

CHRIS MATSON ARCHITECT

APPLICATION FOR PLANNING PERMISSION

DESIGN & ACCESS STATEMENT : **APPENDIX 1** = EXTRACT CANOPY & DUCT SPECIFICATION

Change of Use at
13 Drum Street, Edinburgh
November 2023

THE BELOW CANOPY SPECIFICATION IS A STANDARD MINIMUM REQUIREMENT, PLEASE REFER TO SPECIALIST DRAWING FOR SITE SPECIFIC SPECIFICATION

1. Canopy Hood Details

Dimensions of hood: 4600 x 1500 x 400 / 600

The canopy will be manufactured from stainless steel grade 304, with a 400mm front and 600mm back design, riveted construction with welded corners. Incorporated within the canopy would be a full-length purpose-built filter housing to accommodate 9 of, 500mm (wide) x 500mm (high) x 50mm (deep), high efficiency stainless steel baffle type grease filters, that will reduce grease within the system up to 94.6%. Canopy to house 4 no bulkhead lights or insert lights with grease drip trays on each end of the extraction hood.

Face velocity hood design = 6.90m/s
Volume = 3.52m³/sec

Total number of grease filters 9/Dimensions 495*495*45 Design Volume 3.52m³/s/9 = 0.39m³/s

9 of stainless-steel baffle filters

Ductwork and Discharge Efflux Velocity for Hood

The ductwork will have 2 no spigots off the top of the 4.6mtr hood, the extract duct will then continue up to the plant section which will run horizontally against the kitchen ceiling internal of the building before going up to the vertical discharge flue above eaves which will appear external of the building.

The extract hood will have a clearance of 2mtr to the front underside, the plant section consists of a carbon filtration unit before the extractor fan which will be united to an attenuator with anti-vibration mounts and Dura-dyne connections which will help nullify any further transmitting noise and vibrations, the extractor fan will be speed controlled via auto-transformer regulator which will help prevent harmonic sounds which cause fan to make when operated by electronic controllers, the plant will have accessible points for service and maintenance.

The vertical discharge flue will be of a high velocity discharge cowl which will be set 1mtr above the eaves. The high velocity cowl is ideal for good dispersion of fumes.

The ductwork size is approximately 600*600 or equivalent and at the discharge point will be a 500 dia .6 x .6 = 0.36m² (air cross duct section)
3.52m³/s/0.36 = 9.77m/second (airspeed in duct)

The 600 x 600 ductwork galvanised mild steel sheet of a folded lock formed and flange construction in accordance with DW144 specification.

The efflux velocity is **17.92m/second** and the duct work will be free from grease disperse all fumes to high level.
(3.52m³/s/0.1964m³ (free area inside 500 dia duct or equivalent)= **17.92m/s velocity**

Pressure lost in system

28 off, Linear Metres Duct @ 2.5	=	70pa
9 off, Stainless Baffle Filters	=	100pa
1 off, High Efficiency Cowl and Bends	=	120pa
1 off, Carbon Unit and Pre Filter	=	125pa
Total	=	415pa clean / 450 pa dirty

Required duty and pressure: [3.52m³/s@415pa](#)

Extractor Fan Specification

Located within the ductwork is a SLC500/2-3B Extractor Fan, 2 pole, 3 phase and speed control via Transformer / Inverter regulator.
This fan runs at 2935rpms with a maximum operating noise of 71 dBA and will handle air flow rate in excess of 4.017m³/sec@540pa.

Kitchen Fresh Air-Inlet Details and Calculations

Design Volume: 3.52m³/s (Canopy hood design volume) x 3600 = 12,672m³/hr

Kitchen area 5.3m x 13.5m x 3.9m = 279.05m³ recommended air change rate for commercial kitchen is 60 ach.

The air change rate equates to 12,672m³/hr divided by the kitchen volume 279.05m³. This gives us an air change rate of 45.06ach. Minimum for commercial kitchen 30-60 ach, this figure can be brought down using the speed regulator.

Supply Volume Design

With such a high air change the design would call for the maximum recommended replacement of 85%.

This would be 3.52m³/s (12,672m³/hr) x 85% requires 2.99m³/s (10,764m³/hr)

Pressure Lost in Air-Supply System

Allowing for 45 pa filter / (600*600 duct = 8.3lm/s velocity) 100 pa duct / 120 pa grille/bends 30 /
= 295pa clean / 350 pa dirty

Air – Supply Fan and Grill Specification

Fan selected: SLC500/2-3A Axial Fan, 2 pole, three phase, speed regulated via Inverter Drive.

This fan runs at 2850 rpms with a maximum operating noise of 78dBA and will handle air flow rate in excess of 3.60lm³/sec @ 428pa.

2. Fan Details

Extraction Fan System

- 500-1 Max Fan /20/4/6/30/18
- TEDS 13A Controller

Fresh Air Fan System

- 450.JM/16/4/5/30
- ME 1.3 Controller

3. Ducting Details



The Ductwork is manufactured from galvanised mild steel sheet, folded and lock formed with flanged construction in accordance with D.W.144 specification or can be spiral round ductwork.

4. Noise Control

Regarding our advice for the kitchen extract system, we have assumed an evening ambient noise level of 45dBA L90 up to 23.00 hours outside the nearest windows on the building, at approximately 3 to 4 m distance from the extract discharge at roof level. Given the location and the type of ventilation system required a realistic design criterion would be approximately 5dB below the background noise level outside the nearest possible noise sensitive windows.

We have selected a silencer for the extract discharge system; the silencer would be rectangular design without a pod, typically 500mm x 500mm long. The silencer should reduce the radiated discharge noise to 40dBA @ 4m distance.

We advise fitting a silencer to the sides of the extract fan to reduce noise within the kitchen area. The silencers advised are a design 500mm x 500 x 500mm long. The extract fan is located within the riser which effectively controls break out noise that could be radiated externally. In addition, the fan and ductwork system should be supported off the building structure using anti-vibration mounts/hangers to avoid vibration transmission into the building structure.

Flanged Square Silencers Specification

Silencers are available in two standard lengths –

- 1D (length = Diameter)
- 2D (length = 2 x Diameter)

Each length is then available with and without cylindrical centre-body or 'pod' which provides

additional attenuation. These are identified by the inclusion in the product code 'P' for podded or 'NP' for unpodded versions.

When selecting the appropriate silencer, account needs to be taken of both the level of sound reduction achieved and, in the case of a podded silencer, the additional pressure drops in the system which need to be overcome by the fan.

For sound, deducting the appropriate 'dBA Attenuation' figure from the dBA @ 3m' figure in the relevant fan performance table gives a combined dBA @ 3m figure for the fan and silencer combination.

For pressure, the 'ΔP' figure should be added to the pre-attenuation pressure requirement before selecting the appropriate fan.