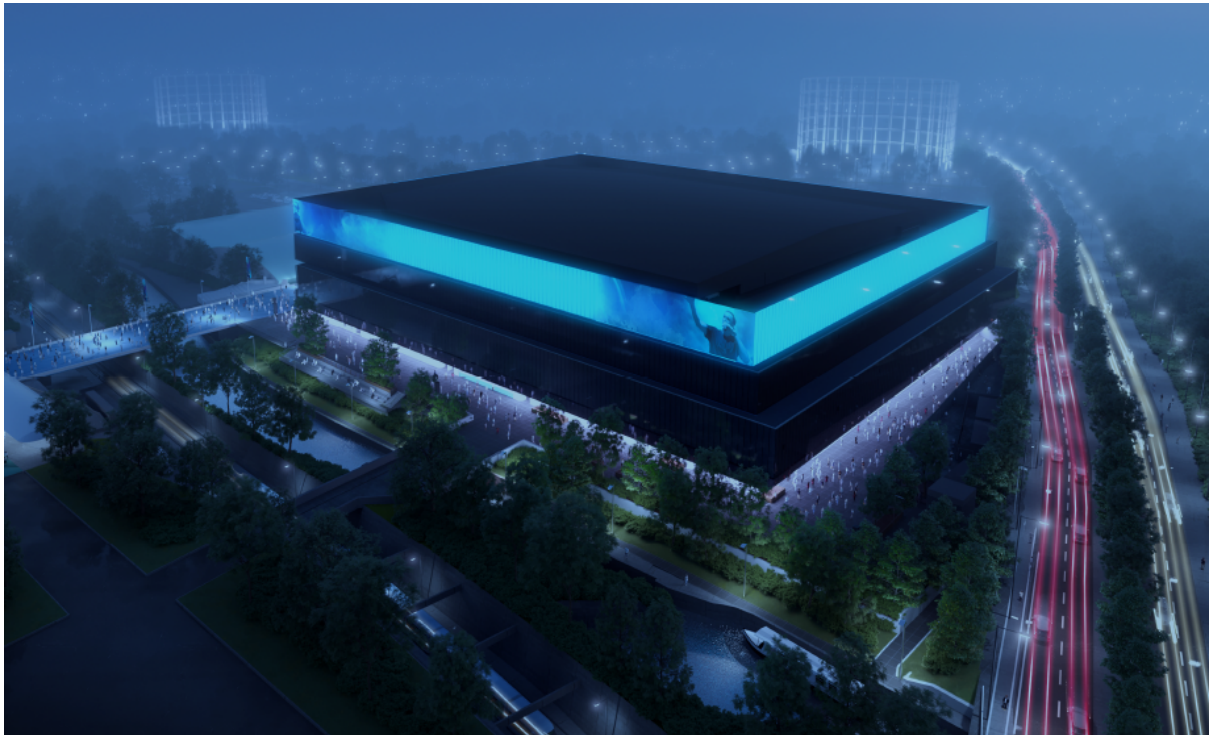


Co-Op Live - 68B202M

BRA-SES-XX-XX-RP-X-10625



Planning Condition
Section 106, Condition 25
Fumes, Vapours and Odour Extraction

DOCUMENT STATUS

Document Status				
Revision	A	B		
Date	07/12/23	19/01/24		
Author	DS	DS		
Checked	DS	DS		
Verified	DK	DK		



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3.0 Kitchen Canopies
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1.0 Introduction

This document has been produced to provide details required under Planning Section 106, Condition 25, which states:

Prior to the first use of the development, details of a scheme to extract fumes, vapours and odours from the premises shall be submitted for approval in writing by the City Council, as Local Planning Authority. The approved scheme shall then be implemented prior to the first use of the development and thereafter retained and maintained in situ.

2.0 System Overview

The management of fumes, vapours, and odours is a paramount consideration in the facility's operational design. We have implemented a comprehensive system utilizing advanced technology to ensure effective control and mitigation of these elements. Kitchen areas are the only source of fumes, vapours and odours within the premises. The key components of the system include Halton canopies located over cooking areas with UV treatment, a Halton Pollustop unit with carbon filters, and the discharge of clean air through external louvres.

1. Halton Canopies Incorporating UV Treatment:	- Kitchens are equipped with Halton canopies that are specifically designed to capture and contain fumes, vapours, and odours emitted during cooking processes. - These canopies incorporate UV treatment technology, which assists in neutralizing and eliminating airborne pathogens and contaminants, enhancing the overall air quality within the kitchen space.
2. Halton Pollustop Unit with Carbon Filters:	- The extract system is integrated with a Halton Pollustop unit, a cutting-edge technology aimed at further refining the extracted air. - This unit houses advanced carbon filters, meticulously designed to trap and eliminate odours, volatile organic compounds (VOCs), and other airborne contaminants, ensuring that only purified air is released into the environment.
3. Discharge of Clean Air via External Louvres:	- The purified air, having undergone rigorous filtration and treatment, is safely and efficiently discharged to the exterior environment through external louvres. - These louvres are strategically positioned to facilitate the dispersal of clean air while minimizing any potential impact on surrounding areas.

Regular maintenance schedules and stringent quality checks will be integral parts of the operational protocols. This proactive approach ensures the optimal functioning of the ventilation and filtration systems, guaranteeing consistent and efficient management of fumes, vapours, and odours.

3.0 Kitchen Canopies

Kitchen canopies are designed, supplied, and commissioned by Halton Food Service, who are recognized for their innovative and effective ventilation systems specifically designed for kitchens and foodservice spaces. They have membership in the European Hygienic Engineering & Design Group (EHEDG) demonstrates their commitment to maintaining high standards in food safety and hygiene.

Air flow rates have been calculated in strict accordance with SEFR methods set out in Building Engineering Services Association (BESA) document DW 172, based on the actual cooking equipment to be installed.

Details of a typical ventilation canopy are included for reference, detailing the levels of filtration provided.

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4.0 Kitchen Extract Design Strategy

19024	OVG Manchester	DESIGN NOTE	028
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Date:	18/08/2020
Subject:	Kitchen Extract Ventilation
Circulation:	



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Rev	Date	Description	Prepared By
A	18/08/2020	First Issue	B. Thomas

1.0 INTRODUCTION

This design note has been prepared to explain the Stage 4a design strategy for the kitchen extract ventilation systems including the use of UV-C filtration.

2.0 STANDARD KITCHEN EXTRACT

The historic method of designing a kitchen extract system would be to provide a bifurcated extract fan located remote from the space which would be connected by a network of fire rated ductwork. The fire rated ductwork would act as extension of the fire compartment which encapsulates the kitchen. The extract fan and discharge point would have to be located to avoid noise and air contamination issues. Untreated grease and smoke laden air would have required a vertical discharge point above roof level.

During operation, the smoke from the kitchen would discharge at the kitchen extract point to atmosphere. Generally, the extract would be untreated, meaning that the point of exhaust would need to be minimum 10m away from a building entry point or window. This distance increases to 20m to comply with BREEAM as it is classed as a point of pollution

As the air would be untreated, a strict and complex maintenance regime would need to be put in place to ensure that the ductwork could be cleaned regularly. Extract ductwork left uncleaned presents a significant fire hazard due to the build-up of grease. It is also due to the build-up of grease that the fire rated ductwork is used and that fire dampers cannot be installed.



Figure 1 - Grease build-up in extract ductwork

3.0**UV-C FILTRATION METHODOLOGY AND ACTIVE FIRE PROTECTION**

As part of the kitchen extract strategy for this project, ME Engineers have utilised a strategy that involves using a high level of filtration that effectively removes grease particles from the air stream, in conjunction with active fire protection (Ansul 1201) within each extract canopy.

UV-light technology breaks small grease particles into smaller molecular units. Ozone generated by the UVC lamps reacts with the solid and vaporized greases. The resulting substance will not stick to the ductwork or fans. This helps to reduce a serious fire risk and expensive cleaning of the ducts. These filters are integrated as an integral part of the kitchen canopies so that the grease is broken down before it gets to the extract ductwork.

As the grease has been broken down and removed from the kitchen extract at the hood, there is no longer a risk of grease build-up in the kitchen extract ductwork. The ductwork can therefore be constructed using conventional galvanised steel (DW144) with fire dampers used where the ductwork passes through fire compartments. This presents a capital and operational cost benefit.

DW172 states that where kitchen extract ductwork leaves the fire compartment of the kitchen, it must be fire rated and fire dampers should not be used. However, this does not take into account the use of UV-C filters and their effect on the grease particles.

In addition to the integrated UV-C canopy filtration with Ansul 1201 protection, is a packaged Ecology air handling unit which is used to extract the air from the kitchen. An Ecology unit comprises of the following components:

- Panel & Bag filter
- HEPA filter
- Active Carbon filter
- Heat recovery coil
- Extract plug fan

After the grease is broken down by the UV-C filters, it will leave a powder like residue. The panel and bag filters are used to remove the larger particles from the air stream prior to the HEPA filter which is used to remove the finer particles. The HEPA filter also acts a level of protection for the carbon filter which is then used to remove the remaining odours and naturally generated Ozone arising from the UV-C filtration system.

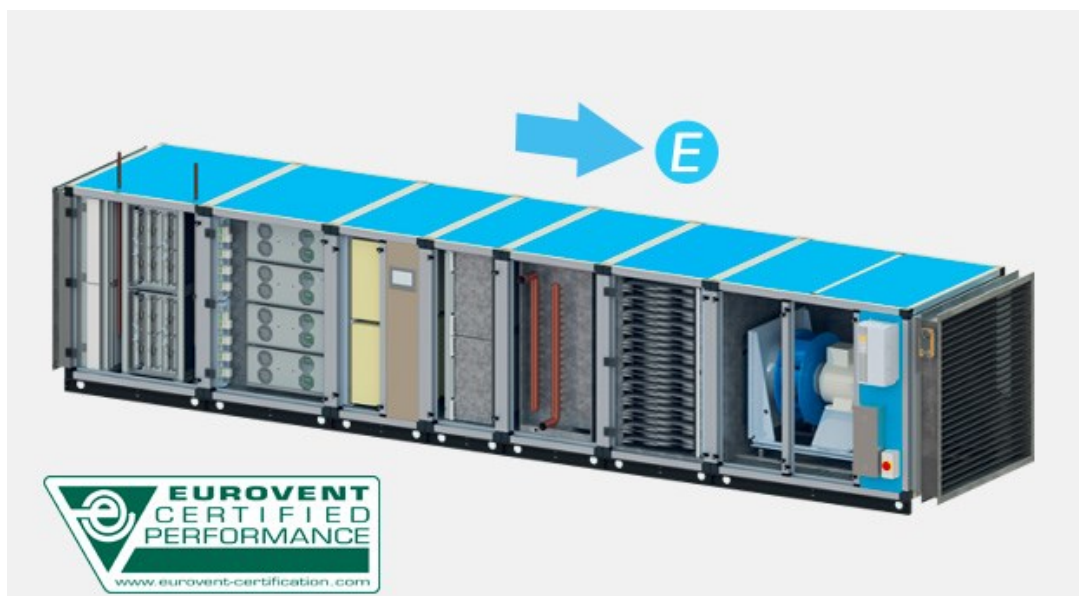


Figure 2 - Ecology unit diagram

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Once the air stream has passed through all levels of filtration, it can then be looked at as a clean exhaust air system, which has benefits for the surrounding environment and compared to a conventional kitchen extract, has less constraints from a design and construction aspect.

In order to extend the life of the filters and the Ecology unit, there are several safety interlocks put in place for the operation of the kitchen extract system. It is critical that the Ecology units are only used in conjunction with UV-C filters to ensure that heavy grease particles do not block the filters within the ecology unit. The kitchen extract system is therefore interlocked with the UV lamp control system to ensure that the ventilation is not in operation unless the UV-C filters are activated.

UV-C filters will also have additional safety interlocks that ensure they are switched off when the ventilation system is not in use to prevent the lamps from burning out. They will also switch off if an access panel is opened during maintenance.

Cleaning and maintenance regimes will still need to be adhered to, to ensure that the UV-C filters and grease baffles in the hoods are being regularly cleaned. The ductwork will also need regular and thorough cleaning.

4.0 CONCLUSION

In conclusion, the UV-C method has a large number of benefits to the client and the surrounding environment:

- Galvanised steel ductwork can be installed as opposed to fire rated ductwork for all kitchen extract systems
- Reduced level of maintenance and cleaning required due to the removal of grease particles at source
- Cleaning the exhaust air stream and removing pollutants before discharging to atmosphere allows flexibility with louvre positions
- Extended life span of all components within the kitchen extract system
- Reduced design restrictions on the ventilation system due to the clean exhaust system

This is a method that ME Engineers have implemented on numerous projects in the past. Examples include:

- O2 Arena, London
- Aviva Stadium, Dublin
- Twickenham Stadium, Twickenham
- Tottenham FC Training Centre, Enfield
- Wimbledon Centre Court
- Wimbledon No.1 Court
- AMEX Stadium, Brighton
- Leicester City FC Training Ground

Co-Op Live - 68B202M

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5.0 Kitchen Extract Management and Maintenance Strategy

No.19024	OVG Manchester	DESIGN NOTE	039
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Date:	12 th March 2021	
Subject:	Catering Extract Ventilation Grease & Odour Control, Monitoring and Maintenance Strategy	
Circulation:	Warren Hope	Manchester Council
	Naomi Pimblett	BH Fire
	Hannah Cain	BH Fire
	Neil Unsworth	Manchester Fire
	Tony Elias	BAM
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Rev	Date	Description	Prepared By
01	12/03/21	Issued for Information	Mike Rees-Holden

1.0 INTRODUCTION

This Design Note sets out the intent of the catering extract grease and odour control, monitoring and maintenance strategy to be implemented for the catering extract ventilation systems incorporated into the CO-OP Live Arena.

In brief, the key elements of the grease and odour control system are:

- Grease separators integral to extract canopies
- Grease coalesce filters integral to extract canopies
- UV-C filters integral to canopies
- Grease sensors located within extract ductwork either side of fire dampers located between each canopy and it's associated Ecology Air Handling Unit (EAHU)
- Panel, bag and HEPA filters to remove smoke and airborne particles from the air stream
- Carbon filters to remove excess Ozone from UV-C filters

The key elements of the monitoring system are:

- Safety interlocks from all access and maintenance panels to shut-down plant when panels are open
- Safety interlocks to monitor the status and health of UV-C lamps. In the event of failure of a lamp, an alarm shall be raised that maintenance is required. In the event that a predetermined number of lamps (TBC during the detailed design of each canopy) have failed and the effectiveness of the system has been compromised, the associated ventilation plant and catering equipment will be automatically shut-off and an alarm raised
- The duct mounted grease monitors shall be monitored regularly and raise an alarm that cleaning is required once grease levels of >150microns are identified
- Safety interlocks with the duct mounted grease monitors such that if grease levels of >200microns are detected, the associated ventilation plant and catering equipment will be automatically shut-off and an alarm raised

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2.0 DETAILED SYSTEM DESCRIPTION

The Contractor shall design and install a kitchen extract system compliant with HVCA Kitchen Ventilation System Specification DW172:2018 and DW144. The Contractor installed kitchen extract ductwork shall be provided with good access for cleaning at a maximum spacing of 2 metres between access points and at every change of direction.

An integrated Duct monitoring system with full alarm to interlocks must be installed specifically but not limited to each side of each Fire damper between each extract canopy and it's associated AHU.

A fully integrated 3 stage filtration Stainless Steel canopy with KSA grease separators, Secondary Coalesce Filters and fully integrated UV-C Lamps must be installed and a full pollution control AHU system combining Panel, Bag, HEPA and Carbon filters as described in full in the Stage 4a Design.

The full service and maintenance regime should be installed along with an approved service company and an appointed specialist periodic duct cleaning specialist. All systems must have a central remote monitoring access solution with primary and secondary alarm modes. On activation of second alarm the full system must be interlocked to shut down.

Canopy grease separators shall comply with testing criteria, as required within HVCA Specification for Kitchen Ventilation Systems DW172:2018 and be of non-combustible construction.

Canopy manufactured throughout using 1.2 mm thick grade 304 satin-finish stainless steel formed, folded and welded construction with all joints and seams being liquid tight.

A full-length, fully insulated make-up-air plenum shall be incorporated to the front face of the canopy fitted with removable stainless steel perforated plate diffuser complete with primary equalising plates. Make-up-air plenum supplied as standard with balancing damper.

A full-length extract plenum shall be liquid tight with sloping grease filter collection channel and removable grease collection drawer. Extract plenum spigots supplied as standard with balancing damper.

Grease filters shall be 500mm x 330mm x 51mm heavy-duty stainless steel, multi-cyclone type.

Canopy sections supplied as standard with hinged roof panels complete with LED vapour proof IP65 rated lights effecting 500 lux at the working surface.

Testing and balancing (TAB) ports supplied as standard allowing easy access for accurate measurement and simple balancing/commissioning.

The Halton system shall consist of a three stage filtration system to reduce airborne particulate (smoke) to minimum 0.3micron size. The filters should be designed to assist in removing cooking odours, smoke and grease from the discharge air and be supplied, installed by the contractor. Ongoing maintenance shall be carried out by the Operator. The AHU filtration system shall include a primary panel and Bag filter section, HEPA filtration to 0.3 microns, and active NFX Carbon filter to adsorb any residual ozone. The system shall be designed to ensure the discharge level of ozone does not exceed levels as recommended by 'The World Health Organisation.'

AHUs will be constructed in accordance with BS EN 1886:2007 and BS EN 13053:2019

The AHU Pollution Control Units will be constructed to Eurovent standards.

All disposable filters incorporated within the units are to BS ISO 16890-1

The filtration system shall report filter life status via SMS and / or cloud based software connection, and shut down the extract fan if filter overload warning is exceeded or if build-up of grease deposits in the extract ductwork exceeds 200 microns.

The control system shall incorporate:

- full cloud based Interface control panel

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- UV control sensors
- UV healthy / maintenance required interlock
- Extract fan interlock on / off switch interface
- Cooking range electric power and main gas solenoid interlock
- Emergency knock off button / interlock
- Fire alarm and interlock
- Overlapping Ansul R102 Fire suppression system with interlock
- Landlords Controls / BMS interlocks
- Make up air interlock

2.1 Kitchen Canopy / Hood Fire Protection

The exhaust hood and system must be protected by an approved automatic fire detection and suppression system installed in accordance with the requirements of the LPC and the Operators property insurers.

An Ansul R102 overlapping system is specified.

2.2 Kitchen Interlock Controls

The system must be configured so that should the extract fan or a UV tube fail then the electric cooking shall be disabled. The control system shall be interfaced with the fire alarm and be capable of remote alarm and monitoring.

The UV unit lamps shall be monitored for failure so that if the operating efficiency of the UV tubes drops by 10% the electric supply to the kitchen equipment will shut down and remain isolated until the system is returned to 100% efficiency. A notice period of not more than 24 hours (Cooking time) shall be permitted between UV failure and supply shut down for repairs. A minimum 30% redundancy in the number of tubes is recommended.

A differential pressure switch or similar approved, across the extract fan shall be interlocked with the cooking electrical supply so that the supply remains off when the extract fan is not operating.

The interface panel and the motor control panel must be interlocked with the fire alarm such that in the event of a fire alarm signal all plant is shut down.

A differential pressure switch shall be installed across the Pollustop Ecology unit which shall be interlocked with the kitchen's main electrical supply so that the electric supply remains off when the Ecology unit is not operating.

2.3 Maintenance Requirements

Maintenance requirements are subject to the intensity of use and type of cooking & therefore frequency of cleaning and filter replacement shall be adjusted to suit and be remotely monitored throughout the life of the system. The Operator shall ensure the following minimum levels of maintenance are adhered to:

Canopy Grease / separators filters – Daily check / clean

Canopy UV equipment - quarterly clean, replace lamps after 13,000 hours of operation

Pre- filter (Bag) - quarterly clean or when remote monitoring indicates dirty filter

HEPA filter – Change quarterly or when indicated as dirty via the monitoring system

Carbon Filter – Change annually or when indicated as dirty via the monitoring system

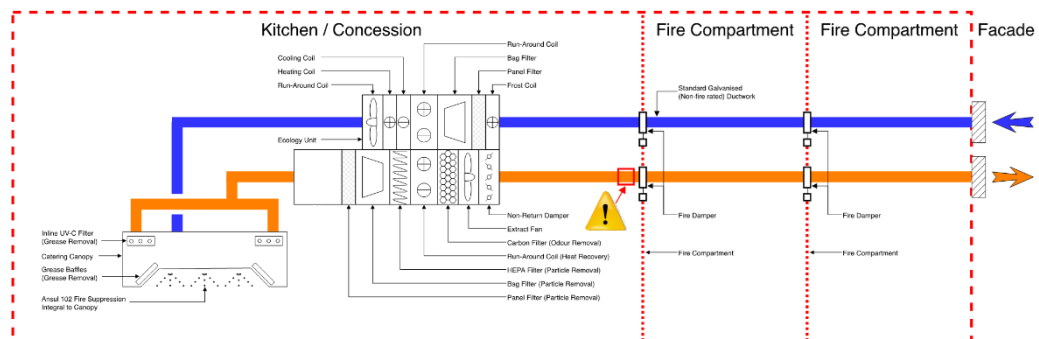
Ductwork is to be under a constant monitoring system and an additional visual inspection quarterly. Cleaning frequencies shall be determined as a result of both the monitoring and inspection. Note, where high levels of grease and smoke are produced from the cooking process, inspection and cleaning levels shall be increased accordingly to mitigate any risks of fires in the ductwork system both upstream and downstream of the filtration equipment.

The operator shall generate reports on a quarterly basis detailing checks undertaken, defects noted and works carried out. The report should note the differential pressures across the filtration systems and compare against the manufacturer's recommended operating and maximum levels. Maintenance checks and cleaning / replacement of filters shall be increased as necessary to ensure the system works effectively.

3.0 EXAMPLE DIAGRAMS OF CONTROLS INTERLOCKS

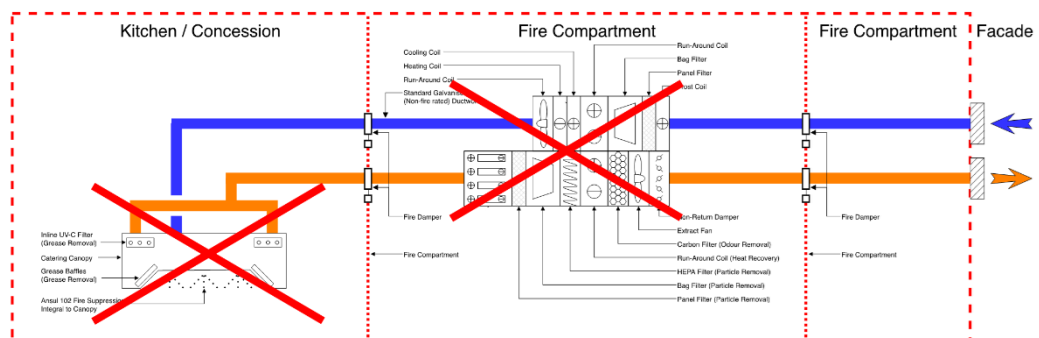
3.1 Grease Sensor Reading >200 microns

Grease Sensor Reading >200microns



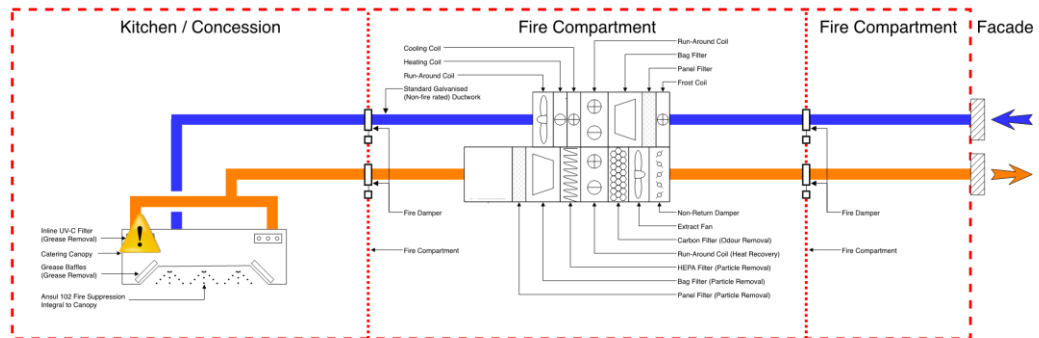
- Duct mounted grease sensor monitor grease levels within ductwork either side of fire dampers
- Grease levels of >150microns will trigger an alarm that duct cleaning required
- Grease levels of >200microns will shut down associated EAHU and electrical supplies to catering equipment and trigger an alarm that duct cleaning immediately required

System Shut Down

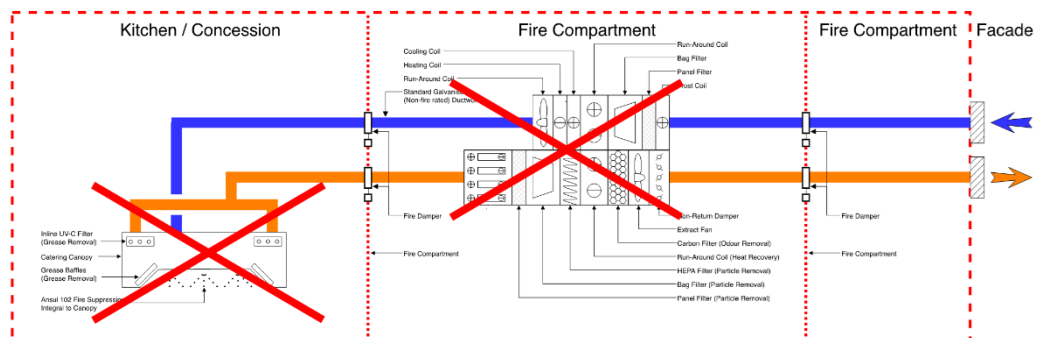


- Safety and maintenance monitoring of any and all filtration elements means that if any item is removed or not operating within the set limits, the whole system is disabled
- Remote monitoring can be provided to inspect and monitor the status of the system and its components 24/7
- Failure of any element within the system can raise an alarm via the BMS to alert the FM team to the issue

3.2

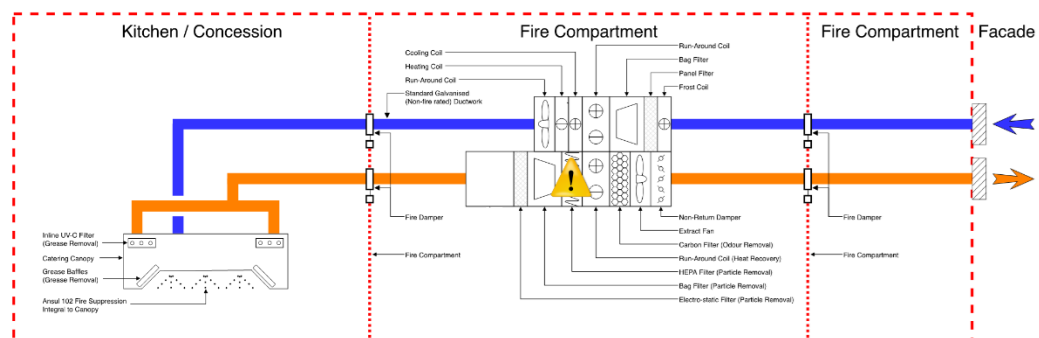
Failure within UV-C Cassette**UV-C Cassette Failure**

- Safety and maintenance monitoring of any and all filtration elements means that if any item is removed or not operating within the set limits, the whole system is disabled
- Remote monitoring can be provided to inspect and monitor the status of the system and its components 24/7
- Failure of any element within the system can raise an alarm via the BMS to alert the FM team to the issue

System Shut Down

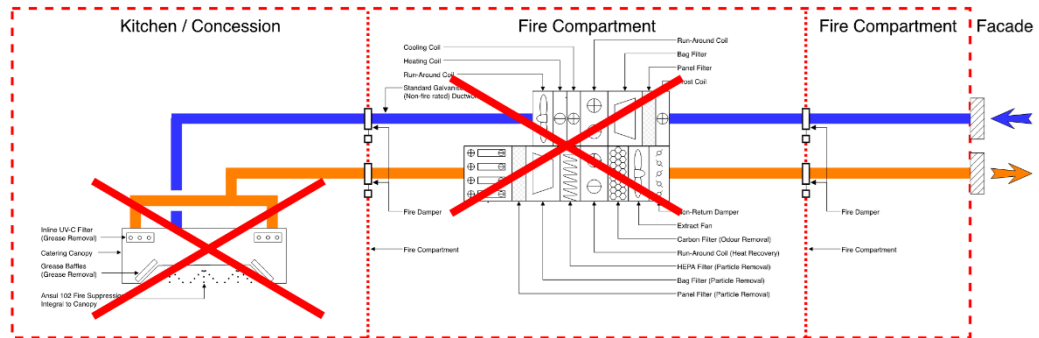
- Safety and maintenance monitoring of any and all filtration elements means that if any item is removed or not operating within the set limits, the whole system is disabled
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- Failure of any element within the system can raise an alarm via the BMS to alert the FM team to the issue

3.3

HEPA Filter Removed**HEPA Filter Removed**

- Safety and maintenance monitoring of any and all filtration elements means that if any item is removed or not operating within the set limits, the whole system is disabled
- Remote monitoring can be provided to inspect and monitor the status of the system and its components 24/7
- Failure of any element within the system can raise an alarm via the BMS to alert the FM team to the issue

System Shut Down



- Safety and maintenance monitoring of any and all filtration elements means that if any item is removed or not operating within the set limits, the whole system is disabled
- Remote monitoring can be provided to inspect and monitor the status of the system and its components 24/7
- Failure of any element within the system can raise an alarm via the BMS to alert the FM team to the issue