



Kitchen Ventilation Base Building Requirements for Food Halls and Mixed-Use Retail Properties

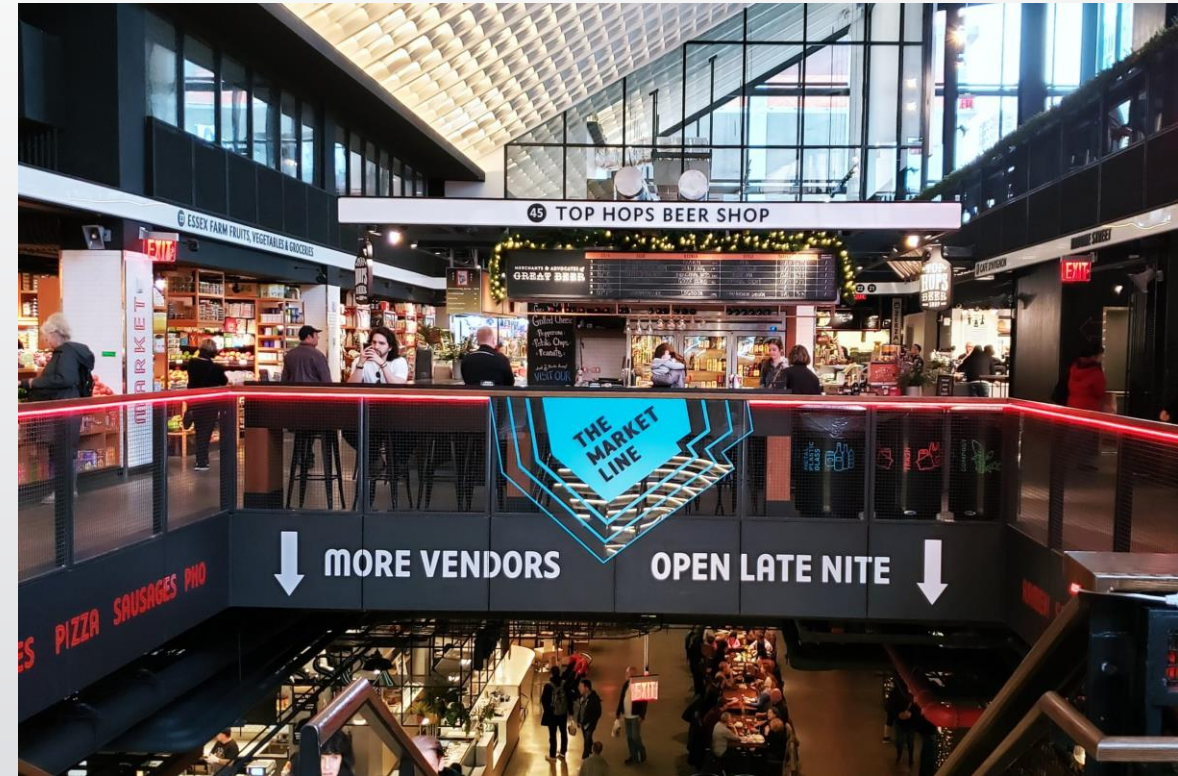
KitchenVentilation.com

Knowledge by **Halton**

[HTTP://WWW.TECHNICALAIR.COM/](http://www.technicalair.com/)

The Known Unknowns of Foodservice Operation

- Food Halls and Mixed-Use Retail properties create significant challenges for property developers and designers
 - Overall concept may be known, needs of individual tenants may not be
- Planning base building infrastructure for future tenants is designed around several unknowns
 - virtually all these unknowns can be addressed
- These types of projects require a system capable of adapting to changes in tenants or vendors
- With the useful life of the buildings estimated to be 15-30 years, a system that is put in place should be able to accept or be updated to the latest generation



Questions to Ask to Determine Kitchen Ventilation Base Building Requirements



- **How many vendor or tenant spaces need to be accommodated?**
- **Is there a mix of QSR (Quick Service Restaurant), Fast Casual, and Fine Dining?**
 - In the case of Food Halls, how many stalls or vendor spaces need to be accounted for?
- **What is the most efficient path for the exhaust duct to route through?**
 - Is it cost-effective to run the duct vertically through revenue-producing spaces or is there sufficient infrastructure space carved out to allow for it?
 - Is it more cost-effective to run ductwork through a side wall?
 - Can the system be manifold together to allow for one or two main trunk lines and have tenants or vendors connect to the system?
 - If a manifold system is available, can the vendors or tenants operate independently?
- **When consideration is given to sidewall discharge at the lowest levels of the building, are there residential properties or adjacent spaces that might generate complaints about odors?**

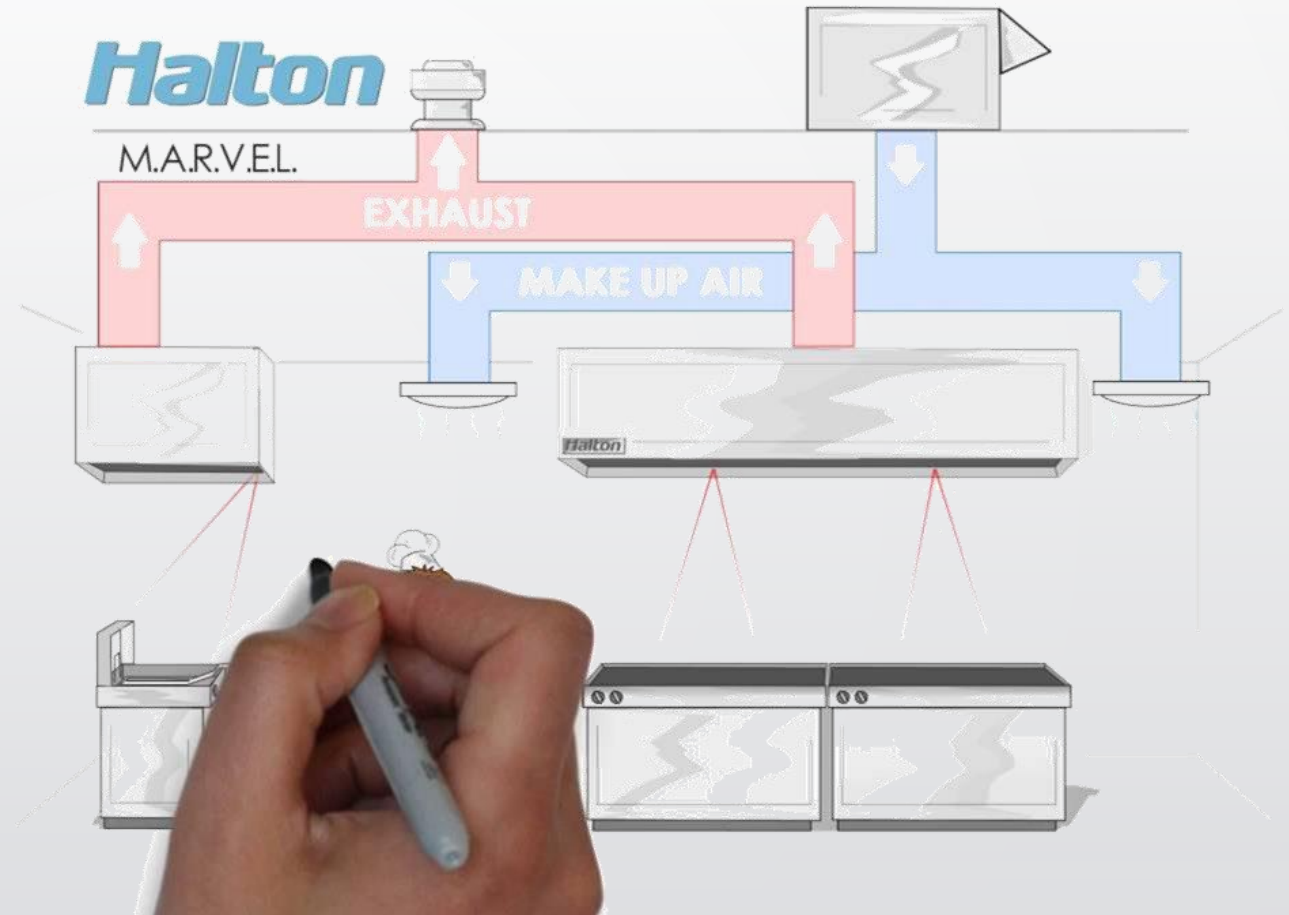
Estimating Exhaust Needs

- Estimates for exhaust needs must consider:
 - Number of vendor or tenant spaces
 - Allowance for what type of foodservice operation
- **Example: 10-space food hall or mixed-use property.**
 - Developer would like to have:
 - 5 QSRs (Quick Service Restaurant)
 - 3 Fast Casual
 - 2 Fine Dining Establishments
 - Typical QSR has lowest exhaust burden
 - close-coupled style hoods requiring lowest airflows
 - Fast Casual concepts have slightly larger footprint
 - would require increase in available exhaust capacity
 - Fine Dining has the greatest exhaust requirements and appliance load

Type of Foodservice Operation	Estimated Exhaust	Allocated Spaces	Total Estimated Exhaust
Quick Service Restaurant (QSR)	2000 CFM	5	10000 CFM
Fast Casual Restaurant	3000 CFM	3	9000 CFM
Fine Dining Establishment	5000-7500 CFM	2	15000 CFM

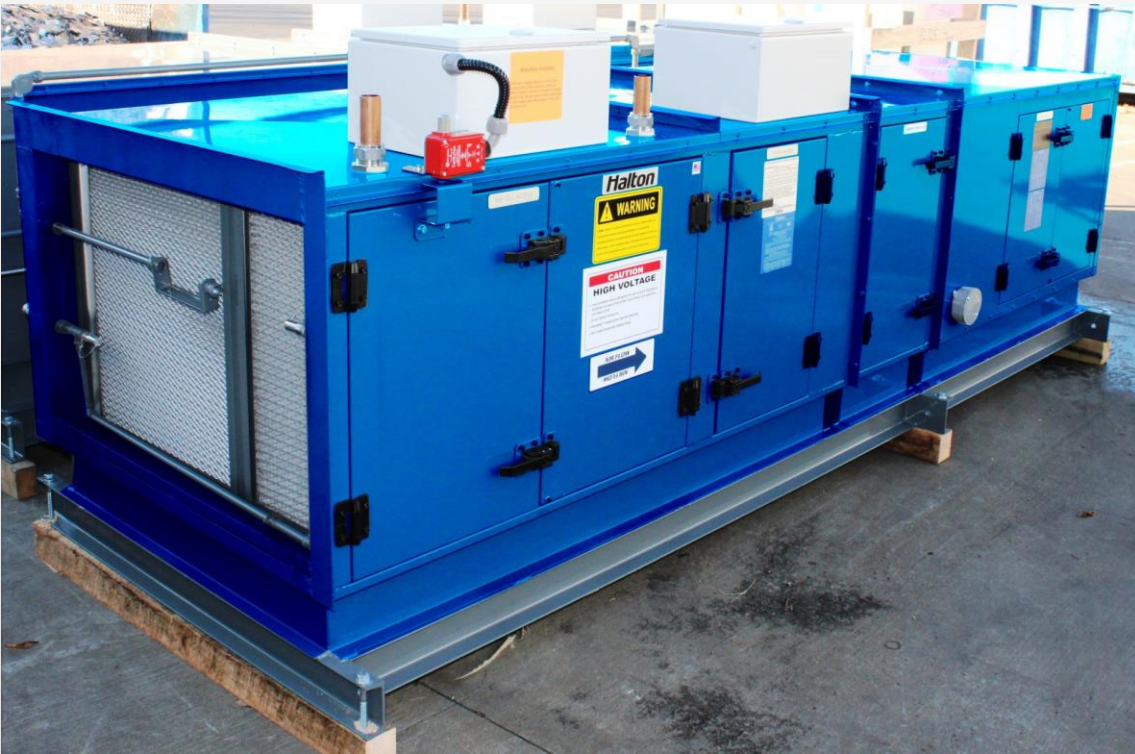
Estimating Exhaust Needs

- In example above, total exhaust for 10 spaces = 34,000 CFM
 - It does not necessarily mean that max exhaust will be required at all times
 - Exhaust infrastructure, ductwork size, exhaust fan, and make-up air requirements need to be sized to accommodate that amount of exhaust air
- Once the estimate for total exhaust is calculated, then a determination for the exhaust duct routing and if a pollution control unit is needed



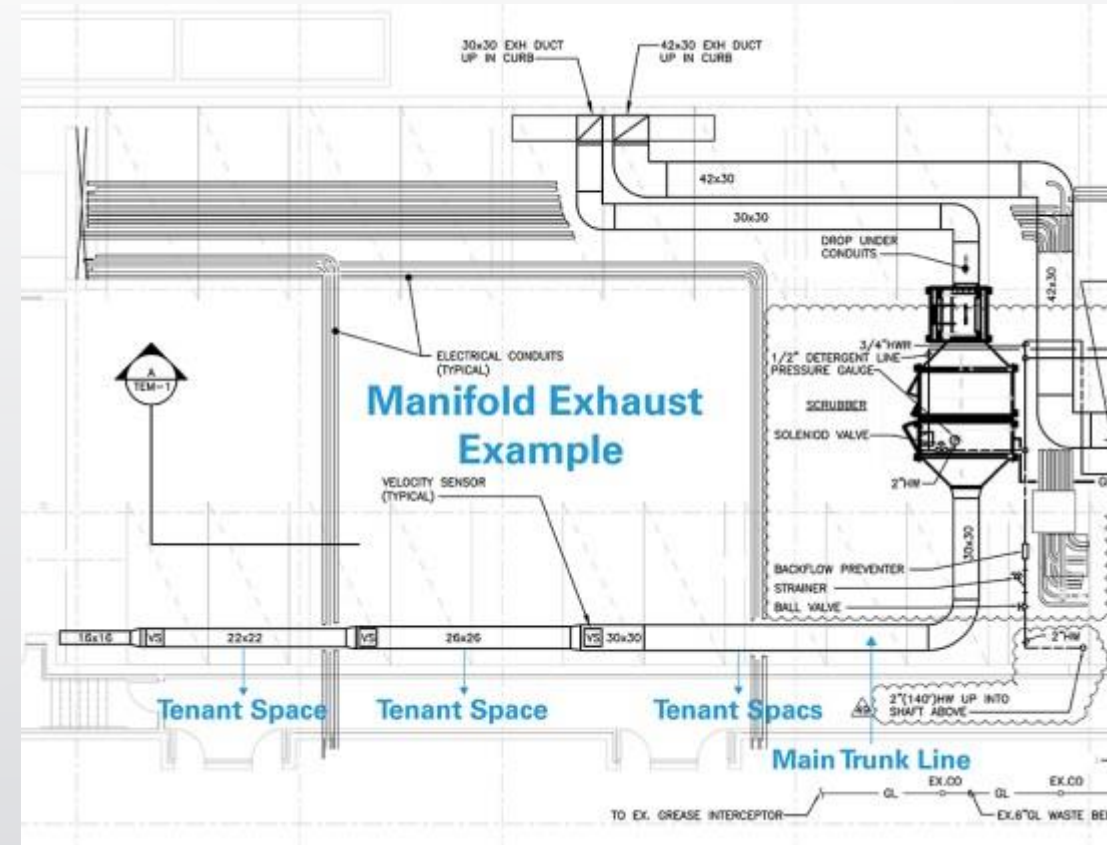
Considerations for Pollution Control Units (PCUs)

- If Filtration needs are contemplated
 - Number and type of foodservice operations
 - Cooking processes from bakery to a steakhouse
 - Operational hours
 - Estimated loading and maintenance cycles
- Odor Mitigation
 - Area of discharge
 - Best available technology
 - Odor monitoring capabilities
 - Avoidance of residential complaints

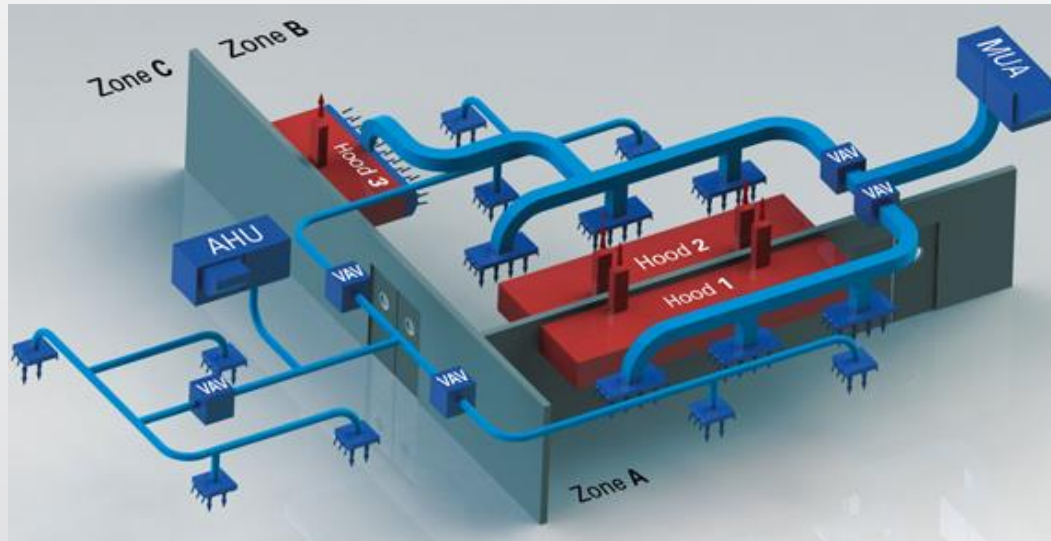


Base Building Ductwork

- Assume a manifold duct system allows a central exhaust fan or Pollution Control Unit (PCU) to serve multiple tenant spaces:
 - Vendor ductwork would typically exit the vendor space and tie into the manifold duct
 - Where the ductwork discharge is located is a function of
 - Location of the tenants
 - Most direct access to the outside of the building
 - This can be either a horizontal sidewall discharge (assuming the appropriate PCU technology is used) or a vertical stack to the roof
 - A cost comparison can be made to determine the most cost-effective means of discharge
 - Routing ductwork vertically may be impractical due to number of floors and impact on removing revenue-producing square footage



Hood/Systems Controls



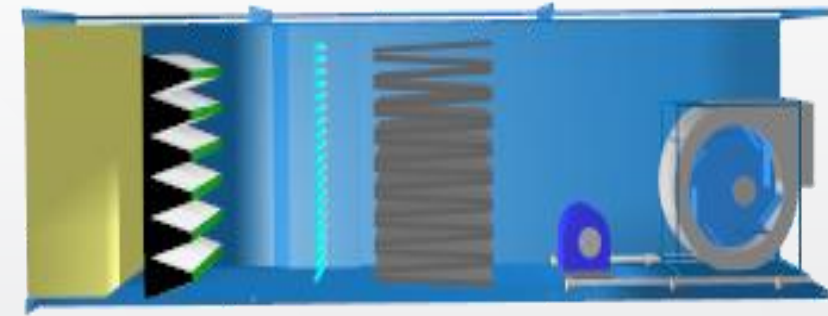
- Hood/control package for vendor supplied as part of vendor space fit-out detailed in the lease agreement
- Systems/controls are available that can manage multiple vendor systems on common ducts while operating independently of each other
- Control package manages operation of base building exhaust system
 - Monitors affected ductwork for grease deposition
 - Monitors operational status/maintenance intervals of [Pollution Control Unit](#)
 - Receives signals from vendor systems to determine required exhaust and MUA levels
- Controls must be able to adjust to reflect any new vendor requirements for exhaust volumes
- Overall exhaust volume on the base building system must accommodate future vendors
- “Moving” exhaust levels for new vendors is a simple program change for those systems capable of these adjustments

Pollution Control Units



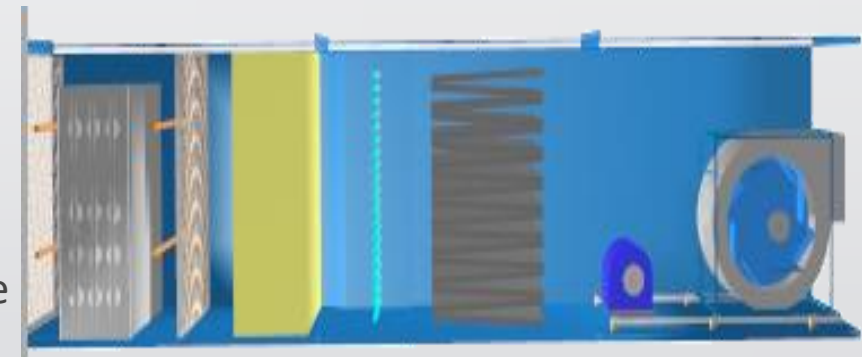
- **Media Filter Units**

- Lower first cost, higher maintenance cost
- Filters are disposable/ need to be replaced when full
- Have filter monitoring capability-indicate when filters need to be changed
- Effective systems on lighter load applications
- Allowance for ongoing maintenance/filter replacement should be accounted for



- **ESP's (Electrostatic Precipitators)**

- Higher first costs but typically lower maintenance costs.
- Remove particulate by charging the grease particles positively
- Have wash system that can clean plates daily
- Single pass, double pass, and, in some instances, triple-pass configurations
- volume of loading the system would see determines number of passes
- solid fuel application/very high grease production necessitates a double or triple pass



- See presentation, ["What is the Difference Between Kitchen Pollution Control Units"](#) for more information

Smoke Mitigation



- Smoke particles vary in size from less than 0.1 microns up to 2 microns
- solid fuel operations produce much finer smoke particulate than other operations
- Depending on cooking processes, higher efficiencies of filtration may be required to remove visible smoke
- Recommended to use HEPA filter with a minimum efficiency of 99.97% for particle size of 0.3 microns for solid fuel operations
- Absolute filters with lower efficiency rating (95% for a particle size of 0.3 microns) may be used if smoke removal is not as crucial



Cooking Odor Mitigation :4 Major Odor Abatement Systems



- **Odor Spray**

- Masking spray injected into airstream on timed interval cycle
- Effective for minor or “non-critical” odors such as baking
- Spray is consumed and must be replaced
- Paired with paper filter units

- **Permanganate**

- Adsorbent chemical compound used in combination w/ carbon
- strong oxidizing agent
- requires a chemical reaction that is not always present in cooking effluent
- not as effective as activated carbon

- **Carbon Panels**

- most effective carbon-based odor absorbent material
- activated carbon made from coconut shells
- traps the VOCs that cause odor
- Once full, must be replaced

- **UV/Carbon Panels**

- Most effective odor mitigation technology available.
- UV light, which acts on the VOC's/carbon adsorbs them
- Ozone from the UV lamps continues to reduce odors after the effluent is discharged from the PCU
- Effective for “odor critical” applications

Fire Risk Mitigation & Fire System Requirements



- All fire codes must be adhered to, including access points and fire wrap.
- Periodic inspections required based on NFPA96 and IMC Code standards.
- Technologies can monitor grease buildup in ductwork/ alert management that critical maintenance of the ductwork is required
- There are two methods to protect affected ductwork, PCU and tenant hoods, with manifold duct system
 - Have an electric actuation of the individual tenant hood and the manifold duct.
 - Local requirements would dictate whether the PCU needs to activate its fire system if there is an event in a tenant space
 - This method isolates fire suppression discharge to individual tenant and manifold duct (possibly the PCU dependent on local requirements)
 - Have all tenants' fire systems activate when an event occurs in one space
 - Refer to [NFPA 96](#), Chapter 10, and your local code authority for their specific requirements.

Closing Remarks

- With a base-building configuration in place, the developer has significant flexibility in assigning the tenant space based on exhaust demand. Exhaust can be shifted from a space using less of the exhaust allowance to a space requiring slightly higher exhaust values
- Should you require help in planning your Food Hall or Mixed-Use Retail properties, the experts from [Technical Air Systems, Inc.](#) and [The Halton Group](#) can guide you on the proper selection and any accessories needed to meet your local requirements



Contact the Experts

- Learn more about Halton Group's Food Halls and Mixed-Use Retail Properties Solutions along with their complete commercial kitchen line by going to <https://www.halton.com/solutions/food-hall-ventilation/>
- Contact the Technical Air Systems' Sales Engineering Team at 973-285-0333 or by email at solutions@technicalair.com
- Learn more about Technical Air Systems, Inc at <http://www.technicalair.com/>
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