

Order Plans

8. Install systems, materials, and equipment to conform with drawings and specs, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Construction Manager for resolution prior to installation.
 9. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
 10. Install mechanical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location.
 11. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.
- 3.2 AIR CONDITIONING UNIT INSTALLATION**
- A. Install in accordance with manufacturer's instructions and comply with the following requirements:
1. Provide layout drawings of units, locations and power requirements to electrical installer.
 2. Install minimum 30 percent efficiency air filters in unit during installation phase. Do not operate the unit without filters in place.
 3. Mount rooftop unit on factory built roof-mounting frame. Install roof mounting frame level. Secure frame to structural framing and rooftop unit on frame as indicated on the Drawings.
 4. Install 3-inch long flexible duct connection at inlets and outlets of units.
 5. Install condensate drain piping and traps in accordance with manufacturer's instructions and as shown on the Drawings. All metal piping and supports shall be of same material to prevent electrolysis.
 6. Control installers shall install thermostat and all wiring associated with control signals into the units.
 7. Install all line voltage power wiring and conduit as indicated on the Drawings and as specified in Division 16 - Electrical.
 8. Coordinate with Mechanical Contractor to install a new set of filters three days prior to Substantial Completion review.
- 3.4 EXHAUST/SUPPLY FAN INSTALLATION, GENERAL**
- A. Install fans level and plumb, in accordance with manufacturer's written instructions. Secure roof-mounted fans to roof curbs with cadmium-plated hardware.
- B. Provide access space around fans for service and maintenance, as indicated on the Drawings and in compliance with applicable Mechanical Code.
- C. Clean unit cabinet interiors to remove foreign material and construction dirt and dust.
- D. Coordinate with Electrical Contractor to provide electrical power wiring as specified in Division 16 - Electrical.
- 3.4 DUCTWORK INSTALLATION**
- A. Ductwork Installation, General
1. Ductwork is generally diagrammatically indicated on the Drawings and shall be generally installed as indicated. Do not scale Drawings to exact locations or dimensions.
 2. Install ducts to best advantage, avoiding conditions that coordinate with other building components. Do not cut structural members without approval of Construction Manager. Check with Structural Drawings for duct locating elevations.
 3. Duct sizes are indicated as net inside dimensions on the Drawings. The indicated dimensions shall be altered at the job site for the purpose of avoiding interference and clearance difficulties to other dimensions producing the same air handling characteristics, provided such altered dimensions are approved by the Construction Manager.
- Hangers and Supports**
1. Securely fasten all ducts to building construction by means of hangers, supports, guides, anchors, and sway braces to maintain duct alignment, to prevent sagging, and to prevent noise and excessive strain on ducts due to movement under operating conditions.
 2. Adequately mount and anchor all material and equipment as required. Include lateral bracing as required to prevent horizontal, seismic movement. Refer to applicable Mechanical Code requirements and details on Drawings for seismic requirements.
 3. Do not support ducts from fans or other equipment.
 4. Power-driven fasteners shall not be used to support ducts.
 5. Support round duct, 30-inch and larger, with two hangers at each support point.
 6. Hangers and supports shall conform to SMACNA section, "Hangers and Supports". Support horizontal ducts with in 2 feet of each elbow and within 4 feet of each branch intersection using double strap hangers on each side of fitting.
 7. Support vertical ducts, passing through roofs with two continuous angles screwed to the duct and bearing to the roof structure, and conforming to SMACNA section "Riser Support-From Floor."
- C. Seismic Supports and Bracing
1. Where required, all ductwork and equipment shall be seismically supported and braced per the SMACNA "Guidelines for Seismic Restraints of Mechanical Systems and Plumbing Piping Systems", including Appendix E.
- D. Joints Sealing, General
1. Duct tape shall not be used on duct joints.
 2. Transverse joints: All transverse joints including Ductmate type joints on all supply, return, exhaust and outside air intake ducts, sealed using Hardcast Arabol.
 3. Interior exposed joints: Seal using water based sealer, Hardcast Iron Grip.
 4. Interior concealed joints (above 1-inch W.G. pressure ductwork): Seal using gypsum impregnated tape and adhesive.
 5. Interior concealed joints (to 1-inch W.G. pressure ductwork): Seal using water based sealer, Hardcast Iron Grip.

6. Exterior joints (above 1-inch W.G. pressure ductwork): Seal using gypsum impregnated tape and adhesive.
 7. Exterior joints (to 1-inch W.G. pressure ductwork): Seal using oil based sealer, Hardcast Gripe Grip or equal.
 8. Exterior joints: Seal water and to air-tight condition with sealant.
- E. Ductwork Painting, General - Where the interior surfaces of ductwork are visible through the blades of supply outlets, return inlets, and exhaust inlets, paint interior visible surfaces with one coat of flat black paint. See Section 09905 - Painting.
- F. Cleaning - Clean the inside of plenums, casings, enclosures, fans, and accessible ductwork before starting fans.
- 3.5 DUCTWORK ACCESSORIES, INSTALLATION**
- A. Provide duct-mounted balancing dampers or attached opposed blade dampers so that each diffuser, grille and register may be individually balanced.
- B. Provide unit opposed blade damper where individual duct mounted balancing dampers are not provided.
- C. Provide turning vanes in all mitered elbows in all ducts, so that tips are parallel with the sides of the ducts. Vanes shall be single thickness type with extended trailing edge. Tips of acoustical turning vanes on outside radius shall be flush with acoustical lining.
- D. Provide flexible connections to completely isolate fans from direct contact with all sheet metal work.
- E. Provide access panels or doors, as required, for access to valves, controllers, fire dampers.
- 3.6 DUCT INSULATION, INSTALLATION**
- A. Wrapped Ductwork Insulation
1. Application Requirements: Insulate the following ductwork as follows:
 - a. HVAC supply ductwork between fan discharge or HVAC unit discharge, and from terminal outlet.
 - b. HVAC return ductwork between room terminal inlet and return fan inlet, or from unit inlet.
 2. Insulate each ductwork system specified above with 1-1/2 inches thick insulation and vapor barrier jacket, application limited to concealed locations.
 3. Unwrapped Ductwork Insulation - Line all supply and return ductwork, as well as mixed entering air and outdoor air intake ductwork, in exposed areas, outdoors, shafts and plenums, and where indicated on Drawings, with 1-inch thick semi-rigid fiberglass liner board.
- Install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that insulation serves its intended purpose and as follows:
1. Install insulation on pipe and ductwork systems subsequent to painting, testing, and acceptance of tests.
 2. Install insulation materials with smooth and even surfaces. Insulate each continuous run of piping with full-length units of insulation, with a single cut piece to complete run. Do not use cut pieces or scraps abutting each other.
 3. Clean and dry pipe or duct surfaces prior to insulating. Butt insulation joints firmly together to ensure a complete and tight fit over surfaces to be covered.
 4. Maintain integrity of vapor-barrier jackets on pipe and ductwork insulation, and protect to prevent puncture or other damage.
 5. Extend pipe and ductwork insulation without interruption through walls, floors and similar piping penetrations, except where otherwise indicated.
 6. Protect outdoor insulation from weather by installing outdoor protective finish or jacketing as recommended by manufacturer.
 7. Replace damaged insulation that cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.
 8. Insulation installer shall advise Contractor of required protection for insulation work during remainder of construction period, to avoid damage and deterioration.
- 3.7 CONTROL SYSTEMS, INSTALLATION**
- A. Installation
1. Install systems and materials in accordance with manufacturer's instructions and recommendations, rough-in drawings, and details indicated on the Drawings.
 2. Coordinate with Electrical Contractor to install electrical components and use electrical products complying with requirements of applicable requirements specified in Division 16 - Electrical.
 3. Mount controllers at convenient locations and heights.
- B. Control Wiring - The term "control wiring" shall be defined to include providing of wire, conduit and miscellaneous materials as required for mounting and connecting electric control devices.
- C. Wiring System
1. Install complete control wiring system for electric control systems.
 2. Conceal wiring except in mechanical rooms and areas where other conduit and piping are exposed.
 3. Provide multi-conductor instrument harness (bundle) in place of single conductors where number of conductors can be run along common path.
 4. Fasten flexible conductors bridging cabinets and doors, neatly along hinge side, and protect against abrasion. Tie and support conductors neatly.
- D. Start-Up - Start, test and adjust electric control systems in presence of manufacturer's authorized representative. Replace damaged or malfunctioning controls and equipment.
- E. Cleaning - Clean factory-finished surfaces. Repair marred or scratched surfaces with manufacturer's touch-up paint.

- F. Final Adjustment - After completion of installation, adjust thermostats, control valves, motors and similar equipment specified in this Section. Final adjustment shall be performed by specially trained personnel in direct employ of manufacturer of primary temperature control system.
- G. Control Sequences
1. Rooftop Packaged Units
 - a. Occupied: Energize rooftop units during occupied cycle via manufacturer supplied thermostat. Modulate outside air and return air dampers in sequence and in conjunction with unit's mechanical refrigeration to maintain desired room temperature via manufacturer supplied thermostat.
 - b. Unoccupied: Maintain outside air damper closed, single unit fan and unit's heating to maintain reduced room temperature of 60 degrees F with unoccupied thermostat.
 - c. Dehumidification (where applicable): Humidity sensor shall operate the refrigeration system and initiate hot gas reheat as required to maintain space humidity at 55% RH.
 2. Thermostats: Transmittal thermostat model #547 SENS019 provides with 110 volt unit package. Provide and wire correctly. Verify secondary backup. Thermostats shall be programmed for continuous HVAC unit supply fan operation during occupied periods. Program thermostat for control time, date and setpoints as follows:

Occupied Heat	70°F
Unoccupied Heat	55°F
Occupied Cool	76°F
Unoccupied Cool	85°F
Occupied Start	6:00 a.m. (set for continuous fan)
Unoccupied Start	1:00 a.m.
- END OF SECTION

08/10/18
1845
JOB NO:
DRAWN: BH, MJ, SO
CHECKED: AR, CF
ACC #: 1820228

HVAC
SPECIFICATIONS



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