

## **PART 1 - GENERAL**

These standards apply to the installation of materials, equipment and accessories for kitchen exhaust systems.

### **1.01 DESIGN CRITERIA**

- A. Drawings and Specifications: (All Mechanical equipment installation - Fans, Hoods, Plumbing and piping shall be designed by and bear the Mechanical Engineer of Record PE stamp and signature)
1. Indicate unit dimensions, weight loading, required clearances, electrical characteristics and connection requirements. Provide multiple sections to indicate elevations and spatial requirements. Show dimensions between cooking surface and hood.
  2. Include equipment schedules: Identification tag, fan capacities, coil capacity, balancing requirements, sound power levels, electrical requirements, weights, etc.
  3. Indicate service access (filters, coils, fans, electrical equipment, etc.) requirements on plans. Access doors shall be of adequate size for removal of largest piece of equipment (fan wheel, motor, etc.) Service access clearance height shall be a minimum of 7-feet above finished floor and for equipment clearance requirements. Grease duct access doors shall be of sufficient size and at appropriate locations to accommodate cleaning of ducts. Grease duct access doors shall be UL listed, 304 or 316 stainless steel construction, meet NFPA96A Standards and shall maintain the liquid tight construction of the grease duct system.
- B. Design:
1. Kitchen Hoods: Comply with NFPA 96, Chapter 5 of the International Mechanical Code, UL 710 and local building and fire department requirements. (See 2.01 C)
  2. Kitchen design shall assure that kitchen, scullery, serving line and storage spaces are “negatively pressurized” with respect to adjacent spaces. This means that during restaurant/kitchen operations, more air will leave the space via the kitchen exhaust than is supplied through the mechanical supply

systems. The kitchen supply shall be 10% to 20% lower in volume (cfm) than the kitchen total exhaust.

3. The air velocity through kitchen grease hood exhaust duct shall be not less than 1,000 feet per minute.
4. Provide DDC system activated and controlled kitchen systems. Controls shall be automatic under control of the DDC system and without a tenant "Off" switch (other than fire shutdown or other safety shutdown switch).
5. Supply kitchen makeup air from the building air handling unit, with no separate "make up air" systems (stand-alone or packaged). This is only allowed if a variance from the Washington State Energy Code is approved by the Airport Building Department for kitchen hood exhaust systems greater than 2000 CFM (WSEC section C403.7.7.1.)
6. Leakage Test: All Type I ductwork shall be leakage tested by applying 6" w.g. pressure and maintain constant pressure with zero pressure drop for minimum of 10 minutes. Perform tests according to SMACNA "HVAC Air Duct Leakage Test Manual" before ceiling installation "cover" (recommend testing before insulating duct.)
7. Access panels: UL Listed, stainless steel, double skinned, cam lock access door similar to Access Armor.
8. Naturally vented appliances must be proven to be "safe" if installed in the "negative" pressure "back of house" space.
9. Dampers: Required dampers must have shafts that extend to outside of duct. No actuator should be installed inside the duct. Dampers must be accessible for maintenance without removing any equipment for access. Damper should not include an integral actuator. Actuator will be provided separately as part of controls scope (DDC).
10. Natural Gas cooking equipment requires electronic ignition(s), and no standing pilots can be used.
11. Test and Balance: All exhaust systems to be tested (TAB) for total CFM and capture velocities. Reference Mechanical Standard 200593.
12. Commissioning: Full commissioning of all Kitchen Hoods is required. Designs should include a complete sequence of operation. A commissioning test plan must be written and submitted for approval in advance. Commissioning activities will be under the direction of the Certified Commissioning Professional. Required testing includes pre functional test(s) by contractors completed prior to official commissioning. Commissioning

and cooking functional test(s) to be witnessed by multiple Port of Seattle departments. Depending upon sequence of operation, testing may need to be scheduled at night.

13. Terminate kitchen exhaust per IMC. Exhaust height above roof shall be in accordance with IMC 506.3.13 and IMC 506.4. Terminate Type I kitchen exhaust a minimum of 10-feet horizontally from parts of the same or contiguous buildings, and avoid locating fans near the inside 'L' of a building where grease could blow onto adjacent windows or walls. Exhaust fans and outlets shall not be located closer than 25 feet from any air handler outside air intake.

## **PART 2 – PRODUCTS**

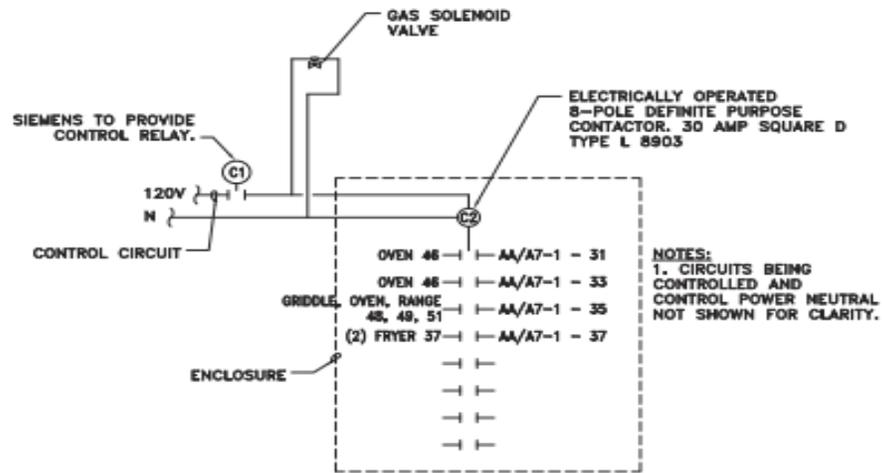
### **2.01 TYPE I KITCHEN HOOD**

- A. Hood shall be constructed of not less than 18ga. stainless steel and shall be completely controlled by the building DDC system.
- B. UL 710 listed hoods shall operate with a minimum “capture velocity” of 150 cubic feet per minute per lineal foot as measured at the hood outer rim or the UL 710 listed cfm, whichever is greater. Non UL710 listed hoods shall comply with IMC 507 and the “duty” of cooking appliance. (Example: A UL listed wall mounted canopy hood with a face width of ten feet and a depth of four feet from the wall would require 2,700 cfm exhaust (((4'+10'+4') X 150 cfm)) unless the listing required more!)
- C. Fabricate hood, ducts and accessories in complete accordance with Chapter 5 of the International Mechanical Code, NFPA 96 and local building and fire department requirements.
- D. Type I hood shall contain at least two sets of high efficiency grease baffle filters.
- E. Ducts are recommended to be round, must be minimum 18GA “300” series Stainless Steel liquid tight welded construction routed vertically to the exterior. Horizontal runs shall contain at least one UL listed watertight access door on the horizontal run.
- F. Ducts encased in approved and listed “Fire Wrap” such as 3M Fire Barrier Duct Wrap” shall be installed with protective metal jacket (0.016 Aluminum or 0.010 Stainless Steel from the hood to the roof.

- G. Perform Duct leakage tests: Light test in accordance with IMC 506.3.2.5 and leakage tests by applying 6” w.g. pressure and maintain constant pressure with zero pressure drop for minimum of one hour before ceiling installation “cover”. (Recommend testing before insulating duct.) Approved pressure test, as specified above, can be substituted for light test with approval and witness by Airport Building Department (ABD).
- H. Provide Siemens DDC system activated and controlled kitchen systems. Hood control shall be automatic under control of the Siemens building DDC system and without a tenant “Off” switch (other than fire shutdown or other safety shutdown switch). The Siemens DDC system shall provide sequencing for “normal” (fans are “On” during all operating hours), “unoccupied” (nighttime shutdowns), hood temperature interlock, local (cooktop) “Fire” events (fire suppression activation may be through an approved control panel), and for “smoke control” sequences as appropriate requiring building equipment control.
- I. Fire Extinguishing System: All fire extinguishing systems shall be UL 300 listed in accordance with NFPA 96 and WAC 51-54A-0904. Approved automatic systems shall be provided for protection of hood, ducts and cooking equipment and shall be tied into the fire alarm system and DDC control system. Each fire extinguishing system to provide independent output relay. In addition, fire alarm system to provide a common signal upon space or zone fire alarm to DDC.
- J. Natural Gas piping to cooking equipment under Type I hood to be provided with a common natural gas solenoid valve. DDC sequence of operation closes gas valve upon fire situations (adjacent zone or space specific either under hood or in space), or due to hood temperature interlock (exhaust fan is off or fails to proof with a high hood temperature). Natural gas valve to reopen upon clearing of all alarms. During unoccupied periods without a fire situation or hood temperature interlock, exhaust fan off situation should not close natural gas valve. See Figures 1 and 2.
- K. Natural Gas “reset” as shown in Figure 2 to be installed at 5 to 6 feet from finished floor and be accessible, not blocked by equipment, to occupants of space.
- L. Electric supply to cooking equipment under Type I hood to include a single common relay contactor installed by electrical contractor (division 26) for all cooking equipment that needs to be disconnected under hood. Controls sequence of operations (DDC) to interrupt power to common contactor upon fire situations (adjacent zone or space specific either under hood or in space), or due to hood

temperature interlock (exhaust fan is off or fails to proof with a high hood temperature). See Figures 1 and 2.

- M. Electrical Cooking equipment under Type I hood must use an automatic resetting breaker, such as a GFCI installed by electrical contractor (division 26). No "Shunt Trip" breakers to be used.



**SEQUENCE OF OPERATION**

INTERLOCK DISCONNECTS ELECTRICAL POWER UNDER HOOD UPON ACTIVATION OF THE ASSOCIATED FIRE CONTROL PANEL OR UPON DDC SYSTEM SIGNAL THAT THE ASSOCIATED HOOD EXHAUST FAN IS NOT OPERATING.

**DETAIL**

EXHAUST FAN / OVEN INTERLOCK SHUTOFF SCHEMATIC DIAGRAM

SCALE: N.T.S.

3  
E1.1.1

**Figure 1 (Typical)**



**Figure 2 (Typical)**

- N. Where more than one Type I hood is installed in a Concession space, there will be a single gas DDC solenoid operated valve and/or electrical circuit relay connected to shut down all equipment under all hoods in the event of a fire. Fire alarm system to provide a common signal upon space or zone fire alarm to DDC.
- O. Heat detector (DDC temperature sensor) location for hood actuation shall be accessible in or at the hood, and not be located in the duct. Hood Temperature interlock to be on the controls system (DDC) to automatically stop cooking fuel source if exhaust fan is not on or fails to proof.
- P. Recommended practice for cook top equipment involving steaming or boiling water (such as Woks or steamed vegetable preparation in conjunction with “regular” cooktop use (fryer or grill)) should involve incorporation of a hood water wash system for cleaning.

**2.02      TYPE II KITCHEN HOOD**

- A. All dishwashers shall employ a Type II kitchen Hood as designed by the licensed project mechanical engineer.
- B. Chemical dishwashing machines are not allowed to be installed at SeaTac airport as the chemicals defeat the grease interceptor operations. A minimum of 140 degree water shall be supplied to dishwashers to meet Health Department requirements for dishwashers without chemical injection.
- C. Dishwasher Type II hood ductwork must be as short as possible. Ductwork must be 0.024 thick min. Aluminum or equivalent Stainless Steel construction and have watertight joints.
- D. Approximately 30% of exhaust for the dishwashing areas must be exhausted from the ceiling level.
- E. Type II hoods required over electrical cooking equipment to include a single common relay contactor installed by electrical contractor (division 26) for all cooking equipment that needs to be disconnected under hood. Controls sequence of operations (DDC) to interrupt power to common contactor if exhaust fan is off or fails to proof during occupied hours. See Figures 1 and 2.

**2.03      KITCHEN HOOD EXHAUST FAN (Applies to Type I and Type II).**

- A. Manufacturers: ACME, Cook, Penn.
- B. Centrifugal fan in aluminum housing of upblast, roof-top configuration, AMCA rated, and UL listed. Fans: AMCA Certified, Non-overloading.
- C. Fans shall incorporate grease containment (Type I) such as grease guard, grease gutter (or equivalent grease capture collar system) and hinged curb (Type I and II) for maintenance access.

END OF SECTION