Air Quality CONSULTANTS

Odour Risk Assessment and Management Plan: QSR Restaurant, 1 Station Road, Reading

May 2020

Experts in air quality management & assessment

Document Control

Client	The Thackeray Estate	**Principal Contact**	Paul Allen

Job Number	J4135

Report Prepared By:	Lucy Hodgins

Document Status and Review Schedule

Report No.	Date	Status	Reviewed by
J4135A/1/F2	12 May 2020	Final	Penny Wilson (Associate Director)

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1 Introduction

1.1 This report sets out the odour risk assessment for the proposed quick service restaurant (QSR) at 1 Station Road in Reading. The cooking of food has the potential to generate odours and therefore an odour risk assessment has been undertaken to identify the potential for odour impacts from the extraction system serving the proposed restaurant.

1.2 A planning application for the quick service restaurant has been submitted to the local authority and is currently being considered. If permission is granted the Environmental Health Officer has suggested the following draft pre-commencement condition be applied, which this report has been prepared to address. The aim is to provide this information prior to the determination of the application, to remove the need for the condition.

'No development shall commence on site until an odour assessment has been carried out and a detailed odour management plan to include scaled plans, odour control specifications and a maintenance plan has been submitted to and approved in writing by the Local Planning Authority. Reference shall be made to the DEFRA guidance on the Control of Odour and Noise from Commercial Kitchen Exhaust Systems (Jan 2005) when assessing potential odours and selecting appropriate odour control methods. Thereafter, the development shall not be carried out other than in accordance with the approved scheme unless otherwise agreed in writing by the Local Planning Authority.'

1.3 The report describes the methodology and findings of the odour risk assessment, identifies the level of odour abatement that will be required to minimise the risk of odour impacts and provides details of how the odour control system will be maintained to minimise the risk of odours from the proposed restaurant. Desco Ltd has provided information on the proposed odour abatement system to be installed within the kitchen; the specification of this system has been compared with the recommended level of abatement determined in this assessment. Desco Ltd have also provided details of the proposed maintenance plan for the equipment which will minimise the potential for odour emissions from the proposed kitchen. This report has been prepared by Air Quality Consultants Ltd on behalf of The Thackeray Estate.

2 Odour Assessment

2.1 EMAQ's Guidance on the 'Control of Odour and Noise from Commercial Kitchen Exhaust Systems' (EMAQ, 2018), which supersedes the Defra guidance (Defra, 2005b) that has been withdrawn, contains an assessment procedure for identifying the potential risk of odour impacts from commercial kitchen operations. The results of this risk assessment can be used to determine a suitable level of odour abatement to be installed into a commercial kitchen.

2.2 The risk assessment for odours is split into the following four parts:

- dispersion;
- proximity to receptors;
- size of kitchen; and
- cooking type and grease loading.

2.3 Each part is given a risk rating score and the total risk rating denotes the level of odour abatement which is likely to be required to prevent the kitchens from causing odour nuisance impacts. The following sections of this report outline each part of the risk assessment in relation to the proposed kitchen.

2.4 Where assumptions have been made these are clearly stated in the risk assessment and are based on the professional experience of Air Quality Consultants Ltd. (see Appendix A1).

Dispersion

2.5 The risk rating for dispersion relates to the conditions under which kitchen extraction emissions are discharged. The relevant risk ratings described in the guidance are shown below. The risk score is shown in parentheses.

- VERY POOR (20) – Low level discharge, discharge into courtyard, or restriction on stack;
- POOR (15) – Discharge not low level, but below eaves, or discharge rate below 10 m/s;
- MODERATE (10) – Discharging 1 m above eaves at a rate of 10-15 m/s; or
- GOOD (5) – Discharging 1 m above ridge at a rate of 15 m/s or more.

2.6 The risk rating for dispersion for the kitchen is judged to be VERY POOR. The proposed exhaust will discharge odours at ground floor level, through an extract louvre at ground floor ceiling level at the rear of the building.

Proximity to Receptors

2.7 The risk rating for proximity to receptors relates to the distance between the point of discharge of kitchen emissions and the nearest sensitive receptor locations. Sensitive receptor locations may be residential properties, commercial premises or frequently used public open spaces. The relevant risk ratings described in the guidance are shown below. The risk score is shown in parentheses.

- CLOSE (10) – Closest sensitive receptor is less than 20 m from kitchen discharge;
- MEDIUM (5) – Closest sensitive receptor is between 20 and 100 m from kitchen discharge; or

- FAR (1) – Closest sensitive receptor is more than 100 m from kitchen discharge.

2.8 The risk rating for the proximity to residential properties is judged to be CLOSE. The proposed location of the extraction exhaust will be located at the rear of the building at ground floor ceiling level. The upper floors of 1 Station Road, from the 1st floor and above, have recently received planning permission for conversion from offices to residential properties. Therefore, residential properties will be located above the louvre. A hotel is also located to the rear of the building, which will be approximately 20m from the louvre.

Size of Kitchen

2.9 The risk rating for size of kitchen relates to the volume of food prepared by the kitchen and is described in terms of the capacity of the restaurant or take-away. The relevant risk ratings described in the guidance are shown below. The risk score is shown in parentheses.

- LARGE (5) – More than 100 covers[1] or a large-sized take-away;
- MEDIUM (3) – Between 30 and 100 covers or a medium-sized take-away; or
- SMALL (1) – Less than 30 covers or a small take-away.

2.10 The kitchen will provide a take-away and eat in service, providing seats for 45 people. Taking into account the quick service nature of the restaurant, the risk raking for the size of kitchen is considered to be LARGE.

Cooking Type and Grease Loading

2.11 The risk rating for cooking type and grease loading relates to the type of cooking methods employed in the kitchen and the type of food prepared. The relevant risk ratings described in the guidance are shown below. The risk score is shown in parentheses.

- VERY HIGH (10) – Pubs (high level of fried food), fried chicken, burgers or fish and chips. Turkish, Middle Eastern or any premises cooking with solid fuel;
- HIGH (7) – Vietnamese, Thai, Indian, Japanese, Chinese, Steakhouse;
- MEDIUM (4) – Cantonese, Italian, French, Pizza (gas fired); or
- LOW (1) – Most pubs (no fried food, mainly reheating and sandwiches, etc.), tea rooms.

2.12 The food prepared by restaurant will comprise mostly fried foods. The risk for the cooking type and grease loading is judged to be VERY HIGH. Whilst the grease loading is judged to be very high the fried foods are not as odourous as foods which use a lot of spices or onions.

[1] A cover refers to a single person being served at any one time.

Risk Assessment Summary

2.13 The odour risk assessment summary is shown in Table 1 for the kitchen.

Table 1: Kitchen Odour Risk Assessment Summary

Criteria	Risk Rating	Risk Score[1]	Description
Dispersion	Very Poor	20	Low level discharge from rear of building Discharging from a louvre at ground floor ceiling level
Proximity to Receptors	Close	10	Closest sensitive receptor within 20m of outlet. Residential apartments on the 1st floor of the building above the louvre.
Size of Kitchen	Large	5	Seating for 45 customers and take away service so judged to be a large kitchen
Cooking Type and Grease Loading	Very High	10	High level of fried food. Therefore, the grease volume will be high, but not judged to be particularly odorous.
TOTAL RATING	**Very High**	**45**	**The kitchen should employ a Very High level of odour control.**

[1] Total Risk Score of <20 = Low to Medium Risk, 20 to 35 = High Risk; and >35 = Very High Risk.

2.14 The overall odour risk rating of the kitchen is 'Very High'. It is however judged that whilst the grease loading is very high the fried foods are not as odorous as foods which use a lot of spices or onions or are cooked with solid fuel.

Recommended Odour Abatement System

2.15 This section of the report briefly outlines the odour control measures that would need to be installed on the proposed kitchen extract system to provide optimal odour abatement and minimise the risk of odour impacts at the nearby residential properties.

2.16 The odour control measures suggested are those recommended within EMAQ's guidance on odours from commercial kitchens (EMAQ, 2018) for kitchens with a 'Very High' odour risk assessment score.

2.17 The guidance outlines that abatement systems that offer a 'Very High' level of odour control may include:

"1. Fine filtration or electrostatic precipitation (ESP) followed by carbon filtration (carbon filters rated with a 0.4 – 0.8 second residence time).

2. Fine filtration or ESP followed by carbon filtration and by conteractant/ neutralising system to achieve the same level of odour control as 1.

3. Fine filtration or ESP followed by UV ozone system to achieve the same level of control as 1."

2.18 In addition to this, the guidance states that the discharge stack shall:

"1. Discharge the extracted air not less than 1 m above the roof ridge of any building within 15 m of the vent serving the commercial kitchen. Additional odour control measures may still be required depending on the cooking type and frequency.

2. If 1 cannot be complied with for planning reasons, then the extracted air shall be discharged not less than 1 m above the roof eaves or dormer window of the building housing the commercial kitchen. A higher level of odour control measures than those required in part 1 may be required.

3. If 1 or 2 cannot be complied with for planning reasons, then higher levels of odour control measures than those required in part 1 or 2 may be required."

2.19 In AQC's professional experience, carbon filters offer a significantly better level of odour abatement than similarly specified ozone-based systems. If carbon filters are used, the guidance recommends for a 'very high risk' site a residence time within the carbon filters of 0.4-0.8 seconds. However, Table 13 of the guidance provides clarity on recommended residence times for various cooking processes. For '*kitchen producing large amount of fried food or concentrated cooking of burgers'* the recommended residence time within the carbon filter is 0.2-0.4 seconds rather than 0.4-0.8 seconds as recommended more generally as a very high level of odour abatement. This is because for fried food the grease is odourous, which will be removed by the grease filters, with the carbon filters removing any residual odours. A higher residence time is necessary for Indian restaurants and others with an excess of onions or garlic smells from cooking which have more residual odours but are less greasy.

3 Proposed Odour Abatement System

3.1 The risk assessment methodology detailed above is based on a conventional odour control system where all of the extracted air from the canopy is discharged to atmosphere via a flue.

3.2 The proposed system within the proposed restaurant is a package abatement plant with treated air recirculation. The specific model proposed is The Reco-Air 2.0. In this system the extracted air from the canopy is taken to a unit which cleans the air, removing smoke, moisture, steam, odour and grease and the air is then recirculated back into the kitchen. The specifications for this plant are appended to this report as Appendix 3.

3.3 The proposed system within the restaurant will include a negative recirculation system, in which 10% of the treated air is exhausted from the system through the rear wall. The purpose of this is to ensure less air is returned to the kitchen than extracted to help contain all odours and grease within the canopy.

Table 2: Filtration and Odour removal for the Reco-Air 2.0

Abatement Stage	System	Comment
Filtration	**Fine Filtration**	Fine filtration system is required to remove any particles or grease, to protect the odour removal system. The system will include: Grade G4- large grease particulate filter Grade F6- fine grease particulate filter Grade F9- smoke removal filter
Odour Removal	**Carbon Filtration**	Following particulate removal, the residual gaseous odours will be removed using carbon filtration. The carbon filtration system will comprise food grade activated carbon which has a minimum residence time of 0.2s, with a typical dwell time of 0.3s.

3.4 The EMAQ guidance recognises that these recirculation systems have an application where there is no or limited route to atmosphere. It states that due to the recirculation element of the system the '*filtration needs to be multistage with a high level of efficiency which makes it both expensive and bulky'.*

3.5 The guidance acknowledges that *'the design basis of the package system is comparable to control systems used elsewhere'* but identifies that they are likely to be much more expensive than installing a conventional system. The guidance therefore recognises the benefits of the recirculation systems and the negatives compared to conventional systems only relate to the cost and space requirements.

3.6 The proposed Reco-Air 2.0 system proposed within the restaurant therefore adheres to the recommendations of the odour risk assessment and thus meets the requirements of the EMAQ

guidance on the 'Control of Odour and Noise from Commercial Kitchen Exhaust Systems' (Defra, 2005) for a very high level of odour abatement for kitchens producing a large amount of fried food.

3.7 Whilst the system does not meet the stack dispersion criteria detailed in paragraph 2.19 the proposed system is judged to be acceptable as only a small volume of air will be discharged, which will have been subject to a high level of grease and odour treatment. Furthermore, the system proposed has a sophisticated automated control system which ensures the system is working effectively. The controls and maintenance procedure that will be in place to ensure odours are minimised are detailed in section 4.

4 Maintenance Plan

4.1 Operators of commercial kitchens have a duty to ensure that the ventilation system serving their kitchen is maintained and operated effectively. Regular maintenance of any odour control system is imperative to ensure that optimal odour abatement performance is maintained during operation to ensure the risk of odour emissions are small and the potential for odour nuisance is minimised.

4.2 Good maintenance is required for food hygiene, noise minimisation and fire risk purposes as well as for odour control.

Unit Design

4.3 The Reco Air Unit will be mounted within the ceiling void in close proximity to the two extraction canopies (See Appendix A2). The location of the system close to the canopies will minimise the amount of duct work which will require cleaning and easy access will be provided for maintenance and cleaning.

4.4 The system is sophisticated and features a number of automatic control systems to ensure it is operated effectively and that it cannot be operated incorrectly.

4.5 The system monitors and reports the status of the filters in real time, such as whether they are saturated and also whether filter pressure drops within the system. If certain criteria are met an alarm is triggered to identify that the filter needs to be changed.

4.6 The maintenance of the system is integral to the design to prevent misuse, such as preventing operations when the filters are dirty or removed. The unit will shut down/cease to function if any of the following scenarios occurs:

- A unit filter access door is left open or ajar;
- Filters are removed or left out of the unit; or
- Pressure drops across any of the primary 3 sets of filters that exceed pre-set warning levels.

Maintenance Regime

4.7 All the Rec-Air 2.0 systems require a service contract to ensure that the system is maintained to deliver optimum performance, which includes an annual service visit to change the grease and carbon filters irrespective of the filter status. The annual service also includes a degrease and clean of internal surfaces of the unit.

4.8 Whilst there are designed in systems to prevent operation with dirty filters the manufactures anticipate that under normal conditions the grease filters will require changing every 3 months and the carbon filters annually. They therefore recommend that the grease filters are replaced at these intervals to minimise reactive maintenance, and provide a quarterly maintenance service to respond

to this need. The restaurant operators will review the need for this quarterly service. Nevertheless, given that the majority of the extracted air is returned to the restaurant there is a high incentive for the operators to ensure the equipment is operating effectively, as greasy odorous air would not be wanted within the restaurant.

4.9 General maintenance within the kitchen will also include cleaning of cooker hoods on a daily basis and periodic cleaning of duct work between canopies and the unit.

5 Summary

5.1 The potential for odour impacts at nearby residential properties as a result of the proposed quick service restaurant at 1 Station Road, in Reading, have been assessed.

5.2 It is recommended that both particulate filtration and carbon filtration be installed on the extract system to remove particles and residual odours from the airstream. The proposed system to be installed within the site comprises a recirculation odour control system with particulate and carbon filtration which is judged to meet the required level of odour control.

5.3 The proposed system has a sophisticated automated management system which ensures the system is operated effectively, which includes alerts for the replacement of grease filters when necessary. The system will be maintained through a service contract with the filters changed as required.

5.4 Given the system proposed and the maintenance system installed, the risk of adverse odour impacts at nearby sensitive properties is judged to be insignificant.

A1 Professional Experience

Penny Wilson, BSc (Hons) CSci MIEnvSc MIAQM

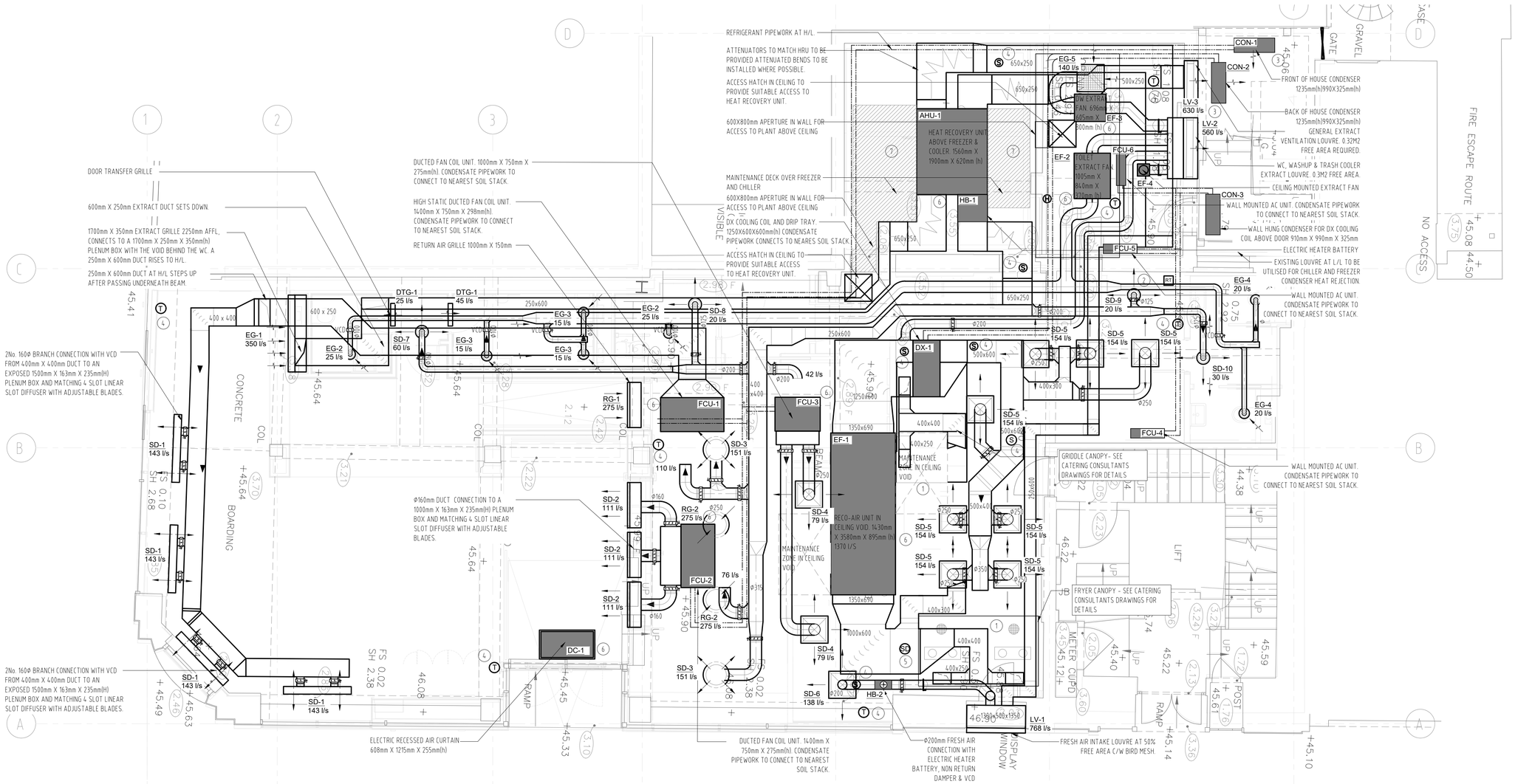
Ms Wilson is an Associate Director with AQC, with more than 18 years' relevant experience in the field of air quality. She has been responsible for air quality assessments of a wide range of development projects, covering retail, housing, roads, ports, railways and airports. She has also prepared air quality review and assessment reports and air quality action plans for local authorities and appraised local authority assessments and air quality grant applications on behalf of the UK governments. Ms Wilson has arranged air quality and dust monitoring programmes and carried out dust and odour assessments. She has provided expert witness services for planning appeals and is Member of the Institute of Air Quality Management and a Chartered Scientist.

Lucy Hodgins, BSc (Hons) MIEnvSc MIAQM

Lucy is a Senior Consultant with AQC, with over ten years' experience in the field of air quality. She has extensive experience in the assessment of air quality impacts for a range of industrial, commercial and residential projects, using qualitative and quantitative methods to assess road traffic and point source emissions utilising a variety of models, including ADMS Roads, Breeze Roads, ADMS-5 and Breeze Aermod. She has prepared assessments for energy from waste, anaerobic digestion and waste biomass facilities for a range of air pollutants, along with nuisance dust and odour assessments. Lucy has also been involved in air quality management and assessment work for local authorities, including air quality modelling for Clean Air Zones as well as microsimulation modelling for junction improvement schemes. She has also undertaken numerous operational dust assessments for mineral and waste facilities, as well as assessments of construction dust emissions. She is a Member of the Institute of Air Quality Management and the Institution of Environmental Sciences.

Full CVs are available at www.aqconsultants.co.uk.

A2 Proposed Plans



SITE NUMBER:
BASE MODEL:
ASSET TYPE:
CLASSIFICATION:
OWNER:
BASE VERSION:
UPGRADE CLASSIFICATION:

PROJECT YEAR:
FURNITURE PACKAGE:
DESIGN BULLETINS:

PROJECT TYPE:

1 Station Road, Reading, RG1 1LG

REV.	DATE	DESCRIPTION
A	APR 2020	ISSUED FOR TENDER

ISSUE DATE: 28.04.2020 PROJECT ISSUE DATE
PROJECT NUMBER: 1968.READING
DRAWN BY: R.B.
CHECKED BY: C.K.

SEAL
DESIGN GUIDELINE ONLY - NOT FOR CONSTRUCTION

SHEET NAME
HVAC PLAN GROUND FLOOR

SHEET NUMBER
M1.1

A3 Proposed Reco-Air 2.0

Reco-Air

Recirculating kitchen extract solutions

Patented recirculation for the commercial foodservice industry

No requirement for route to atmosphere

- Unlock new locations
- Reduce fire risk
- Environmental benefits
- Problem solving
- Cost saving & flexibility

UL Verified 710B

Patented

www.reco-air.com 14 Heritage Park, Hayes Way, Cannock, Staffordshire, WS11 7LT - U.K. +44 (0) 333 305 2978

No requirement for route to atmosphere

Reco-Air units work at the heart of a kitchen ventilation system serving all electric catering equipment and achieving complete recirculation of exhaust air with no requirement for route to atmosphere.

Highly efficient filter technology removes particulates and odours and provides exhaust air independently certified as clean to re-introduce as supply air.

Significantly reducing fire risk by eliminating long duct runs to atmosphere, simplifying planning procedures and providing opportunities to install kitchen operations in previously unfeasible locations.

Reduce fire risk

» **Reco**-Air significantly reduces fire risk by eliminating duct work to atmosphere.

Emissions control

» Catering kitchens and food preparation facilities produce emissions containing contaminants currently expelled to atmosphere by traditional extract.

Flexible locations

» **Reco**-Air units can be located internally or externally, adjacent to or remote from the point of canopy extraction. The unit can be hung within ceiling voids giving flexibility to equipment layout and also eliminating the requirement for certain planning processes.

» **Reco**-Air units are easily retro-fitted or relocated.

Cost saving

» **Reco**-Air reduces CAPEX investment by eliminating fire-rated duct work to atmosphere, reducing construction and installation costs with easy assembly and flat pack options.

» Traditional extract duct work requires regular specialist cleaning and accessing duct systems is often difficult and costly.

» **Reco**-Air can reduce utility usage and plant requirement, making it a cost efficient alternative to traditional extract.

Approvals

» Fire Officer
» Air Quality Consultant
» Acoustic Consultant
» Building Control Officer
» Environmental Health Officer
» Food Standards Agency
» City of Westminster: APPROVED alternative to high level kitchen extract

Reco-Air removes:

Grease | Steam | Smoke | Odour

Reco-Air already operate in properties for:

» Heathrow
» Network Rail
» British Land
» Hammerson
» Capital and Regional
» McArthurGlen Group
» Everyman Cinemas
» Canary Wharf Management
» Al Nakheel Mall, Riyadh
» Crossrail
» Debenhams
» Westfield
» St George
» intu
» Land Securities
» Grosvenor
» Standard Life
» Selfridges
» Young's & Co
» PF Chang's

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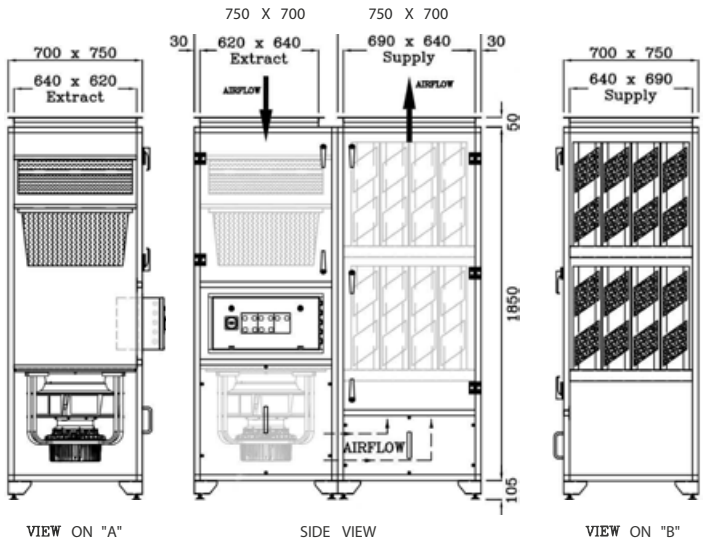

RA1.5 Standard Specification

- » 25mm double skin panels
- » Galvanised steel finish to interior
- » Various external finish options
- » Panels insulated with 45Kg/m³ density mineral wool
- » Primary Filters sets F1, F2, F3
- » Fan section 400V
- » Three phase suitable for 0 to 10V signal control
- » Unit duty l.2m³/s @ 320 Pa. external
- » Fan motor: 5.5kW, 400V, 3 Phase
- » Motor full load on maximum speed 8.4amps
- » Max. ambient working temperature range 45°C
- » F4 Activated carbon cylinders
- » Unit weight with all filters fitted approx. 785Kg

Reco-Air range of models

								Floor Mounted Size				Void Mounted Size			
Model	UL	Air Flow	Pascals	Fan size	Amps	Phase	Canopy	W	D	H	Wt.	W	D	H	Wt.
RA .5		0.33 M³/S	100 PA	280mm ¢	2.3	Single	1.5 Mtr	700	685	2155	280kg	685	2250	800	343kg
RA .5plus		0.5 M³/S	250 PA	280mm ¢	1.6	Three	2.0 Mtr	700	685	2155	286Kg	685	2250	800	350Kg
RA 1.0	✓	0.9 M³/S	250 PA	450mm ¢	8.3	Three	3.0 Mtr	1500	700	2005	530kg	700	3580	875	572kg
RA 1.5	✓	1.2 M³/S	320 PA	500mm ¢	8.4	Three	4.5 Mtr	1540	1130	2005	765kg	1130	3580	895	820kg
RA 2.0	✓	1.8 M³/S	250 PA	500mm ¢	8.4	Three	6.0 Mtr	1540	1430	2005	884kg	1430	3580	895	974kg
RA 2.5		2.25 M³/S	320 PA	2x500mm ¢	16.8	Three	7.5 Mtr	1815	1540	2005	1093kg	1815	3580	895	1210kg
RA 3.0		2.7 M³/S	320 PA	2x500mm ¢	16.8	Three	9.0 Mtr	2115	1540	2005	1210kg	N/A			
RA 3.5		3.15 M³/S	320 PA	2x500mm ¢	16.8	Three	10.5 Mtr	2500	1540	2005	1395kg	N/A			
RA 4.0		3.6 M³/S	350 PA	2x500mm ¢	16.8	Three	12.0 Mtr	2800	1540	2005	1500kg	N/A			

Air Cleanliness Study by Validair

Site: The Waterside, Imperial Wharf, Chelsea
Equipment: RA2.5
Date of test: 31/03/2015
Report Reference: VA-RBF-50189-Rev2

Report summary

The air quality from Reco-Air system is very clean and maintains a level of around ISO Class 7-8 for smaller particles. The larger particles are arrested during cooking periods and for these sizes ISO class 5-8 is seen.

This means that the air returning from the Reco-Air unit is around a thousand times cleaner than typical atmospheric conditions.

Acoustic survey report by Applied Acoustic Design

Reco-Air noise levels are very low. Casing-radiated noise from standard units are between 54 to 57 dBA when measured at 1m.

Itsu, Terminal 5, Heathrow

No route to atmosphere

A new location identified by Heathrow for use by an F&B operator, but no route to atmosphere available.

Reco-Air units installed to food preparation areas, enabling a full, new hot food offer to trade at the airport.

Solution: RA1.5 and RA1.0

JD Wetherspoon, Network Rail Waverley Station, Edinburgh

Unlock a new location

Heritage Grade II listed building had no option for external extract due to strict conservation control.

Reco-Air unit installed, enabling a previously unfeasible location to trade with a full, hot food menu.

Solution: RA2.5

INTU, Merry Hill Centre

Change of use A1 to A3 - retail to hot food

The landlord hoped to convert a vacant retail unit for use by an F&B tenant.

Reco-Air unit installed enabling ground floor unit with no route to atmosphere to operate a full commercial kitchen with hot food offer.

Solution: RA2.0

UL Verified 710B

Patented

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