FLOW CHART
HOW TO USE

When using a flow chart, only ONE question can be asked at a time. Furthermore, the "flow" of the chart must be followed. Always begin at the arrow for the starting point, question 1, which asks if smoke or grease–laden vapors are produced. For example, If you answer 1 (the first question) with a YES (it does produce smoke or grease-laden vapors), then you never get around to asking the questions relating to the process producing steam, nuisance odors or the total heat input levels asked by 3 unless the answer to 1 is No. Thus, if you answer YES to the first question, NO to the third question, and the cooking or heating equipment does not comply to UL710B you get a Type I hood. You cannot then answer subsequent questions, as they do not follow logic line (or flow) of the chart. However, if, in the inspector's opinion, the amount of grease-laden vapors produced is insignificant or not visible, then they can use the "other criteria" to justify installing the equipment either with a Type II hood, or no hood at all. The flow chart is a great guideline, but it is worthless if the flow chart discipline is not applied.

Type I

1. Does cooking/heating process emit smoke or grease-laden vapors?

This is the most important of all of the questions, and requires the most diligence to answer. Grease deposition is a fire hazard because grease may spontaneously combust at about 680° F. Objective documentation may exist to assist. EPA 202 documents a concentration of particulates given a specific ventilation rate for UL 710B listed re-circulating hood systems using UL 300 fire suppression systems. Concentrations of less than 5 mg/m^3 at specific exhaust rates are considered to be negligible, and not a fire hazard. Future test methods will provide documentation relating to total volume of grease-laden effluent irrespective of exhaust rates. Subjective evaluation criteria are also valid. If there is no oil medium, and the product does not include animal protein items, then there will not be grease-laden effluent. There may be "excess" heat and condensate, but not volatile organic compounds that can condense and build up in sufficient volume to fuel a fire. Because a toaster can make toast "smoke" does not mean a hood is required. Because a steam table produces some vapors does not mean a Type II hood is required. Soup or sandwich warmers, though they may have inputs beyond the limits referred to in this guide do not necessarily need to be hooded, as they are not "cooking", and the temperatures to which they bring food products are not high enough to generate significant effluent

2. Is ventless equipment listed to UL710B criteria?

This is the objective documentation referred to in 1. At this time UL 710B is the best critical limit we have. Submittals for re-circulating hood systems listed to this standard do not require Type I hoods.

Type II

3. Does process produce fumes, steam, and nuisance odors or the total heat input is greater than 12K BTU/hr or 3.7 KW?

This question deals with fumes (defined as solid particles condensed from the gaseous state), steam and unwanted odors originating from the process. If these cannot be controlled in the space by the HVAC system (question 4 below) a Type II hood may be required. The second part of the question deals with heat equivalents emitted into the space. This is where the "other criteria" referred to in the flow chart becomes critically important. The amount of excess heat generated by a piece of equipment that is warming or holding a food item consists of two variables: latent heat and sensible heat. Latent heat is the amount of heat released when steam makes a phase change to become vapor, or when vapors precipitate. Sensible heat is the heat value represented by a thermometer…it reads the same regardless of relative humidity. If the installation is in a large space, such as a stadium, auditorium, arena or other facility with very high ceilings and large volumes of indoor air, there is no need to vent as there is no hazard of elevating temperature and humidity levels. However, if the space is small, or lacking mechanical ventilation, and or has low ceilings, then a Type II hood may be needed to assure that the heat from the process does not cause the space to become uncomfortable or humidity levels to rise to such as point as to encourage mold growth or ceiling panels to discolor or sag. The critical limits associated with this question are based upon empirical evidence and best guesses from informed industry experts.

4. Can the HVAC system accommodate heat, odor, fumes and steam?

Unwanted odors or fumes may require a Type II hood if the kitchen HVAC system cannot control them within the space. Also, the HVAC system must not allow the relative humidity (RH) within the space to exceed 65% RH at any time. Greater than 65% RH may lead to mold or fungal growth within the space.

"No Hood" Required Qualifiers

Is this a dishmachine?
Under-counter type dishwashers do not require a hood. All others do, unless equipped with an integral ventless system.

Does process produce fumes, steam, and nuisance odors?
"Excess" is defined as comparable amounts relative to other low to medium temperature cooking equipment, such as fryers, griddles, ovens or dish machines.

In every example it is necessary to consider all of the variables that relate to safety. Replacement air is critical to capture and containment of heat and grease-laden vapors. From a mechanical perspective, simply verifying that the makeup air system exists, is wired to the exhaust, and is of sufficient volume to prevent creating a negative pressure in the space is adequate. The commissioning of an exhaust system is critical, as the motors that drive the fans for both exhaust and supply are typically shipped from the manufacturer ready for full speed performance. Engineers specifying fans always select fans with greater horsepower than is necessary to hit their design air volumes, thus, every system MUST be balanced.

From an environmental health perspective, taking care of the mechanical and fire needs is only the beginning. Replacement air diffusers that impinge air onto prep tables and potentially hazardous foods that are being held hot or cold presents a hazard. Turbulence is to be avoided in the kitchen prep area, though it is desirable in the dish room, especially over the clean dish table and over drying racks. Another disconnect between mechanical codes and health codes relates to materials used. The Mechanical Code allows the use of regular steel to form a hood. Health codes require that surfaces be durable and easy to clean, with coving where two planes meet (ANSI NSF Std 2). Thus stainless steel hoods sporting labels for NSF Std 2 listings are needed. In every case,

common sense must be used to gain the best perspective on the potential hazard that the menu, process and the equipment may present in each individual, specific situation. Similarly, the code official needs to check the data plates provided on UL 710 hoods. All hoods that are pre-engineered and listed to UL 710 are required to have data plates that indicate the minimum exhaust and replacement air values that the assembly was built to. Unlisted Type I hoods must follow the prescriptive formulas of the Mechanical Code for exhaust volumes. The 3 inch air barrier requirement where wall mounted hoods abut combustible wall material is a component of their UL 710 listing. Unlisted hoods must be checked to verify that they maintain appropriate distance to combustible requirements, and adequate distances from the bottom edge of their UL listed filters (unlisted filters are not allowed in any Type I application) to cooking surfaces or open flame, as the case may be.

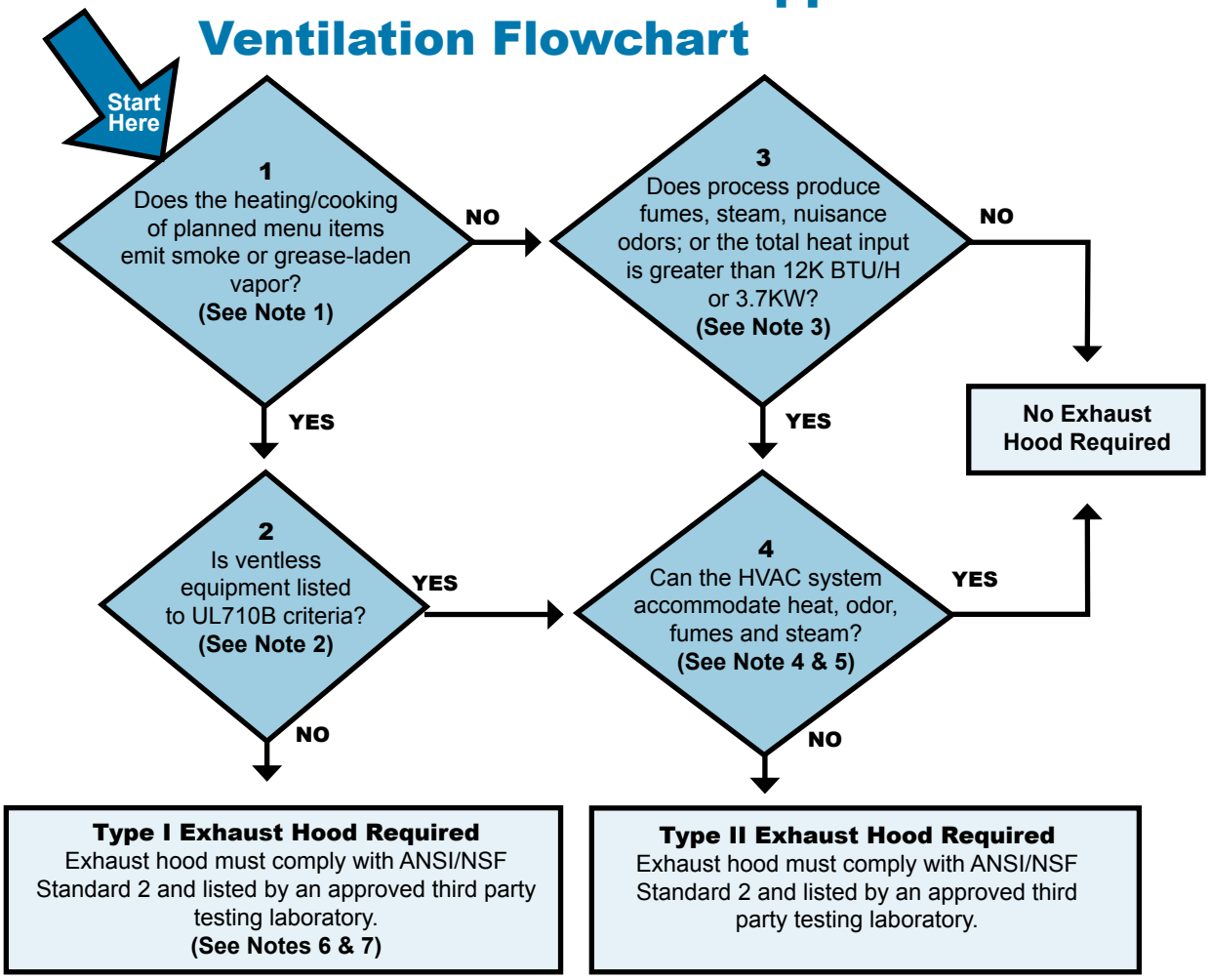
Special Notes

The Minnesota State Fire Marshal has ruled (FMCAP 00-007-I) that the “wood only” stone hearth-style ovens must have all separate, welded Type I ducts. Though they do not require fire suppression systems for surface or duct protection, they do require a hose station be installed so that it has ready access to the oven in the event of fire. All such equipment must be installed pursuant to the manufacturer’s installation instructions. Eyebrow hoods are not required as the oven is designed to be at a negative pressure compared to the kitchen. The local code official may also accept class A (NFPA 211) chimneys. Hearth ovens with heavy usage do produce grease-laden vapors and effluent, and their ducts are subject to deposition of grease. An aggressive cleaning schedule may be needed, and it is recommended that an inspection be made after 30 days of use to better determine the required cleaning schedule for safe operation. This cleaning requirement should be part of the food or food service licensee’s due diligence master cleaning schedule, and available for review by the Authority Having Jurisdiction upon inspection. The Minnesota Uniform Fire Code (MUFC) requires inspection of such systems and safeguards every 6 months.

Cooking equipment that uses solid fuels such as wood and/or charcoal are required to have a separate hood (or hood sections, dedicated duct collar), duct and exhaust fan. The exception to this is that another piece of cooking equipment can be located beneath the same hood provided it is not a piece that requires surface fire suppression (fryer, griddle, range, braising pan, gas or electric broiler, etc.). All such equipment requires surface fire suppression and duct protection. A single fire system can serve multiple hoods provided they are located in the same fire zone.

The Minnesota State Fire Marshal continues to accept NFPA 13, UL subj. 199B water-based fire suppression cabinets and systems that use Grinnell GEM EA-1, ¼” orifice sprinkler heads for surface fire suppression over fryers and other surface cooking equipment. They will continue to do so until such time as a listed head becomes available.

Commercial Kitchen Appliance Ventilation Flowchart



NOTES:

1. The industry standard for measuring grease-laden vapor is EPA test method 202 which measures vapor at an air flow rate of 500 cubic feet per minute (CFM). The maximum test emission rate should not exceed 100 mg/min. (5mg/m^3) of grease vapor. See http://www.epa.gov/ttn/emc/methods/method202.html.

2. UL710B is the industry performance standard for recirculating hood systems for cooking equipment with integral devices for reducing condensable particulate emissions. See http://ulstandardsinfonet.ul.com/scopes/0710b.html.

3. The heat gain of all heating and cooking appliances must be included in the evaluation of the space.

4. The kitchen HVAC system must maintain a continuous relative humidity not to exceed 65%. (ASHRAE 62.1-2004.5.10.1)

5. One must consider Other Criteria* such as whether existing HVAC system has capacity to compensate for heat gain associated with process(es) or multiple units. A professional engineering report may be required by the code official confirming that the building HVAC system has been designed to overcome the heat gain introduced by the cooking appliance(s).

6. Pursuant to Minnesota Building Codes, all Type I hood systems require an automatic fire extinguishing system.

7. Exhaust hood must be UL710 listed or comply with Type I hood requirements in Section 507 of the MN Mechanical Code.

*Other Criteria:
1) Menu/volume (food and equipment),
2) Temperatures and heat gain,
3) Type of fuel,
4) Method of heat transfer
5) Space, HVAC rates, % fresh air (outside)