COMMERCIAL KITCHEN VENTILATION REPORT
Restaurant / Takeaway Kitchen Extract System
Location: Llay, Wrexham, Wales

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1. Introduction

This report describes the design, performance, noise mitigation, odour control, and commissioning strategy for the proposed commercial kitchen ventilation system serving a restaurant/takeaway operation in Llay, Wrexham. The premises are located close to residential accommodation, and therefore the system has been designed to minimise noise and odour impact while providing effective extraction for heavy-duty cooking.

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2. Kitchen Canopy & Cooking Description

- **Canopy dimensions:** 5.4 m (L) × 1.2 m (W)
- **Canopy area:** 6.48 m²
- **Filters:** 8 × stainless steel baffle filters (600 mm × 600 mm)
- **Cooking type:** Indian and fried food (heavy grease and odour load)

The canopy and filtration arrangement is suitable for heavy-duty cooking and provides effective primary grease removal prior to ducted extraction.

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3. Design Airflow Calculation

A design capture velocity of **0.50 m/s** has been adopted, in line with best practice for heavy-duty commercial cooking adjacent to residential properties.

Extract airflow calculation:

6.48 m² × 0.50 m/s = 3.24 m³/s
3.24 m³/s × 3,600 = **11,664 m³/hr**

Design extract airflow:
➡ **11,500 – 12,000 m³/hr**

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4. Ductwork Design

- **Duct size:** 710 mm circular
- **Specification:** DW172 grease-rated ductwork
- **Total duct length:** approx. 18 m
- **Bends:** 2 × 90°
- **Access panels:** Provided in accordance with TR19

At the design airflow, the duct velocity is approximately **8.2 m/s**, which is appropriate for grease transport while minimising noise and pressure loss.

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5. System Pressure Loss
The total system resistance has been calculated to include all components:

Component	Typical Pressure Loss (Pa)
Canopy & baffle filters	100–120
Straight ductwork	130–170
2 × 90° bends	80–100
Acoustic attenuator	60–80
Carbon filtration system	200–300
Jet cowl discharge	50–70

Total external static pressure 620–840 Pa

Design static pressure adopted:

➡ **900 Pa** (allowing for filter fouling and commissioning margin)

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6. Extract Fan Selection
Extract Fan
Systemair KBR/F 630 EC

- **Fan type:** Backward-curved centrifugal, EC motor
- **Electrical supply:** 230 V / single phase
- **Design airflow:** 11,500–12,000 m³/hr
- **Design static pressure:** 900 Pa
- **Motor power:** Approx. 4.5–5.5 kW
- **Speed control:** Integrated EC controller
- **Application:** Heavy-duty grease-laden kitchen extract

The selected fan is suitable for restaurant and takeaway kitchen extract systems where high airflow, elevated static pressure, and low noise operation are required, particularly where only single-phase power is available.

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7. Odour Control
Odour control is provided by a **commercial deep-bed activated carbon filtration system** installed within the extract ductwork.

- **Rated airflow:** ≥ 12,000 m³/hr
- **Carbon bed depth:** 200–300 mm
- **Face velocity:** ≤ 0.5 m/s
- **Pressure loss (clean):** 200–300 Pa

The system is suitable for Indian and fried food cooking and is designed to minimise odour impact at nearby residential properties.

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8. Noise Impact Assessment
8.1 Noise Design Criteria
The target noise level at the nearest residential façade is:

➡ **≤ 45 dB(A)**

This target aligns with commonly applied Environmental Health guidance for mixed-use areas in Wales.

8.2 Fan Noise Data
Systemair KBR/F 630 EC (typical at duty):

- Fan casing sound pressure @ 1 m: **82–84 dB(A)**
- In-duct sound power level: approx. **95 dB(A)**

8.3 Noise Mitigation Measures

- 710 mm circular acoustic attenuator (1.2 m long)
- Large-diameter ductwork to reduce air velocity
- EC motor technology (lower RPM, reduced tonal noise)
- Anti-vibration mounts and flexible duct connectors
- Vertical jet cowl discharge

Combined attenuation (conservative): approx. **25 dB(A)**

8.4 Predicted External Noise Levels

Location	Predicted Level
Fan casing	82–84 dB(A)
After attenuation	~60 dB(A)
At discharge	~55 dB(A)
At nearest residence	**≤ 45 dB(A)**

The system is therefore predicted to comply with Environmental Health noise expectations.

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9. Make-Up Air Provision
A dedicated make-up air fan is provided to replace extracted air and maintain correct kitchen balance.

- **Supply airflow:** 8,500–9,000 m³/hr
- **Supply:** 230 V single phase
- **Mounting:** External wall
- **Control:** Interlocked with extract fan

This prevents excessive negative pressure and improves canopy capture efficiency.

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10. Commissioning Strategy
The system shall be commissioned by a competent ventilation engineer.

- Airflows measured and balanced to design values
- EC fan speed set and locked post-commissioning
- Supply and extract interlocks tested
- Noise levels verified
- Odour control performance confirmed under cooking conditions

Commissioning records shall be provided to the client and retained for inspection.

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11. Compliance Statement
The proposed ventilation system has been designed and shall be installed and commissioned in accordance with:

- Building Regulations – Approved Document F
- DW172 – Specification for Kitchen Ventilation Systems
- TR19 – Internal Cleanliness of Ventilation Systems
- Environmental Health guidance on noise and odour control

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12. Conclusion
The proposed kitchen ventilation system, incorporating a **Systemair KBR/F 630 EC single-phase extract fan**, large-diameter grease-rated ductwork, acoustic attenuation, and carbon filtration, is suitable for restaurant and takeaway use. The system provides effective extraction for heavy-duty cooking while controlling noise and odour impact on nearby residential properties.

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