

## **MECHANICAL SYSTEM DESIGN**

### **Submission Requirements**

Tenant shall submit complete plans and specifications for all HVAC work, as per the requirements of Exhibit B of the Lease and these criteria, which shall consist of, but not be limited to, the following:

- Floor plan and/or reflected ceiling plan at ¼ inch = 1' - 0' scale or larger, including all ductwork, exhaust systems, kitchen exhaust hoods, piping and equipment.
- Partial roof plan including location of all roof mounted equipment and roof penetration details (i.e. packaged rooftop units, condensing units, air handling units, make-up air units, exhaust systems, etc.).
- Refrigerant piping and natural gas piping riser diagrams as applicable.
- HVAC automatic temperature control sequence of operation diagrams and information.
- Equipment schedules, including packaged rooftop and condensing units, air handling units, electric heaters, exhaust fans, kitchen exhaust fans, make-up air units, air devices (diffusers, registers and grilles), etc.
- System and equipment installation details sufficient for construction.
- Material and equipment specifications.
- Landlord Design Submittal Forms (DS-3, DS-4, DS-5, DS-6, DS-7, DS-8 & DS-9) must be completed with the applicable HVAC information. See Section Seventeen of this manual for details.
- The Tenant shall provide equipment and system information in accordance with other sections of these criteria and the Standard Project Details.

### **The Landlord Provides the Following**

The Landlord provides the following in conjunction with the Tenant's HVAC system:

- Designated roof top structural zones where Tenant's roof top HVAC equipment shall be placed.
- Available gas service connection point if such service is desired by Tenant for HVAC system.

Refer to the Lease Outline Drawing and the criteria sections below for specific conditions and requirements relative to the above services.

### **Return air shall be provided as follows:**

Tenants may choose between a ducted return and a plenum return air system, excepting restaurant/food and odor producing Tenants, which will be required to use a ducted return air system.

No combustible material of any kind, including fire-retardant treated wood blocking, is allowed above the ceiling in a plenum return condition.

## **SECTION XII MECHANICAL SYSTEM DESIGN**

### **Outside Air, Relief & Exhaust**

Rooftop units shall be provided with an outside air economizer (per applicable Energy Code) and gravity or powered relief. Restaurant and other odor producing type Tenants shall provide powered relief. If practicable, exhaust equipment shall be located toward the rear of the building, away from the mall common area, in order to prevent the possibility of wafting odor.

### **Toilet Exhaust System**

Tenants shall install either: (1) a recessed ceiling mounted exhaust fan, which is ducted to a Tenant provided and installed vent through the roof; or (2) a roof mounted exhaust fan with ductwork extended to a ceiling grille(s) in the toilet room(s). A backdraft damper is required for either option.

### **Natural Gas Service**

Natural gas service is available at a gas utility company meter center connection point at the base building service courts. If gas service is desired, the Tenant shall contact the Landlord's Tenant Coordinator to review the service connection location and pipe routing requirements before beginning design work.

### **HVAC System**

Tenants shall furnish and install a packaged gas or electric rooftop unit on the roof above the Tenant's premises

### **HVAC Equipment Requirements**

- Approved manufacturers are Trane, Carrier, York or as approved by the Landlord.
- All service connections shall be through the curb type.
- Rooftop units shall be down discharge type and shall be provided with an economizer (per applicable Energy Code) and gravity or powered relief.
- Condensing units shall be provided with low-ambient controls and a winter start kit.
- Electric heaters above 3 kw and motors above ½ horsepower shall be three phase type.
- Air filters shall be two-inch thick throw-away type

## HVAC Design Conditions

	<u>Outdoor</u>	<u>Indoor</u>
Winter / Heating	-8 degrees F	70 degrees F
Summer / Cooling	91 degrees F, dry bulb 75 degrees F, wet bulb	76 degrees F Max. 50% relative humidity
Roof / Wall U Factors	Roof = .0400 btuh/sq.ft./F Wall = .0526 btuh/sq.ft./F Tenants shall make adjustments as required for exterior storefront exposure.	
Lighting & People Load	Per Tenant design and ASHRAE recommendations	
Equipment Load	Per Tenant design and ASHRAE recommendations	
Minimum Outside Air	Per ASHRAE 62 and code	
Toilet Exhaust	Per ASHRAE 62 and code	

## Designated Roof Framing Areas

Designated roof framing areas have been reinforced to support limited additional weight for Tenant rooftop HVAC equipment. These areas are shown on the Lease Outline Drawing. All roof top equipment shall be placed within these designated zones in accordance with the Landlord's Standard Project Details. See SPD Nos. 17, 18A, 18B, and 18C for more information. If equipment or other supported loads exceed the maximum allowed per the Landlord's Standard Project Details or, if in the Landlord's opinion, structural analysis of the method of support is necessary, Tenant shall at Tenant's expense utilize the Landlord's Structural Engineer to evaluate supplemental structural framing plans, details, and calculations or to design the required support.

## Curb and Roof Penetrations

- For roof top units, roof curbs shall be insulated and shall be manufactured by: (1) the rooftop unit manufacturer, or (2) a high quality prefabricated custom curb manufacturer.
- For condensing units or other equipment supports, metal utility rail curbs flashed into roof shall be used to support the equipment.
- Electrical service connections shall be installed through the curb opening to the underside of the HVAC equipment wherever possible in lieu of a separate roof penetration.
- All curbs for rooftop equipment shall be installed in accordance with the Landlord's Standard Project Details. and shall be secured to the building structure as required. The Landlord's roofing contractor at the Tenant's expense shall perform all roof repair and flashing work associated with the curb and equipment installation.

## Tenant Condensate Drain

- For roof top unit condensate drain, Tenant shall extend piping through the roof curb and down into the Tenant space to an approved drain.
- The condensate drain line shall be insulated per code; insulation is only required below the roof.

## Smoke Detectors

A duct detector is required on the return side at each rooftop unit and shall meet the requirements of SPD-16 and all applicable building codes.

## Temperature Controls

Temperature controls shall be designed to operate the system properly and maintain temperatures required by Law during all hours when the Tenant is open for business. Operation of the HVAC equipment shall be controlled by a seven day, twenty-four hour time clock as approved by the Landlord. Night setbacks shall be provided if required by applicable Energy Code. The location of the thermostats shall be indicated on the Working Drawings.

## Noise and Vibration Restrictions

Noise and vibration that may be caused by the operation of any HVAC equipment must be controlled with vibration isolators, resilient mounting details, flexible duct connections, duct linings and other measures which may be required. Equipment which is suspended from or mounted to the base building structure must be installed so that no noticeable vibration is transferred to the base building structure.

### **Ductwork**

Ductwork shall be galvanized sheet metal designed, fabricated and installed in accordance with the Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) design practices and standards for low pressure low velocity ductwork. Balancing devices shall be installed in accordance with Associated Air Balance Council standards.

### **Flexible Duct**

Flexible duct shall be equal to Thermaflex M-KE series and length shall not exceed five feet. All bends shall be properly supported so as to prevent kinking. A flexible duct connector shall be provided at rooftop and air handling unit supply and return connections.

### **Air Distribution Devices**

Air distribution devices shall be ceiling or side wall mounted registers or diffusers installed as required to achieve draft-free air distribution in accordance with good engineering practices. A manual volume damper shall be installed upstream a minimum of three (3) feet from all registers or diffusers throughout the Tenant's sales areas.

### **Duct Insulation**

Duct insulation shall be installed on all outside air and supply air ductwork. The minimum installed R-value shall be 4.2 or greater where required by Code. Duct wrap shall have a FRK foil vapor barrier. It is recommended that acoustical duct lining be provided for the first 10 feet of supply and return ductwork connected to rooftop units and air handling units.

### **Fire Dampers**

Tenants shall provide fire dampers where required by Code. Tenant shall indicate the rating and location of fire dampers on design drawings. Provisions shall be made for sufficient access to each fire damper. All fire dampers must carry evidence of UL approval and appropriate fire rating.

## **RESTAURANT MECHANICAL DESIGN CRITERIA**

### **Exhaust and Make-Up Air Criteria:**

- Exhaust fans, make-up air units, exhaust hoods, fire protection equipment, all associated controls and other mechanical components shall be high quality commercial grade equipment.
- Exhaust fans for the purpose of removing smoke, heat and grease-laden air from cooking areas, shall be of the utility set upblast type, having high velocity vertical discharge to project the contaminated air up and away from the roof and nearby outside air intake openings. The minimum vertical discharge velocity shall be 2,500 FPM and the fan shall be UL 762 Listed. See Restaurant Design Criteria Details FDC-1 and FDC-2 at Section Eighteen of this manual.
- A "Grease Guard" Rooftop Defense System, approved in writing by the Landlord, shall be installed adjacent to the kitchen exhaust fan.

**Kitchen Exhaust Hoods** shall be Type 1, UL Listed as manufactured by Gaylord Industries, Inc., Captive-Aire Systems, Inc., or Landlord approved equal. Water-wash type hood shall be provided when required by the Landlord.

**Installation** of the exhaust fans, make-up air units and other required equipment shall be performed in accordance with the Landlord's Standard Project Details. All roof flashing and repair work associated with roof-top equipment installation shall be performed by Landlord's roofing contractor at Tenant's sole expense. Supplemental opening framing: Reinforce deck openings from 6 inches to 18 inches in size with 2"x2"x1/4" steel angles. Place framing angles perpendicular to flutes; extend minimum two flutes beyond each side of opening and weld to deck at each flute. For openings larger than 18" reinforce as shown in SPD Nos. 17, 18A, 18B, and 18C.

**The Roof-Top Equipment Location** must be coordinated with the Landlord and the equipment of adjacent Tenants to insure that the minimum code required clearance between exhaust outlets and fresh air intakes is maintained.

### **Ductwork Requirements:**

- Kitchen exhaust hood ductwork shall be fabricated and installed in accordance with the International Mechanical Code, 2000 edition, and IDPH requirements. Ductwork shall be fabricated from 16 gauge or heavier black steel, with all joints welded. Access doors in this system shall be in the vertical face at intervals determined by field conditions and applicable Codes.
- Dishwasher ductwork and moisture eliminators for dishwasher exhaust shall be fabricated and installed in accordance with ASHRAE standards and applicable Codes. Ductwork shall be fabricated from E-Brite 26-1 stainless steel, or aluminum. All ductwork from the dishwasher shall be properly pitched and piped to an approved drain. All joints shall be soldered to prevent leaking. An accessible balance damper shall be provided at the dishwasher connection to the exhaust system.

### **Duct Insulation Requirements:**

- Kitchen exhaust hood ductwork shall be insulated with two (2) inch thick blanket type fiberglass insulation with 0.20 BTU per pound per degree Fahrenheit specific heat, 2000 degree design or as required by applicable Codes. All insulated joints shall be double layered with overlapped joints. Insulation shall be installed on all kitchen exhaust ductwork in full accordance with the manufacturer's instructions, Codes and requirements. Duct insulation in plenum ceilings and corridors (where applicable) shall be canvas covered.
- Dishwasher exhaust ductwork shall be insulated with one half inch thick fiberglass duct insulation having a 3/4 pound density and vapor barrier.

