

Cleaning and Performance Specification for the Heating, Ventilation and Air Conditioning of the Proposed Five Guys Manchester Piccadilly

Design Overview

Chapman Ventilation will design, manufacture, deliver, install, test and commission the ventilation, heating and air conditioning systems for the proposed Five Guys restaurant as detailed on the Design Drawings.

Taking into account good working practice and 40 years of experience we design summer temperatures to be 6 degrees C below external ambient, this eliminates the “chill factor” often associated with American shopping malls where you need a coat to go into the air-conditioned shops, and more often now in the UK the use of oversized A/C units and poor design.

Equally, winter temperatures are designed to give comfort given customers will require an ambient internal temperature to suit their winter attire.

Design criteria are as follows:

Maximum external temperature 30 deg C	Front of house temperature 22 deg C
Minimum external temperature – 4 deg C	Back of house temperature - ambient
	Front of house temperature 22 deg C
	Back of house temperature 18 deg C (Fresh Meat prepared back of house)
Kitchen Canopy Extract rate	2800 l/s (co-efficient calculation)
Kitchen/Restaurant Supply Air 10ls per person	2380 l/s (85% of Kitchen Extract)
Toilet Extract	90 l/s (allowing 10l per cubicle/urinal)
General Extract (Prep Area)	500 l/s (allowing 20 Air Changes per Hour)
Prep Area Supply Air	500 l/s (allowing 20 Air Changes per Hour)



Kitchen Extract

Design extract duty – 2800 l/s

Canopies

The kitchen cookline canopy will be manufactured by Sirius Products Ltd, model type CCA 6300 x 1300 x 400. Canopy is to incorporate “capture and containment” technology. Each 2.1m section will have 2no. 300 x 200mm spigots that will connect to the 400mm x 800mm extract header at the rear and 2 no. 200 dia spigots at the front where fresh air supply can be connected and diffused through the front face. Light protection to be installed to top of canopy to allow suitable access to ductwork for cleaning.

Kitchen Extract Fan

The extract fan will be manufactured by Flakt Woods. Backward curve centrifugal fan 2.8 m³/s at the pressure required by the system. The Flakt woods fan comes complete with acoustic housing and is direct drive. The unit will be mounted on A/V mounts and has flexible connections on the inlet/outlet to reduce noise/vibration transmission through the ductwork. The fan will be sited on the internal plant area.

The fan is to be controlled via an inverter located in the control panel in the manager's office/plantroom to give an operating duty of 2.8 m³/s (75% of the fans max duty).

Odour Control

In order to eliminate cooking smells and grease, we will be installing the following 6 stage filtration system. This will be sited in the plant area within the unit, this system has been installed on Five Guys sites across the UK and is proven to work sufficiently. In order to eliminate cooking odours and grease,

1. Nvx baffle filters to remove large particles grease at the source of the cooking.
2. 2 x ESP 4500 which consists of 2 banks of electrostatic precipitators.
3. Capture UV-C (to remove grease and odours)
4. *1 - Panel Filters* Used to remove the largest particles. Disposable pleated panel type, grade EU4
UV-C lamps neutralise the odours, the grease vapours and the remaining grease particles contained in the exhausted air.
5. *Bag Filters (to remove smaller particles)*
Used to remove the particles coming from the grease neutralisation which can be considered as a kind of ash. Disposable microfine glass fibre type, grade EU8.
6. *Activated Carbon Filters*

Used to remove ozone generated by ESP and the UV-C lamps to <0.06 ppm.
Rechargeable cells containing NFX grade carbon granules.

Ductwork

All ductwork will be manufactured and installed to DW 144 specification for sheet metal ductwork as produced by the HVCA. The ductwork will, where building construction permits, be 600mm x 600mm type c Fire rated ductwork installed to manufactures specification and galvanised duct with roll steel angle flanges from the plant room to the roof.

Every 1.5m or where restricted as near as possible and every change of direction, an access door suitable for the duct size will be installed to allow for cleaning.

The ductwork will pass through the location of the extract fan and terminate at roof level via an accelerator cowl, discharge velocity 15m/s

General Extract

Provide a general extract system to the office and occupied back of house. A Systemair (or equivalent) prior 250 fans with a duty of 500 l/s @ 200 pa will be used. SFP for fan = 0.367 w/l/s.

Ductwork

All ductwork will be manufactured and installed to DW 144 specification for sheet metal ductwork as produced by the HVCA.

Grilles

Within the restaurant area grilles will be standard 595 x 595 4-way blow diffusers fitted within the lay-in grid ceiling and painted out to match ceiling finish. These will be connected to the ductwork via a plenum box and 1m of grey PVC flexible ducting.

The office and other back of house areas will have Lindab CRL diffusers connected via grey PVC ducting.

Toilet Extract

Provide a toilet extract system to all toilets. Design is for 20 ACH per toilet which exceeds the recommended rate but, in our experience, eliminates the odours sometimes found in public toilets. A Systemair K200EC fan (or equivalent) should be used providing a duty of 196 l/s. SFP for fan =0.367 w/l/s.

Ductwork

All ductwork will be manufactured and installed to DW 144 specification for sheet metal ductwork as produced by the HVCA.

Grilles

Each toilet will have 1 no. 100dia Lindab CRL diffuser located directly above the toilet connected to the toilet extract header via grey PVC ducting. The male urinals will have 1 no. 150 dia Lindab CRL diffuser located centrally to extract from this area.

Restaurant Air Conditioning

The air conditioning to the restaurant will be provided by 2 or 3 (dependant on square footage of seating area) Either Toshiba inverter driven heat pumps located in the ceiling void in the restaurant area, each with a cooling load of 12.7 Kw. Within a operating range of -15 to +43 and a heating load of 13.8 Kw Within a operating range of -15 to +15.

The units will be controlled via return air temperature sensors with temperature controllers mounted on the master control panel in the managers' office/plantroom.

Each unit will operate using re-circulated air and 20% air supplied via the fresh air system.

All 400 dia ductwork supplying conditioned air will be internally insulated to prevent condensation.

Office Air Conditioning

The air conditioning to the office will be provided by 1no. Toshiba inverter driven heat pump located on the wall of the office

Fresh air

There will be a fresh air, air handling unit located internally at manufactured by Flaktwoods providing tempered air to the kitchen canopy, servery, restaurant and all back of house areas.

The unit will supply 2.970m³/s which when taken with all the extract systems will provide 85% of the required air to the building. The remaining 15% will be through natural infiltration keeping the building under slight negative pressure.

The unit will make use of 36kw water coil to temper the incoming air to 16 degrees C.

Ductwork

All ductwork will be manufactured and installed to DW 144 specification for sheet metal ductwork as produced by the HVCA. As the ductwork is running in the void and above the ceiling, we would not propose to insulate it.

Grilles

Within the restaurant area grilles will be standard Lindab RGS type grilles mounted in the side of the powder coated ductwork below the ceiling.

The office and other back of house areas will have Lindab CRL diffusers connected via grey PVC ducting.

Controls

Supply and install all controls associated with all plant along with installing a comprehensive control panel, which will have the facility to communicate with any tenant alarms.

The panel will contain a run and stand-by switch for the kitchen extract fan, Run/Fail warning lights for the remainder of the equipment and internally adjusted (not by general staff) an inverter, timer and temperature control for the fresh air.

This system is designed to be automatic with the facility for manual over ride should the need arise. The control panel will have variable air volume built into it such that extract and supply will ramp up and down depending on demand.

The gas interlock will close on the following

- 1) Kitchen extract fail (fan not active)
- 2) Supply air fail (fan not active)
- 3) Fire alarm activation.
- 4) Ansul fire suppression activation
- 5) Gas knock off activation

Power to be provided by the main contractor:

- 1) 145-amp 3ph +neutral isolator adjacent to the HVCA electric panel
- 2) 1Nr. 13-amp fuse spur for fire suppression systems.
- 3) Fire Alarm link for HVCA panel and fire suppression

Ansul Fire Suppression System

A triple tank R102 fire suppression system will be installed by Flamefast (Or equivalent) Nozzles will be positioned according to catering layout.

Commissioning

On completion, balance and commission each system to give the design requirements. Record and demonstrate if required, the performance of each system and record all data, which will be filed in the Operating and Maintenance Manual, which will be issued at handover.

Provide a laminated "layman's" guide to each piece of equipment, which the builder must fix to the nearest wall/surface to enable non-technical people to understand the operation of the equipment.

Along with this, supply as fitted drawings in a plastic sleeve to be fixed on the plant room wall by the builder.

On completion walk through the system with the client's representatives and demonstrate the day-to-day operation of the HVAC along with any local remedial actions that can be taken.

Clean operation of kitchen extract system

As part of five guys cleaning operation the canopy baffle filters and grease trays for the kitchen canopy are clean every night as this is standard practice across the Five Guys Estate.

ESP are cleaned every 3 months via Chapman Ventilation. The ESP cells are replaced with clean cells, and the dirty cell are removed from site to be cleaned. The unit are clean and the clean cells installed back into the unit.

The 3-month ESP service is monitored by Five Guys and adjusted if the store is a high volume of trade in which the cells are change more frequently to 2 months. Chapman Ventilation record are able to supply all ESP services that have taken place over the year on request.

Duct cleaning is done by a nominated contractor that Five Guys appoint.

A.C and A.H.U service and filter change is done every 3 months by Chapman Ventilation

