shall be sized to fit around the outside of the pipe insulation.
 I. Provide pipe saddles and shields on all insulated piping as outlined below:
 1. All insulated piping shall be supported on galvanized shields.
 a. Shields shall be as follows:
 1) Pipes 2" and smaller: 18 gauge x 12" long.
 2) Pipes 2 1/2" and larger: 16 gauge x 18" long.
 b. Shields shall be 180 degrees around the lower half of the pipe at all pipe hangers, except that on trapeze hangers, pipe racks and floor supported horizontal pipes, shields shall be 360 degrees around the entire pipe.
 J. Provide riser clamps at all floor penetrations.

2.03 VALVES

A. All valves shall have the manufacturer's name or trademark and the working pressure cast or stamped on the valve body.
 B. All valves shall be designed and constructed for refrigerant service.

2.04 PIPING INSULATION
 A. Closed-cell insulation shall be provided over all refrigerant suction piping and other services as specified or noted. Closed-cell piping insulation shall be 1/2" thick 25/50 Armaflex or Rubatex. All glues and coatings shall be products of the same manufacturer as the insulation.
 B. Insulation shall be continuous over all valve bodies, fittings, and wall and floor penetrations.

3.0 EXECUTION
3.01ARRANGEMENT
 A. Piping shall follow the general layout, arrangement, schematics, and details. Provide all offsets, vents, drains, charging ports and connections necessary to accomplish the installation. Fabricate piping accurately to measurements established at the project site to avoid interference with ductwork, other piping, equipment, openings, electrical conduits and light fixtures. Make suitable provision for expansion and contraction with expansion loops and offsets.
3.02 MINIMUM HANGER SPACING
 A. Pipe hangers or supports shall be provided within 18" of each horizontal fitting, equipment connection, valve, etc. and at not more than 10 ft. spacings along horizontal runs of straight, copper piping equal to or greater than 1-1/2" diameter, 8 ft. spacing for copper piping equal to or less than 1-1/2" diameter, and 4 ft. spacing for PVC piping in accordance with table 305.4 in the 2009 NCSMC. Follow Ministry guide for maximum vertical spacing of PVC pipe 2 inches and smaller.
 B. Riser clamps shall be provided at each floor penetration.
3.03 UNDERGROUND PIPING
 A. All underground piping shall have a minimum cover of 2'-0".
 B. All underground copper lines shall be protected from corrosion with a continuous plastic sheathing or coating and wrapping. This sheathing or coating and wrapping shall be extended 6" to 12" above finished floor.
3.04 REFRIGERANT PIPING INSTALLATION
 A. All refrigerant piping shall be sized in accordance with the air conditioning equipment manufacturer's written instructions. Provide charging ports, solenoid valves, service valves, driers, etc. at each piece of equipment.
 B. All brazing shall be done while the line is being flushed with carbon dioxide, nitrogen or other inert gases.
 C. The inside of all tubing shall be thoroughly cleaned and internally wiped with a lintless, dry cloth.
 D. Suction lines shall drop below their coils before any horizontal run.
 E. Provide all traps at least every ten feet for extended vertical risers.
 F. All oil traps shall be constructed from close-radius type fittings.
 G. Dryer cups shall be installed to remove horizontally or downward.
 H. Install external equalizer downstream of its expansion valve sensing bulb.
 I. Install expansion sensing valve bulb on top centerline of piping up to 5/8" size, install 45 degrees down from the horizontal centerline on pipe sizes 7/8" and larger.
3.05 CLOSED-CELL PIPING INSULATION INSTALLATION
 A. Insulation shall be provided on all refrigerant suction and indoor condensate drain lines. The insulation shall be installed by the slip-on method; slitting of the insulation is prohibited and shall be cause for rejection. All allows shall be mitered and all such joints and butt joints shall be tightly made and glued.
 B. All insulation installed outdoors shall be coated with a glassy white, ultraviolet protective coating applied in two coats; Armacoat or approved equal.

END OF SECTION

SECTION 23740
 VARIABLE VOLUME AND TEMPERATURE SYSTEM

1.0 GENERAL
1.01 DESCRIPTION
 A. All work specified in this Section is governed by the Mechanical General Section 23710.
 B. This Section 23775 and the accompanying drawings cover the provisions of all labor, equipment, appliances and materials, and performing all operations in connection with the construction of the VVT systems as specified herein and as shown. These systems include, but are not limited to, the following:
 1. Packaged rooftop units
 2. Zone dampers
 3. Direct Digital control (DDC) system
1.02INTENT
 A. It is the intent of this Section of the specifications to provide complete, operable, adjusted variable zone heating and cooling systems as shown and specified which are free of noise, vibration and sweating, and fabricated so as to fit the space allotted and to exhibit a negligible heat transfer.
1.03BASIS OF DESIGN
 A. The basis of design is Trane. Any proposed substitutions shall be proven equal in all aspects to the manufacturer specified above as a basis of design.
2.0 PRODUCTS
2.01PACKAGED ROOFTOP UNIT
 A. Provide one-piece, air-to-air electric cooling. Each unit shall be provided with a full perimeter roof curb. The roof curb shall be of the same manufacturer as the unit, shall support the unit and provide a watertight enclosure to protect ductwork and utility services. Curb design shall comply with National Roofing Contractors Association requirements.
 B. All exterior panels shall be constructed of galvanized steel, bonderized and coated with baked enamel.
 C. Each unit shall contain serviceable hermetic compressors with factory-installed service valves, vibration isolators, crankcase heaters, liquid line sight glasses, filter driers and liquid line service valves.
 D. The indoor air fans shall be of the forward-curved centrifugal, Class I type, belt driven. The outdoor air fans shall be of the propeller type, each directly driven by a 1-hp inherently protected motor.
 E. Cooling systems shall be protected by fusible plug, low and high pressure cut-out switches, compressor overloads and a timing device to prohibit the compressor motor from starting more than once every 5 minutes.
 F. Coils shall be aluminum plate fins mechanically bonded to copper tubes. They shall be of an interwired design for equal circuit loading and to ensure a fully active coil on part-load operation to provide evenly conditioned air.
 G. Provide multiple compressors (minimum of 2) capacity control to permit reduced compressor capacity for units 7 1/2 tons and larger.
 H. Unit heat exchangers shall be drum and tube type with corrosion resistant steel components. Units 7 1/2 tons and larger shall have two stage gas valves.
 I. Each heating system shall include an induced draft combustion air exhaust fan protected by centrifugal switches, heat limit switches, time-delay relay, flame roll-out switches and pilot sensors. Heating controls shall consist of a redundant gas valve, intermittent pilot ignition with electric spark ignition system. Each unit shall be AGA certified.
 J. Provide an economizer which shall provide "free cooling" with outside air without compressor operation. The economizer shall:
 A. Provide low leak dampers rated at 3% maximum leakage at 3 in. W.G. static pressure cast or stamped on the valve body.
 B. Provide spring return motor to close dampers during power failure.
 C. Provide integrated (simultaneous) economizer cooling and mechanical cooling.
 D. Utilize discharge air sensor and enthalpy chgangeover for damper control.
 E. Provide adjustable outdoor air thermostat to lock out mechanical cooling when outdoor air is below its setting.
 F. Direct drive exhaust fan, coupled with the economizer, to exhaust up to 75% of the return air.
 G. Main power wires to unit shall be routed to single point terminal connections with unit mounted disconnect at switch. A single gas connection shall supply both gas valves. All duct and utility connections shall be routed through bottom of unit within the curb perimeter.
 L. A 115-volt convenience outlet shall be sized to handle a small power load or service light.
 M. Controls shall be a stand-alone microprocessor based system providing ability to communicate with the VVT control panel via a twisted wire pair.

END OF SECTION

SECTION 23773
 SPLIT SYSTEMS

1.0 GENERAL
1.01 DESCRIPTION
 A. All work specified in this Section is governed by the HVAC General Section 23010.
1.02INTENT

B. This Section 23773 and the accompanying drawings cover the provision of all labor, equipment, appliances and materials, and performing all operations in connection with the construction and installation of the split systems as specified herein and as shown. This work includes, but is not limited to, the following:
 1. Split system fan coil, heating section and condensing units
 2. Control system (interlocked to all split system components)
 C. Split system units shall be self-contained, automatic, packaged units. These units shall be completely factory assembled as unitary packages complete with operating controls, internal wiring and piping and fully charged with R-410a refrigerant. Only one electrical power connection shall be required for each unit.
 D. Units shall be UL listed and cooling capacities shall be certified in accordance with ARI 210.
1.02INTENT
 A. It is the intent of this Section of the specifications to provide complete, operable, adjusted split systems, as shown and specified, which operate efficiently and automatically, and are free of excessive noise and vibration.
1.03BASIS OF DESIGN
 A. The basis of design is Trane. Any proposed substitutions shall be submitted in accordance with the prior approval requirements.
2.0 PRODUCTS
2.01UNIT CASINGS
 A. Unit casings shall be formed, galvanized steel construction with welded assembly. Galvanized steel surfaces shall be bonderized and painted with baked acrylic enamel for protection. Accessories and components shall match and interlock with all other split system components. Fan coil unit casings shall be fully internally insulated with liner which meets NFPA 25/50 flame spread/smoke developed ratings.
2.02 CONDENSING UNITS
 A. Condensing unit refrigeration systems shall be factory charged and ready for operation. All units with capacities greater than five (5) tons shall be provided with minimum 2-stage (50% and 100%) cooling. Compressor(s) shall be direct drive, 3600 RPM, hermetic reciprocating type with centrifugal oil pump, crankcase heater and internal pressure relief valve. Compressor(s) shall have internal spring isolation and sound muffling and exhibit minimum vibration transmission and noise. Antirecycle timers shall be provided to prevent excessive cycling of compressors thru utilization of a minimum five (5) minute time shutdown of unit on interruption of power or controlled shutdown.
 B. Condensing unit condenser fans shall be direct-driven, propeller blade type. Condensing unit heat rejection shall be vertically upward.
2.03 COILS
 A. Evaporator and condenser coils shall be copper tubing mechanically bonded to heavy duty aluminum fins. Aluminum tubes shall not be acceptable.
2.04 ELECTRIC HEATING SECTIONS
 A. Electric heating sections shall be UL listed and nickel-chromium coil resistance heating elements. Each heater shall be protected by an automatic reset high-limit thermostat and manual reset high-limit thermostat for the primary and secondary overcurrent/thermal protection. Approval of airflow/fan interlock shall also be provided. Controls shall provide for multiple stage start-up and operation.
2.07 CONTROLS AND ACCESSORIES
 A. Operating and safety controls which are internal to each unit shall be provided and shall include, as a minimum, solid state compressor over-temperature protection, electric contactors, thermostatic expansion valve(s), refrigerant drier(s), outdoor fan and compressor cycling thermostats, high and low limit protection against excessive temperatures or pressures.
 B. A 24 volt transformer shall be provided to accommodate an accessory 24 volt indoor thermostat complete with an electronic programmable night setback, separate automatic heat/cool settings, auto/manual fan control and seasonal selector. Thermostat shall provide staging of the cooling and heating to match the stages of each component.
 C. Provide a locking cover for each indoor thermostat.
 D. Controls on electric heat section shall meet NEMA specifications and requirements.
 E. Controls on gas heating sections shall be AGA certified.
 F. Automatic shutdown controls shall be provided to meet local codes (or NFPA 90A as a minimum) and shall consist of freestats and duct-mounted smoke detectors interlocked to the fan coil unit for shutdown on the detection of fire or smoke.
2.08 FILTERS
 A. Units shall have minimum 1 inch thick, low velocity, glass fiber throwaway filters in commercially available sizes.
3.0 EXECUTION
3.01INSTALLATION
 A. The split systems and associated controls shall be installed in strict accordance with the manufacturer's recommendations.
 B. The control system shall be completely wired under this Division 15. Wiring shall be in accordance with the N.E.C. and shall meet all requirements for this installation.
3.02 STARTUP
 A. Provide the services of a factory trained and qualified service technician employed by the unit manufacturer who shall inspect the installation including external interlock and power connections; supervise leak testing, initial operation, calibration of operating and safety controls and supervise electrical testing including insulation resistance of motors and voltage balance between phases during starting and running.
 B. This service technician shall forward a report in four (4) copies to the Owner when the unit is in safe and proper operating condition. This report shall include all pressure and control settings, meg readings, voltage readings per phase during start and run, and shall list minor discrepancies to be corrected that affect safe and reliable operation. One additional copy of the report shall be left in the unit control panel. One copy of bound installation, operation, maintenance service and parts brochures, including applicable serial numbers, full unit description and parts drawings, shall be placed in the unit control panel at the time of startup; four (4) additional copies shall be forwarded to the Owner.
END OF SECTION
 SECTION 23774
 PACKAGED ROOFTOP UNITS

1.0 GENERAL
1.01 DESCRIPTION
 A. All work specified in this Section is governed by the HVAC General Section 23010.
 B. This Section 23774 and the accompanying drawings cover the provisions of all labor, equipment, appliances and materials, and performing all operations in connection with the construction and installation of the packaged rooftop units as specified herein and as shown. This work includes, but is not limited to, the following:
 1. Packaged rooftop units including curbs and accessories
 2. Control system (interlocked to the units)
 C. Units shall be self-contained, rooftop curb-mounted, single package type. The rooftop units shall be completely factory assembled as a unitary package complete with operating controls and shall be completely piped, internally wired and fully charged with R-410a refrigerant. Only one electrical power connection shall be required.
1.02INTENT

A. It is the intent of this Section of the specifications to provide complete, operable, adjusted single package rooftop units, as shown and specified which are free of excessive noise and vibration.
1.03BASIS OF DESIGN
 A. The basis of design is Trane. Any proposed substitutions or equals by other manufacturers shall be proven equal in all respects to the equipment specified as the basis of design. Particular attention is called to the requirements of Section 23010.
2.0 PRODUCTS
2.01CURB
 A. Each unit shall be provided with a full perimeter roof curb. The roof curb shall be of the same manufacturer as the unit, shall support the unit and provide a watertight enclosure to protect ductwork and utility services. Curb design shall comply with National Roofing Contractors Association requirements. Supply/return air opening gasketing shall be provided. Channel shall be provided allowing for adjustment of return air opening location to match the building structural frame indicated.
2.02 UNIT CABINETS
 A. Rooftop unit cabinets shall be formed, galvanized steel construction with welded base assembly. Galvanized steel surfaces shall be bonderized and painted with baked acrylic enamel for complete weather protection. All sheet metal screws shall be stainless steel. The outside air dampers shall be low leak gasketed dampers which must match and interlock with the single package rooftop units. Cabinets shall be fully insulated.
 B. Unit cabinets shall be designed for curb mounting and mate with the full perimeter roof curb for a complete watertight seal. Unit shall rest on top of overhanging the curb to form a protective drip lip.
 C. Access doors for the filter section and the fan section of units sized 10 nominal tons and larger shall be hinged, walk-in type.
2.03 COMPRESSOR SECTION
 A. Compressor section refrigeration systems shall be factory charged, ready for operation, providing minimum 2-stage cooling capacity (50% and 100%) on units of one and a half (1 1/2) tons capacity and minimum three stages on units of nominal 20 and 25-ton and larger. Units of one and a half (1 1/2) ton and larger shall have low pressure control, outdoor ambient temperature protection, crankcase heater, three-phase overload protection, and a minimum five (5) minute time shutdown of unit on interruption of power or automatic control shutdown.
2.04 FILLS
 A. Evaporator and condenser coils shall be copper tubing mechanically bonded to heavy duty aluminum fins. Aluminum tubes shall not be acceptable.
FANS
 A. Condensing unit condenser fans shall be direct-driven, propeller blade type. Condensing unit heat rejection shall be vertically upward.
 B. Fan shafts shall be either single or double wheels, forward-curved and mounted on a common shaft with adjustable sheave drive. All fans shall be statically and dynamically balanced and tested in the factory. Fan shall not pass thru its first critical speed in order to meet the scheduled performance. Fan shaft shall be mounted on not less than two grease-lubricated ball bearings with all fan wheels mounted inboard of the bearings. The end and intermediate assembly shall be mounted on a common base; on units with motor sizes larger than five (5) HP, the entire assembly shall be isolated from the rest of the unit by double deflection vibration isolators.
 B. Variable air volume (VAV) units shall be complete with variable frequency inverter drives and matched inverter-duty motors.
2.06 ELECTRIC HEATING SECTIONS
 A. Electric heating sections shall be furnished with nickel-chromium open coil resistance heating elements with each element protected by an automatic reset high-limit thermostat and manual reset high-limit thermostat for the primary and secondary overcurrent/thermal protection. Controls shall provide for multiple stage start-up and operation.
2.08 CONTROLS AND ACCESSORIES
 A. All operating and safety controls shall be factory installed and shall include solid state compressor overload protection, magnetic contactors, thermostatic expansion valve, refrigerant line drier and automatic damper motors.
 B. A 24 volt transformer shall be provided to accommodate controls and accessories. Each unit shall be complete with an indoor thermostat and control panel complete with the following minimum list of features and capabilities:
 1. Seven day programmable electronic timeclock for programming heating and cooling temperatures as well as night setback times and temperatures.
 2. Battery back-up to protect the programs for up to 24 hours after a power failure.
 3. Manual overrides and a failsafe program.
 C. Controls on electric heat section shall meet NEMA specifications and requirements.
 D. During night setback operation, morning warm-ups after night setbacks and whenever the unit is off, the outside air dampers shall be fully closed and admit no outside air.
 E. Interlocks shall be made to the duct-mounted smoke detectors in each unit's supply and return ductwork to shut the unit off and fully close the return air dampers to prevent migration of smoke upon its detection.
 F. Provide a factory mounted disconnect and integral duplex GFI convenience outlet on all units larger than 25 tons.
2.09 FILTERS
 A. Units shall have 2-inch thick, low velocity throwaway filters in commercially available sizes. Filters shall be not less than 30% 20% average dust spot efficiency when tested in accordance with ASHRAE Test Standard 52; but, FAR 30/30 or an approved equal.
2.10 AIRSIDE ECONOMIZER
 A. An airside economizer shall be provided with each unit. The economizer shall be factory-assembled complete with dampers, electrical actuators, exhaust fans and all controls. The outside air dampers shall be low-leakage type.
 B. The airside economizer shall provide "free" cooling whenever the outside air enthalpy is less than the set point of the outside air enthalpy sensor and cooling is required. The enthalpy sensor shall be adjustable for temperature and humidity setpoints.
 C. If the cooling load is satisfied by the airside economizer alone, no mechanical refrigeration shall be initiated and the economizer dampers shall be modulated to maintain the desired discharge air temperature. The economizer shall modulate up to its full open position to meet the cooling load. When the economizer is at its maximum outside air position and further cooling is required, mechanical refrigeration shall be utilized. When the enthalpy of the outside air is above its setpoint and during normal heating cycles, the outside air damper shall be at its minimum outdoor air position.
 D. Exhaust fans and staged, static-pressure controls shall be provided to prevent over-pressurization of the building during economizer mode. Units serving the first floor shall have 100% exhaust capacity. All other units shall have a minimum 50% exhaust capacity. Provide variable frequency drives on exhaust fans in all units over 25 tons. Drives shall be controlled by a building pressure sensor.
 E. The position of the return and outside air dampers shall also be controlled as specified elsewhere in response to unit and external controls.
3.0 EXECUTION
3.01INSTALLATION
 A. The packaged rooftop units and associated controls shall be installed in strict accordance with the manufacturer's recommendations.
 B. The control system shall be completely wired under this Division 23. Wiring shall be in accordance with the N.E.C. and shall meet all requirements for this installation.
3.02 STARTUP
 A. Provide the services of a factory trained and qualified service technician employed by the unit manufacturer who shall inspect the installation including external interlock and power connections; supervise leak testing, initial operation, calibration of operating and safety controls and supervise electrical testing including insulation resistance of motors and voltage balance between phases during starting and running.
 B. This service technician shall forward a report in four (4) copies to the Owner when the unit is in safe and proper operating condition. This report shall include all pressure and control settings, meg readings, voltage readings per phase during start and run, and shall list minor discrepancies to be corrected that affect safe and reliable operation. One additional copy of the report shall be left in the unit control panel. One copy of bound installation, operation, maintenance service and parts brochures, including applicable serial numbers, full unit description and parts drawings, shall be placed in the unit control panel at the time of startup; four (4) additional copies shall be forwarded to the Owner.
END OF SECTION
 SECTION 23775
 SPLIT SYSTEMS

1.0 GENERAL
1.01 DESCRIPTION
 A. All work specified in this Section is governed by the HVAC General Section 23010.
1.02INTENT

THESE DOCUMENTS ARE SUBJECT TO COPYRIGHT PROTECTION ACT AS INTELLECTUAL PROPERTY. SIMILAR PROTECTIONS ALSO APPLIED TO ELECTRONIC INFORMATION ANY FORM. USE OF THESE DOCUMENTS OR THE ELECTRONIC INFORMATION CONTAINED THEREIN IS PROHIBITED WITHOUT THE WRITTEN PERMISSION OF THE DOCUMENTS OR INFORMATION PROVIDER.