

## MECHANICAL SPECIFICATIONS

### SECTION 15080 - MECHANICAL INSULATION

#### PART 1 - GENERAL

##### 1.1 SECTION REQUIREMENTS

- Submittals: None.
- Quality Assurance: Labeled with maximum flame-spread rating of 25 and maximum smoke developed rating of 50 according to ASTM E 84.

#### PART 2 - PRODUCTS

##### 2.1 PIPE INSULATION

- Preformed Glass Fiber Pipe Insulation: ASTM C 547, Class 1, with factory applied, all purpose, vapor retarder jacket.
- Polyolefin Pipe Insulation: Unicellular polyethylene, preformed pipe insulation. Comply with ASTM C 534, Type I, except for density.

#### PART 3 - EXECUTION

##### 3.1 INSTALLATION

- Install vapor barriers on insulated pipes with surface operating temperatures below 60 deg F.
- Insulate fittings, valves, and specialties.
- Seal vapor barrier penetrations for hangers, supports, anchors, and other projections.
- Coat glass fiber pipe insulation ends with vapor barrier coating.
- Roof Penetrations: Apply insulation for interior applications to a point even with the top of the roof flashing.
- Exterior Wall Penetrations: For penetrations of below grade exterior walls, terminate insulation flush with mechanical sleeve seal.
- Interior Walls and Partitions Penetrations: Apply insulation continuously through walls and partitions, except fire rated walls and partitions.
- Fire Rated Walls and Partitions Penetrations: Terminate insulation at penetrations through fire rated walls and partitions. Seal around penetration with through penetration firestop systems.
- Floor Penetrations: Terminate insulation at the underside of the floor assembly and at the floor support at top of floor. Seal around penetration with through penetration firestop systems.
- Glass Fiber Insulation Installation: Bond insulation to pipe with adhesive. Seal seams and joints with vapor barrier compound.
- Interior Piping System Applications: Insulate the following piping systems:
  - Domestic hot and cold water.
  - Exposed sanitary drains of fixtures for the disabled.
  - Refrigerant piping.
- Do not apply insulation to the following systems, materials, and equipment:
  - Flexible connectors.
  - Fire protection piping systems.
  - Sanitary drainage and vent piping.
  - Chrome plated pipes and fittings, except for plumbing fixtures for the disabled.
  - Piping specialties, including air chambers, unions, strainers, check valves, plug valves, and flow regulators.
- Pipe Insulation Thickness Application Schedule: Insulate piping with the following materials and thicknesses:
  - Domestic Hot and Cold Water: 1/2-inch preformed glass fiber pipe insulation.
  - Sanitary Drains: 1/2-inch polyolefin pipe insulation.

END OF SECTION 15080

### SECTION 15554 - FLUES AND VENTS

#### PART 1 - GENERAL

##### 1.1 SECTION REQUIREMENTS

- Submittals: None.

#### PART 2 - PRODUCTS

##### 2.1 GAS VENTS

- Vent-air intake for high efficiency domestic water heater. Size per manufacturer's recommendation.
- Accessories: Tees, elbows, increasers, draft hood connectors, metal cap with bird barrier, adjustable roof flashing, storm collar, support assembly, thimbles, firestopping spacers, and fasteners; fabricated of similar materials and designs as vent-pipe straight sections.

#### PART 3 - EXECUTION

##### 3.1 INSTALLATION

- Install vents according to stipulated minimum clearances from combustibles.
- Seal between sections of positive pressure vents using only sealants recommended by manufacturer.
- Support vents at intervals to support the weight of the vent and all accessories, without exceeding loading of appliances.

END OF SECTION 15554

### SECTION 15732 - PACKAGED ROOFTOP AIR-CONDITIONING UNITS

#### PART 1 - GENERAL

##### 1.1 SECTION REQUIREMENTS

- Submittals: Product Data and Shop Drawings.
- Comply with ASHRAE 15.
- EER: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Building, except Low Rise Residential Buildings."
- Warranties: Submit a written warranty, signed by the manufacturer, agreeing to the repair or replacement of components that fail within 5 years of Substantial Completion.

#### PART 2 - PRODUCTS

##### 2.1 PACKAGED UNITS, 5 TO 20 TONS

- Factory assembled and tested, consisting of compressors, condensers, evaporator coils, condenser and evaporator fans, refrigeration and temperature controls, filters, and dampers.
  - Refer to Rooftop Heating/Cooling Unit Schedule on drawing M200 for capacities, and manufacturers.
  - Evaporator Fans: Belt driven, forward curved centrifugal.
  - Exhaust/Relief Fans: Direct drive, forward curved centrifugal or propeller.
  - Condenser Fans: Direct drive propeller.
  - Refrigerant Coils: Aluminum fins and copper coil.
  - Compressors: Serviceable hermetic or fully hermetic, with safety controls, hot gas bypass, and timed of controls.
  - Heat Exchangers: Gas fired, with gas controls, electronic ignition, high limit cutout, and forced draft proving switch.
  - Economizer controls (Comparative Enthalpy, 100% capacity).
  - Low ambient controls.
  - Smoke Detectors: Photoelectric.
  - Operating Controls: Two stage heating and two stage cooling on units 8-1/2 tons and over.
  - Roof curb.
  - Control Wiring from T-stat to rooftop unit: Shall be 18ga / 7 conductor, rated for plenum applications.
  - Control Wiring from T-stat to remote sensor: Shall be a separate 18ga / 2 conductor shielded, rated for plenum applications.

#### PART 3 - EXECUTION

##### 3.1 INSTALLATION

- Install units level and plumb and firmly anchored.
- Connect gas piping to burner with pipe same size as gas train inlet, and provide union with sufficient clearance for burner removal and service.
- Connect to supply and return hydronic piping with shutoff valve and union or flange at each connection.
- Install ducts to termination in roof mounting frames. Terminate return air duct through roof structure.
- Connect units to wiring systems and to ground.

END OF SECTION 15732

### SECTION 15810 - DUCTS AND ACCESSORIES

#### PART 1 - GENERAL

##### 1.1 SECTION REQUIREMENTS

- Submittals: Product Data for fire and smoke dampers.
- Comply with NFPA 90A for systems serving spaces more than 25,000 cu. ft. in volume or building Types II, IV, and V construction more than 3 stories in height.
- Comply with NFPA 90B for systems serving spaces in 1 or 2 family dwellings or serving spaces less than 25,000 cu. ft..
- Comply with NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operations," Chapter 3, "Duct System," for range hood ducts, except single family residential usage, unless otherwise indicated.
- Comply with UL 181 and UL 181A for ducts and closures.
- Testing, Adjusting, and Balancing Agency Qualifications: AABC certified.

#### PART 2 - PRODUCTS

##### 2.1 DUCTS

- Spiral Duct: Spiral Lock Seam, without insulation, G90 galvanized finish, ASTM A-653/924
  - Basis of Design Manufacturers: Lindab SPIROsafe, alternates to the basis of design must be submitted for review.
  - Fittings: Factory produced standing seam construction with internal sealing. Fittings with a major axis of 36" or smaller shall be 20 gauge. Fittings with a major axis of 37"-48" shall be 18 gauge.
- Galvanized Steel Sheet: Forming steel, ASTM A 653/653M, G90 coating designation.
- Duct Liner: ASTM C 1071, Type II, with an airstream surface coated with a temperature resistant coating. Thickness: 1-1/2 inch, R-value : 6.3.
  - Adhesive: ASTM C 916, Type I.
  - Mechanical Fasteners: Galvanized steel pin, length as required to penetrate liner plus a 1/8 inch projection maximum into the airstream.
- Joint and Seam Tape: Comply with UL 181A.
- Joint and Seam Sealant: Comply with UL 181A.
- Rectangular Metal Duct Fabrication: Comply with SMACNA's "HVAC Duct Construction Standard" for metal thickness, reinforcing types and intervals, tie rod applications, and joint types and intervals.

##### 2.2 ACCESSORIES

- Volume-Control Dampers: Factory fabricated volume control dampers, complete with required hardware and accessories. Single blade and multiple opposed blade, standard leakage rating, and suitable for horizontal or vertical applications.
- Fire Dampers: Factory-fabricated fire dampers, complete with required hardware and accessories. UL labeled according to UL 555, "Fire Dampers".
- Flexible Connectors: Flame retardant or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.
- Flexible Ducts: Factory fabricated, insulated, round duct, with an outer jacket enclosing 2 inch thick, glass fiber insulation, R-value: 6.0, around a continuous inner liner.

#### PART 3 - EXECUTION

##### 3.1 INSTALLATION

- Duct System Pressure Class: Construct and install each duct system with 2 inch positive and negative duct pressure classifications.
  - Conceal ducts from view in finished and occupied spaces. Except where noted as exposed.
  - Avoid passing through electrical equipment spaces and enclosures.
  - Support and connect metal ducts according to SMACNA's "HVAC Duct Construction Standard".
  - Install duct accessories according to applicable portions of details of construction as shown in SMACNA standards.
  - Install liner on all supply and return duct.
  - Install volume control dampers in lined duct with methods to avoid damage to liner and to avoid erosion of duct liner.
  - Install fire and smoke dampers according to manufacturer's UL approved written instructions.
    - Install fusible links in fire dampers.
  - Provide saddle taps at tees for exposed ductwork.
- ##### 3.2 TESTING, ADJUSTING, AND BALANCING
- The owner will supply an independent balance agent to to balance and adjust the HVAC installation. The balance agent will be responsible for any pulley or belt changes required.
  - The general contractor is to have trained staffed available during the balancing to correct issues noted by the balance agent.
  - The balance agent is to balance airflow within distribution systems, including submains, branches, and terminals to indicated quantities +/- 10%. The hood exhaust system shall be balanced to a tolerance of -0+10% and the make-up air system to a tolerance of -10+0%.
  - The balance agent is to supply a copy of the balance report to the owner, engineer and general contractor for review.

END OF SECTION 15810

### SECTION 15855 - DIFFUSERS, REGISTERS, AND GRILLES

#### PART 1 - GENERAL

##### 1.1 SECTION REQUIREMENTS

- Submittals: None.

#### PART 2 - PRODUCTS

##### 2.1 OUTLETS AND INLETS

- Diffusers:
  - Refer to Grills, Registers, and Diffusers Schedule for equipment schedule
  - Manufacturer: As scheduled (NO SUBSTITUTIONS)
  - Material: As scheduled.
  - Finish: As scheduled.
  - Mounting: As scheduled.
- Wall and Ceiling Registers:
  - Refer to Grills, Registers, and Diffusers Schedule for equipment schedule
  - Manufacturer: As scheduled (NO SUBSTITUTIONS)
  - Material: As scheduled.
  - Finish: As Scheduled.
  - Mounting: Countersunk screw.
- Wall and Ceiling Grilles:
  - Refer to Grills, Registers, and Diffusers Schedule for equipment schedule
  - Manufacturer: As scheduled (NO SUBSTITUTIONS)
  - Material: As scheduled.
  - Finish: As Scheduled.
  - Mounting: Countersunk screw or lay in depending location.

#### PART 3 - EXECUTION

##### 3.1 INSTALLATION

- Coordinate location and installation with duct installation and installation of other ceiling and wall mounted items.
- Locate ceiling diffusers, registers, and grilles, as indicated on general construction "reflected ceiling plans." Unless otherwise indicated, locate units in center of acoustical ceiling panels.

END OF SECTION 15855

### SECTION 15900 - HVAC INSTRUMENTATION AND CONTROLS

#### PART 1 - GENERAL

##### 1.1 SECTION REQUIREMENTS

- Summary: Electric/electronic control sequences for HVAC systems and equipment.
- Submittals: Shop Drawings detailing operating control sequences of each item of HVAC equipment and system and Product Data for controllers, sensors, operators, control panels, thermostats, humidistats, actuators, control valves and dampers.
- System Description: Control systems consists of sensors, indicators, actuators, final control elements, interface equipment, and other apparatus, accessories, required to operate mechanical systems according to sequences of operation indicated and specified.
- Operation Sequence:
  - Unoccupied Cycle: During unoccupied hours as set by a programmable thermostat the outside air and return dampers for the HVAC unit close, and the thermostat set point resets to 65 °F (user adjustable). Upon a call for heating, the HVAC unit energizes.
  - Occupied Cycle: During occupied hours, as set by a programmable thermostat the outside air and return dampers open to a minimum set point. The furnace and exhaust fans run continuously. Upon a call for heating, the furnace heating energizes. Upon a call for cooling, the condensing unit energizes.

#### PART 2 - PRODUCTS (Not Applicable)

#### PART 3 - EXECUTION

##### 3.1 INSTALLATION

- Install control wiring concealed, except in mechanical rooms, and according to requirements specified in Division 16 Sections.

END OF SECTION 15900

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Issue Record:

09/15/15

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