Commercial Kitchen Ventilation System

Statement of Design Methodology and Compliance

1.0 Introduction

The kitchen proposed by PKL Group (UK) Ltd has been designed to fulfil the following regulatory requirement and codes of practice:

- Specification for Kitchen Ventilation Systems – HVCA DW172
- Approved Document F – Ventilation - Building Regulations 2013 (England)
- HSE Catering Information Sheet No. 10, 2000: Ventilation of Kitchens in Catering Establishments
- Heating, Ventilating, Air Conditioning & Refrigeration – CIBSE Guide B

2.0 Calculations

2.1 Method One

Overall ventilation rates for commercial kitchens are stated as being between 30 to 40 air changes per hour (ACH).
The volume of the kitchen facility is calculated as 38 m3. Using a minimum guideline, the requirement would be an ACH rate of 1,140 m3/hr or 0.316 m3/sec.

2.2 Method Two

To devise the extract rate required of the ventilation canopy, the thermal convection method is used from HVCA's DW172 codes of practise.
Listed below are the specific calculations completed by PKL to calculate the optimum extract air rate.

EXTRATION CANOPY FLOW RATE CALCULATIONS - THERMAL CONVECTION METHOD			
ITEM	**QTY**	**DESCRIPTION**	**EXTRACT M3-SEC**
6	1	Six Burner Range	0.24
15G	1	Bratt Pan, Tilting, 80lt, Gas	0.23
13G	2	Oven, Combination, 10 Rack, Gas	0.52
		Theorectical Extraction Volume Required in m3/s	0.99
		Canopy Factor	1.20
		Required Specific Extract Flow Rate in m3/s (m3/hr	1.19 (4,284)
CALCULATIONS ARE FOR VENTILATION OF EQUIPMENT BELOW THE CANOPY AND DO NOT ALLOW FOR GENERAL VENTILATION. ALL AS PER DW172 SECTION 5.			

3.0 Sample Canopy Specification

KPO extraction canopy specification

General description

Wall mounted Stainless steel extraction canopy with built-in air makeup (drawings attached). The canopy is designed to meet DW172 specifications. Overall size: 2900mm long x 1430mm wide x 650mm high.

The canopy is manufactured with two built in air make-up pods. The air is drawn in by natural flow and enters into the canopy via deflection grilles and perforated vents on the inside face of the plenum.

Materials

The canopy is constructed using 304 grade Stainless steel s240 polished sheet 0.9mm.
Internal wall and roof is clad with galvanised sheet 1.0mm. The walls below the canopy are clad with 0.9mm Stainless steel sheets.

Fans and speed controllers

A Ø400mm Sileo E4 fan extraction fan is supplied has an air flow of 0.97m³/s at 30Pa. The sound pressure level is 64 db(A) @3m. A STL3 controller is supplied as standard.

Grease Filters

Stainless steel type 2 baffle filters, 495mm x 495mm x 45mm.

Manufactured to European Standard DIN 18869-5.This DIN classification is equivalent to LPS 1263 which consists of UL1046 (Flame Barrier) & VDI2052 (Grease Efficiency).

Lighting

Three heat resistant bulk-head light are supplied free issue.

External and internal vent and extraction covers.

External:
One back draft damper are fitted
Two aluminium weather grilles are fitted.

Internal:
2x Aluminium single deflection grilles (air make-up only) are fitted inside the canopy.

Compliance labelling

In accordance with BS 6173:2009 if the cooking equipment used is gas then the canopy is fitted with a Data plate which records the following information:

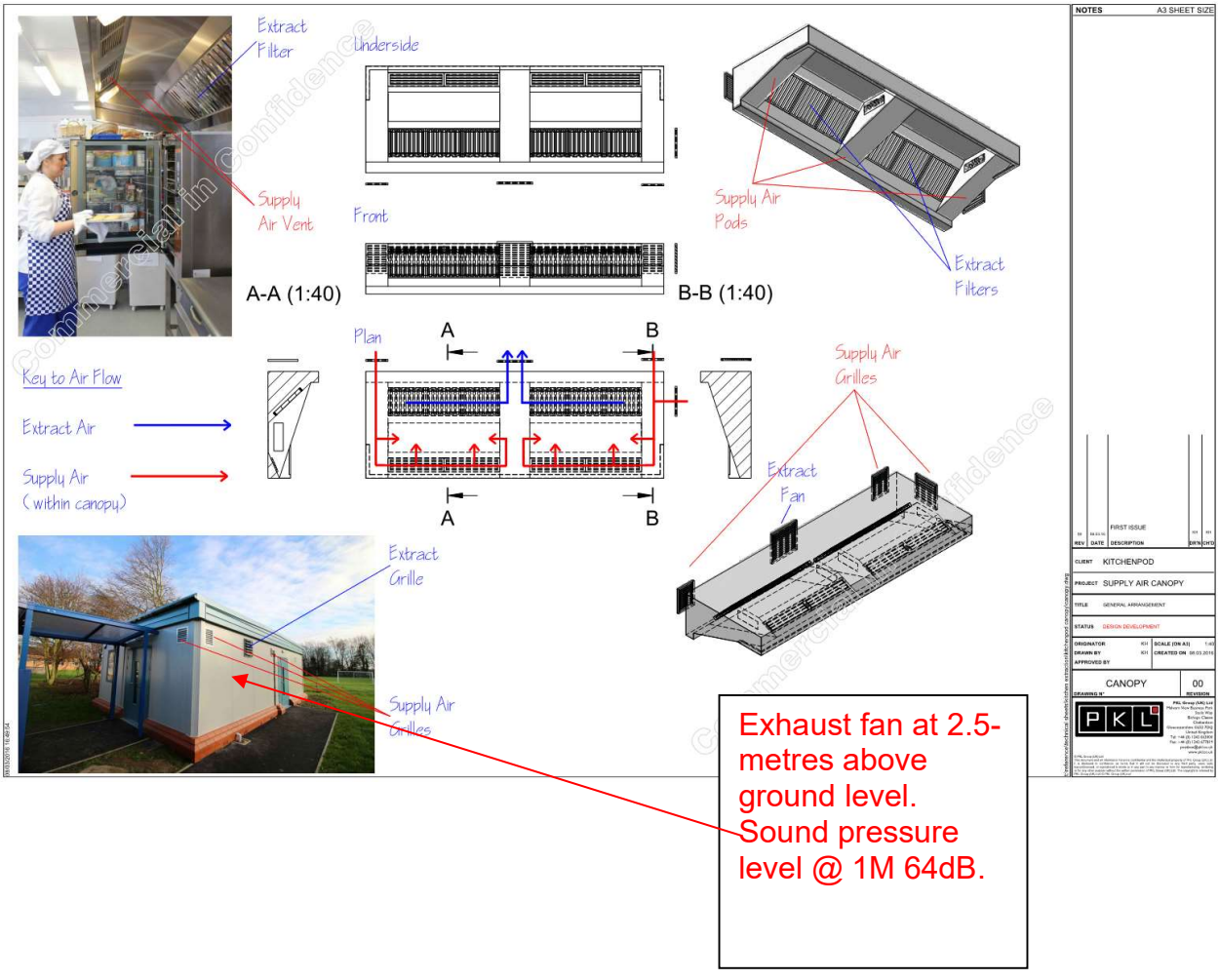
- Canopy serial number
- Installation date
- Extract flow rate
- Pressure drop

4.0 Summary

The canopy has been specified to perform to extract and air change rates stipulated by

- Specification for Kitchen Ventilation Systems – HVCA DW172
- Heating, Ventilating, Air Conditioning & Refrigeration – CIBSE Guide B

To minimise the requirement for additional heating within the kitchen, the canopy is equipped with make-up air pods to deliver ambient air within the envelope of the canopy.
Calculations completed in section two are compliant with recommended rates stipulated within UK codes of practice.
CIBSE guide B stipulates a minimum air change rate of 30 air changes per hour. This equates to an air volume of 0.316 m3/sec. This requirement is delivered by the extract canopy with a ventilation rate that exceeds the minimum CIBSE guideline.
In addition to the mechanical ventilation provided by the extract canopy, 1 no. 250 mm Expelair fan is fitted within the kitchen to provide an additional extract rate of 0.23 m3/s each (0.46 m3/s total).
Purge ventilation can also be provided by the 2. no door openings.



5.0 Appendices

Extract canopy fan specifications

systemair

AW 400E4 SILEO AXIAL FAN

Item no. 34125

Version: 50 Hz

Document type: **Product card**
Document date: **2015-10-06**
Generated by: **Systemair Online Catalogue**

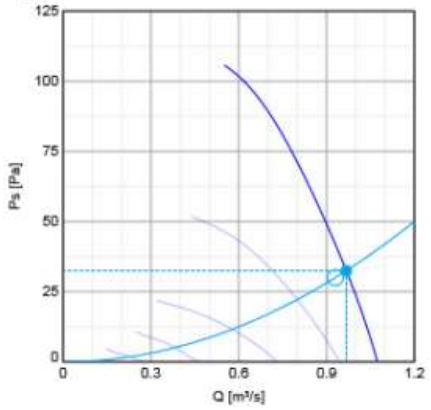
Description

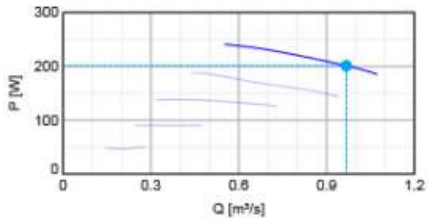
- speed controllable by voltage reduction, plus option of 2-step operation by D/Y switching for 400V versions
- inlet protection guard
- safe and maintenance free operation
- can be installed in any mounting position
- electric connection via terminal box mounted on the motor
- single phase fans are supplied with capacitor

Axial fans of the AW sileo range do have a bionic shape of the fan blade, and are driven by external rotor motors. The AW range is equipped with a square wall plate, galvanized steel and powder coated in black (RAL9005). The protection guard at the inlet side is powder coated in black. The axial impeller is manufactured from black high efficiency composite material. The impeller is balanced dynamically in two levels in accordance with DIN ISO 1940 part 1, quality G6.3. The motors are equipped with thermal contacts for motor protection, with leads to be connected to a motor protection unit, for example Systemair unit S-ET.

Diagrams

Diagrams





Hydraulic data

	Required point			Working point						
	Q [m³/s]	Ps [Pa]	Q [m³/s]	Ps [Pa]	P [W]	n [r.p.m.]	I [A]	SFP [kW/m³/s]	U [V]
User	○ 0.93	○ 30	● 0.967	● 32.5	● 201	1399	0.9	0.208	230

Acoustic data

Sound power level		63	125	250	500	1k	2k	4k	8k	Tot
Inlet	dB(A)	40	53	59	61	65	64	60	52	70
Outlet	dB(A)	38	53	60	62	67	65	60	50	71