

# Halton

– Ventilated Ceiling Solutions



Enabling Wellbeing

**Halton**

# Halton Ventilated Ceilings for enhanced hygiene and safety

Thermal conditions and indoor air quality have a significant impact on the hygiene, safety, and comfort in food service facilities. In a professional kitchen, the work conditions are especially demanding, and four main factors affect thermal comfort: air temperature, radiation, air velocity, and humidity. At the same time, the cooking process emits contaminants at a high rate. Legislation and food safety regulations impose demanding hygiene requirements wherever people, equipment, and installations come into contact with food. It is possible to influence all these factors with well-designed air-conditioning and ventilation systems.



## **Ventilated ceiling applications:**

- Institutional kitchens are characterised by quite low heat loads and particle concentration and by high humidity produced by the cooking process. Cooking appliances are placed in a large zone, where visibility is to be maintained.
- Open kitchen applications, food courts at shopping centres and airports, and teaching kitchens at cooking schools require similar aesthetic skills in staging. In addition to meeting the efficiency, hygiene, and functionality demands, the preparation areas must be clearly visible and aesthetically pleasing.

- Halton Ventilated Ceiling solutions including Capture Jet ventilated ceilings and Cyclocell ceilings are designed to provide excellent indoor climate conditions for highly productive kitchen work, while taking the life-cycle costs of the kitchen into account.

An attractive and totally adaptable design combines with flexible integrated lighting and the quiet operation of our ventilated ceilings to help create an aesthetic and hygienic food service environment in prestige architectural projects, display cooking applications, institutional kitchens, and culinary school facilities.

# One integral ceiling concept, several functions

**The Capture Jet ventilated ceilings** are a flexible solution for kitchens where optimised hygienic conditions, health, safety, and aesthetics are a concern. The integrated design combines low-velocity air supply, effective capture and containment via Capture Jet™ technology, and high-efficiency extraction of pollutants.

The principle of the new Capture Jet ceiling concept lies in the supply air distribution method, aimed at creating optimal containment of pollutants and reducing the contaminant level in the food service facility. A combination of the Capture Jet technology and low-velocity displacement ventilation reduces the cooling capacity required while maintaining the desired temperatures in the occupied space. This improves indoor air quality without increasing the initial and running costs of the air-conditioning system.

The Capture Jet ceiling concept is a wall-to-wall system that covers the 'active' cooking area above the cooking appliances as well as the 'passive' area



where there is no cooking processed. The system consists of stainless steel exhaust air modules with high efficiency KSA grease filters, displacement ventilation through low velocity supply air units either made of stainless steel or aluminium, and integrated light fittings. The efficiency of the exhaust system is improved with Capture Jet technology installed flush alongside the active area. The small air jet helps to direct heat and impurities towards the exhaust, improving the capture and containment efficiency. Low-velocity air diffusers bring draught-free fresh air to the working zone.



# A solution with flexible and functional design

The flexibility of the modular ceiling concept simplifies adaptation to any kitchen layout and facilitates installation and maintenance. Bespoke solutions are designed on the basis of the structural limitations for both new and renovated buildings in restaurants, hotels, central kitchens, and staff canteen facilities.

The wall-to-wall mounted ceiling consists of a smooth surface and structure designed for optimal flow and facilitate simple, cost-efficient cleaning. The patented ergonomic vault design of the Capture Jet ceiling creates a fresh comfort zone to a height of approximately two metres in which temperature, humidity, and air flow are

maintained at ideal levels for optimal comfort. Special large-cavity vaults are available to accommodate even the highest instantaneous contaminant loads. The closed-ceiling concept not only provides superior hygiene but also protects the technical installations and building structure from grease, humidity, and impurities while improving fire safety. Flameproof and non-flammable grease extractors improve the fire safety of the ductwork. Supplementary fire suppression systems can be integrated into the ventilated ceiling system for further protection for the staff and the cooking equipment. The grease extractors can be cleaned easily in a dishwasher or with the automatic cleaning system as an option.



## Features of the Capture Jet ceiling concept:

- Integrated Capture Jet technology for optimal capture and containment efficiency
- Reduction of air contaminant levels up to 70% (BGN survey report)
- High-efficiency grease removal with KSA multi-cyclone filters (95% of grease particles sized eight microns and above)
- Greater energy savings thanks to the low air volume needs with Capture Jet technology, the displacement ventilation method, and adjustable light fixtures

- Protection of the building's structures from grease, humidity, impurities, and fire hazards
- Flexibility in kitchen configuration and architectural design (open lines of sight, special-colour finish)
- Highly efficient, glare-free lighting
- Integrated ventilated ceiling concept including not only all technical features from grease extraction and make-up air to lighting but also delivery, installation, and maintenance provided by a single supplier

# Design guidelines

**The design of a professional kitchen** requires an understanding of the specific restaurant involved and its food service process. Ventilated ceilings require real design expertise because they create an integrated all-in-one solution for commercial kitchen ventilation (efficient extraction, comfortable supply, pleasant lighting, and aesthetic ceiling panel coverage).

The Capture Jet ventilated ceiling concept applies a total approach to kitchen ventilation design allowing the consideration of indoor air quality and energy-efficiency factors simultaneously for the chosen room air distribution system. The ventilation system is designed on the basis of the target values for indoor air quality, the actual heat loads of the kitchen appliances, and the capture efficiency of the ventilation system.

1. The design process starts with identification of the cooking areas where heat and effluents are emitted. Exhaust air flow rates are calculated according to the type of cooking equipment installed, intensity of the cooking activity, and installation height. The exhaust modules are located above these active areas with sufficient overhang and are tightly connected to the exhaust duct. Unique dome-shaped ceiling panels are designed for use between the exhaust units, to improve the containment volume of the pollutants and convective heat. Polluted air is stored before being aerodynamically driven towards the grease filters.

2. For optimal capture and containment efficiency, the unique Capture Jet module is located alongside the extraction area to prevent the thermal current and impurities from spreading into the space. This contributes greatly to creation of a better environment in the cooking area.

3. Make-up air is distributed by the supply air duct through specially engineered low-velocity diffusers designed for the surrounding areas. The displacement ventilation method prevents cross-draughts and uses the natural convection 'engine' of the cooking equipment to guide the heat loads and impurities in the upper areas for exhaust while maintaining a comfortable air temperature in the working zone.

4. Lighting modules are positioned evenly in order to illuminate the entire kitchen area without reflections or shadows.

5. Ceiling panels made of aluminium or stainless steel are the final step, to completely and tightly close the ceiling.





## Superior capture and containment with Capture Jet™ technology

**By using Capture Jet technology** in the ventilated ceiling, it is possible to improve the total effectiveness of the ventilation system. This means better indoor air quality and thermal comfort. The Capture Jet module delivers a small air jet – the Capture Jet – that helps to guide the thermal current toward the extraction sections and prevents the impurities from spreading into the space.

In addition, the energy consumption of a Capture Jet ceiling is lower than that seen with a traditional ceiling concept. For a ventilated ceiling, Capture Jet technology can improve the total performance of the ventilation system by reducing the average contaminant level in the occupied zone by 40%. In addition, the estimated energy savings potential can be as much as 23% (Mustakallio & Kosonen, 2003).





## High-efficiency grease extraction

The purpose of a mechanical grease filter is to remove large particles from the exhaust stream and to provide fire protection by preventing flames from entering the exhaust unit and ductwork.

To ensure high-efficiency grease extraction, Capture Jet ventilated ceilings include Halton's patented, UL- and NSF-classified KSA multi-cyclone filter. This unique grease extractor is constructed of multiple cyclones that remove 95% of grease particles sized eight microns and above. Highly efficient grease filtering is achieved through a unique form of filter honeycomb and by spiralling air flow inside the honeycomb. The air flows continuously in the same direction, and thus grease particles are centrifugally separated from the air flow.



The extraction efficiency and pressure loss of the KSA filter remain practically constant when the system is in use. Independent laboratory tests prove that KSA filters are the most efficient type of mechanical grease filter on the market.

The exhaust air units of the Capture Jet ceiling are completely welded and have a minimum of gaps and joints, to improve hygiene and facilitate cleaning.



## Integrated design approach

### Low-velocity air supply

The supply air distribution strategy has a remarkable influence on pollution removal effectiveness and the thermal environment in kitchens. Thermal displacement ventilation is based on the natural convection of air. Supply air is provided at low velocity around the exhaust area, directly into the occupied area of the kitchen or at the ceiling level. This technology allows the hot and polluted air to stratify naturally, which results in a higher temperature in the upper part of the kitchen while a lower air temperature is maintained in the occupied zone, without disturbance to the convection flows.

Supply air units surrounding the Capture Jet ceiling solution bring draught-free fresh air to the working zone to refresh staff and replace convection flows. They consist of a dual honeycomb structure diffusing fresh air at a low velocity of 0.5 m/s, preventing turbulence. The recommended temperature of the supply air is 18 to 20 degrees Celsius. Air distribution not only helps to guide the heat and impurities toward the extraction sections but also significantly affects thermal comfort and the indoor air quality in the kitchen.

### Optimum lighting

Embedded in the ventilated ceiling system, steam- and heat-resistant lighting equipment is used – designed to meet project requirements and illuminate the entire kitchen without reflections or shadows – with a luminous intensity of at least 500 lux, thus improving safety and hygiene.

Tempered security glass is fixed in place with a holder and greatly facilitates replacement of fluorescent tubes. The light fixtures are IP54 protection rated and equipped with an ECG electrical control gear ensuring that the fluorescent tubes have a long life.

### Ceiling panels

Ceiling panels are made from flame-resistant materials for enhanced fire safety. The gap between the panel and the ceiling structure is tightly sealed, preventing formation of grease deposits. The ceiling panels, exhaust air modules, and supply air units are made of either stainless steel or aluminium. They can be powder coated any colour and sound-insulated to attenuate some of the noise of the kitchen, contributing further to creation of a better working environment.





### **Assembly**

The Capture Jet ventilated ceiling system is an assembly of modular construction and can be easily adapted to different kitchen layouts and configurations. Designed like a hood, the ventilated ceiling module is 300 mm high and 2500 mm long and consists of a standard trapezoidal vaulted dome that creates a large area for increased containment of the pollutants.

The system has an aesthetically pleasing and simple configuration with fully system-adapted duct connections. With your schedule and project requirements always in mind, a factory undertakes the construction and installation of the system.

### **At your service**

Halton has been developing, designing, and manufacturing high-efficiency ventilated ceiling solutions for over 30 years. We believe that high-quality indoor air is the key to a healthier and more productive life. We are committed to following standards and guidelines that help us to provide the most energy-efficient, hygienic, and safe food service environments possible.

Our international experience allows us to create unique solutions adapted for regional requirements. Halton's comprehensive project management includes customer-tailored services from the design, dimensioning, and delivery stages through installation, commissioning, and maintenance.





# Service system enhancements

## UV-C technology

Many kitchens require emission control in their exhaust systems to comply with the increasing demand for environment friendly operations. Our UV-C oxidation technology takes emission control and filtration efficiency to entirely new levels. Capture Jet ventilated ceilings can incorporate UV-C features, resulting in clean ducts and improved hygiene and fire safety.

Air extracted from above cooking equipment contains vaporised cooking oil, water vapour, smoke, and entrained grease. These airborne contaminants can be arrested at source and not conveyed into the atmosphere, by means of a UV-C solution utilising high-efficiency KSA filters combined with UV-C oxidation technology. First, grease particles of eight microns and above are filtered out via mechanical filtration, and the remaining smaller particles and grease vapours are then eliminated with the UV-C system, leaving grease-free ducts and reducing odours in the fan discharge area.



## Capture Jet Clean ceiling system

The automatic wash system maintains high levels of hygiene and facilitates cleaning of the exhaust plenum and filters while increasing productivity and reducing the need for maintenance. We offer automatic wash systems for ventilated ceilings, which combine the Capture Jet's efficiency with filter and exhaust plenum cleaning. These maintain the grease extractors' performance and keep the entire system running at peak performance.

The Clean ventilated ceiling incorporates hot-water nozzles and integrated piping, ensuring automatic cleaning of the interior of the exhaust plenum and the separators with detergent mixed with hot water. After each washing cycle, the water is automatically collected and drained through the kitchen's main wastewater system. For a maximum of flexibility, the automatic washing system can be divided into several independent washing zones on the basis of the kitchen layout and specific needs. Cleaning can be performed even when the exhaust system is in operation, avoiding costly downtime in multi-shift operations.

Washing cycles are programmed with a control cabinet that includes all necessary electronic and hydraulic components. Washing cycle times and zone selections are all controlled by a programmable PLC system. The programs can easily be adapted on site to match changing kitchen features.



# Cyclocell cassette ceilings

The Cyclocell ventilated ceiling is a modular cassette and grid system whose size can be tailored individually for each kitchen. It is engineered for light- and medium-duty commercial cooking applications and is ideal for showcasing the chef's work in display and exhibition cooking areas and cooking schools, thanks to its totally flat, smooth stainless steel panels, which create clean, unobstructed sight lines.

The Cyclocell ceiling concept is a complete ventilated ceiling system providing grease extraction, replacement air, and lighting designed specifically to meet the requirements of professional kitchens.

The modularity of the Cyclocell cassette ceiling enables the adding to or rearrangement of components to accommodate changes in kitchen equipment locations. The unique clip-in feature of the extraction cassettes facilitates easy removal for cleaning. All extraction plenums in the ceiling void are segregated from the structure of the building so that there are no areas where grease and bacteria can thrive. The modular system provides an extraction rate that is twice that of most systems, making it suitable for heavier-duty-output installation. Lighting panels offer very efficient illumination at work surface height.



Modifications and options of the Cyclocell cassette ceiling include vertical service columns, fire suppression, and trim around the elements. The system can also incorporate emergency lighting and fire-rated enclosure.

A complete system includes the necessary ductwork, fans, and other components – hidden behind a stainless steel ceiling – to provide a system that can meet virtually any requirement of the consultant, designer, or architect.

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