PROPOSED LIDL FOODSTORE, CROSLAND MOOR, HUDDERSFIELD

VENTILATION & EXTRACTION STATEMENT

Client:

Lidl GB Ltd (Doncaster Property Office)

Architect:

HTC Architects

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1.00 INTRODUCTION

This Ventilation and Extraction Statement (VES) has been prepared for Lidl Great Britain Ltd and is submitted in support of the full planning application for the proposed Lidl foodstore at Crosland Moor, Huddersfield.

The development will comprise of the erection of a foodstore (Use Class E) with associated access, parking, servicing area and landscaping.

The statement will describe the various ventilation systems proposed for the new Lidl food store.

The ventilation systems will comprise of:

1. Sales Area Centralised Ventilation System.
2. Bakery Extract Ventilation System.
3. Customer Toilet Extract Ventilation System.
4. Mechanical Ventilation Heat Recovery (MVHR) Systems:
    i. DRS room, managers office and cash office combined system.
    ii. Staff room, cloak room and staff WC's combined system.
5. Cold Room Void Recirculatory Ventilation System.

2.00 SALES FLOOR CENTRALISED VENTILATION SYSTEM

The sales area will be served by an intelligent Air Handling Unit (AHU) to provide heating, cooling, and ventilation, as shown on the generic BBS 2021 model drawing in Fig 1.

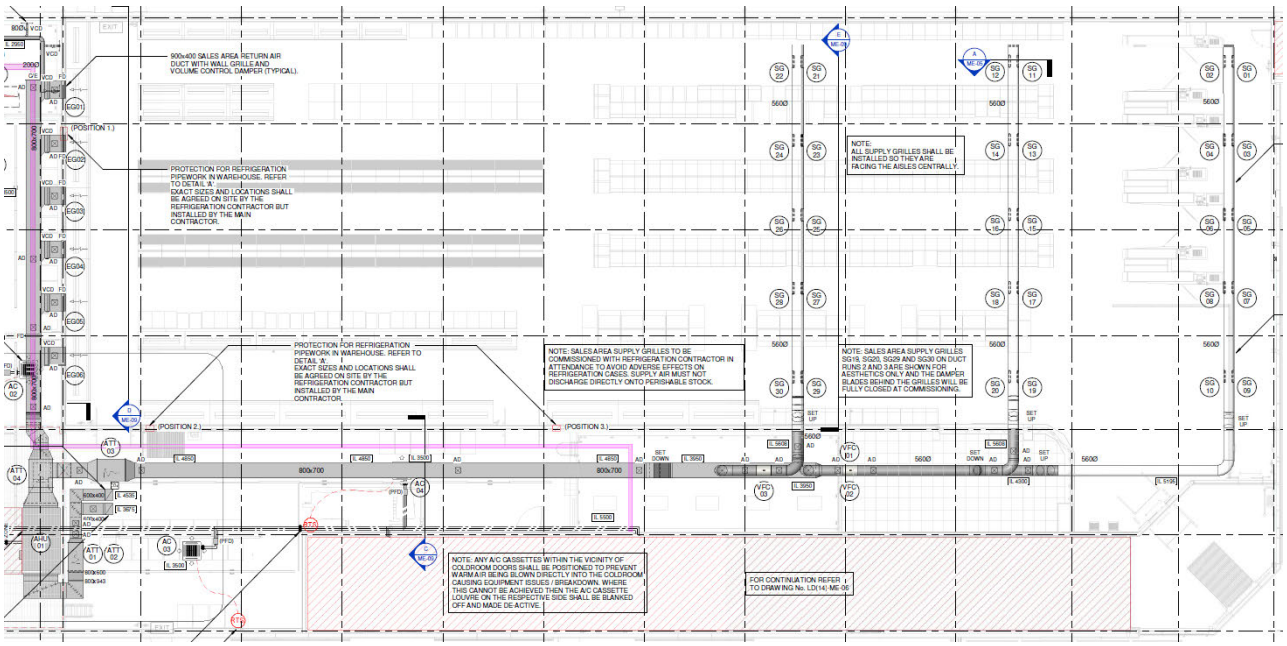

Figure 1 - General Sales Floor Ventilation (BBS 2021)

The dimensions of the AHU and the total air volume of the unit has considered the below criteria:

- CO2 content in the sales area.
- Compliance with room humidity with closed and open back wall chiller cabinets.
- Space heating in winter with a room temperature of 20°C/40% RH.
- Space cooling in summer with a room temperature of 23°C/55% RH.

The AHU has been designed to provide a fixed fresh air volume for occupancy and ensure potentially harmful pollutants are diluted and removed from the store.

The central supply and extract AHU comes complete with filters (F7 supply and M5 extract), high-efficiency rotary thermal wheel, recirculation by-pass, de-humidification circuit with hydraulic package, R410A change-over coil for heating and cooling, EC supply fan and EC extract fan to provide ventilation, heating and cooling to the sales area. The AHU will use a system of distribution ducts, complete with diffusers, attenuators, volume control dampers, 24V motorised regulation dampers and return air grilles. The recirculation by-pass

will allow the unit to operate in 100% recirculation mode, or modulate to the minimum fresh air position, depending on CO2 concentration levels within the sales area.

The AHU shall comprise of:

- Low specific fan power EC extract fan.
- High efficiency thermal wheel (sorption).
- Re-circulation bypass and damper.
- Four circuit heating & cooling DX coil.
- De-humidification circuit.
- Filters.
- Low specific fan power EC supply fan.
- Hinged access panels.
- Fan isolators.
- Integral controls.
- BMS fault and enable via Modbus.
- Fan manufacturer's flexible fan connections.

The AHU shall be provided with a four-circuit interwoven R410A Direct Expansion (DX) coil, served by 2No Variable Refrigerant Flow (VRF) 2-pipe heat pump systems, located in the external plant area. The VRF heat pumps shall be connected to the Building Management System (BMS) control panel via Modbus RTU.

The AHU design includes a de-humidification circuit, which will dry out the supply air stream and maintain a moisture content in the sales area below 10.5 g/kg dry air. The circuit comprises of a run-around coil, with pre-cooling coil before the main DX heating/cooling coil, followed by a re-heat coil. The de-humidification circuit is controlled by the AHU Sub-Controller, with fault reporting to the BMS via Modbus RTU.

Intake and exhaust ducts are connected to the AHU and to roof mounted terminals (duct spouts with bird guards). Separation is maintained between intake and discharge louvres to prevent recirculation of stale air.

The fresh air intake and exhaust ductwork are insulated throughout with elastomeric nitrile-rubber insulation that is closed cell, flexible sheet with a built-in vapour barrier. All other ducts (supply and extract) are insulated with foil face mineral fibre slap insulation for rectangular ducts and wrap for spiral.

Supply air ducts in the ales area are provided with Volume Flow Controllers (VFC's), complete with 24V d.c actuators and differential pressure sensor, which will be used to vary the air volume entering the unit. The VFC's will be controlled to achieve the strategy below:

- Minimum condition: at part load, a third of the AHU supply air volume is delivered to the front of the store above the checkout tills. Duct runs 2 and 3 shall be shut-off.
- As building load increases, the second duct run is brought into action and will regulate with the AHU fan speed from minimum to 2/3 total fan speed. Duct runs 3 shall be shut-off.
- At full building load, the third duct run is brought into action and will regulate with the fan speed from 2/3 to maximum fan speed – 100%.

Duct mounted silencers will be provided on the room side and atmospheric side of both the supply fan and extract fan. The room side silencers will be selected to ensure the noise rating does not exceed NR40. The atmospheric silencer will be selected to ensure the noise level does not exceed the maximum limits stated in the acoustic survey and recommendations report, provided with the planning submission.

The EC fans and low-pressure created by correctly sized ductwork and attenuators, ensures the supply and extract fan Specific Fan Power (SPF) is <2.0W/l/s. This ensures compliance with all relevant ventilation legislation and performance guidance.

3.00 BAKERY EXTRACT VENTILATION SYSTEM

The bakery will be supplied with two double stacked convection ovens. An integral recirculation hood is positioned above the top oven, which is used to cool the exhaust air and dilute baking odours.

Directly above the ovens, general extract ventilation will be provided, as shown in Fig 2. The design of the ventilation system will follow Lidl's standard BBS 2021 specification.

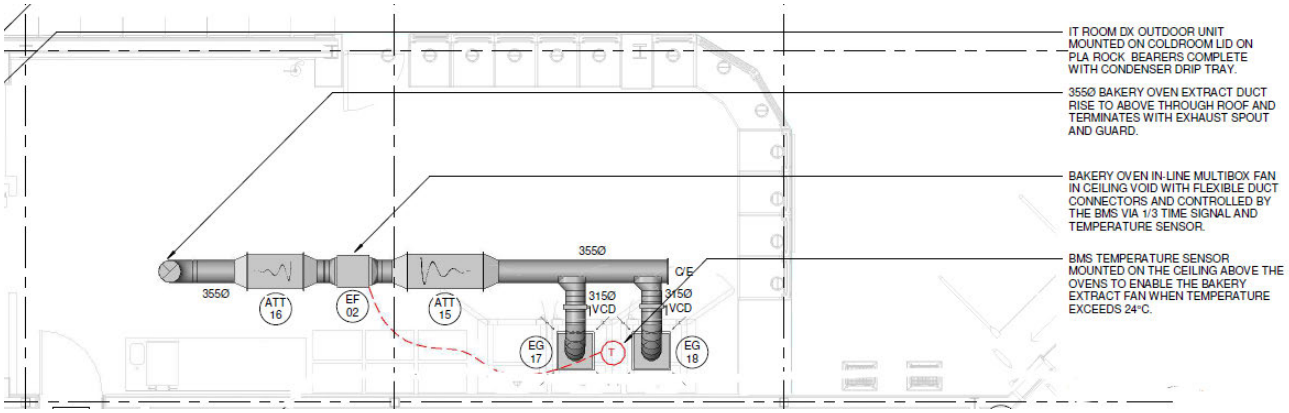

Figure 2 - General Bakery Extract (BBS 2021)

The ventilation system is sized to provide general ventilation only and comprises of:

- 2 No 595x595 louvred faced grilles, which are located above the ovens.
- Galvanised steel spiral ducting, connecting the grilles to outside air.
- In-line duct mounted silencers to control room side and atmospheric noise.
- In-line multi-box extract fan.
- Discharge duct spout and bird guard at roof level.

The extract fan will be driven by an EC external rotor motor, which is 100% speed controllable. This means the system air volume will be set up at commissioning, to ensure no more air is extracted than is required.

The EC fans and low-pressure created by correctly sized ductwork and attenuators, ensures the extract fan Specific Fan Power (SPF) is <0.5W/l/s. This ensures compliance with all relevant ventilation legislation and performance guidance.

The noise level from the fan is likely to be in the region of 45dBA at 3m; however, the Fit-out Contractor will be responsible for confirming the final fan details once the Stage 4 design is completed. Based on Lidl's model design, the noise spectrum for the fan inlet and outlet is expected to be similar to the values provided in Fig 3.

Sound power level		63	125	250	500	1k	2k	4k	8k	Tot
Inlet	dB(A)	35	54	50	56	67	72	52	39	73
Outlet	dB(A)	37	55	51	57	69	73	54	41	75

Figure 3 - Typical Bakery Extract Fan Acoustic Details

Duct mounted silencers will be provided on the room side and atmospheric side of the fan. The room side silencer will be selected to ensure the noise rating in the bakery does not exceed NR40. The atmospheric silencer will be selected to ensure the noise level does not exceed the maximum limits stated in the acoustic survey and recommendations report, provided with the planning submission.

The extract system in the bakery is provided for general ventilation purposes only. The standard extract air volume is 450 litres/second and will be discharged at low velocity at roof level. The exhaust air will mix with atmospheric air immediately and further dilute any potential baking odours.

The extract system will not discharge any fumes, as none are created in the baking process.

4.00 CUSTOMER TOILLET EXTRACT VENTILATION SYSTEM

The customer toilet will be supplied with a general extract system to exhaust vitiated air to atmosphere as detailed in Fig 4 below.

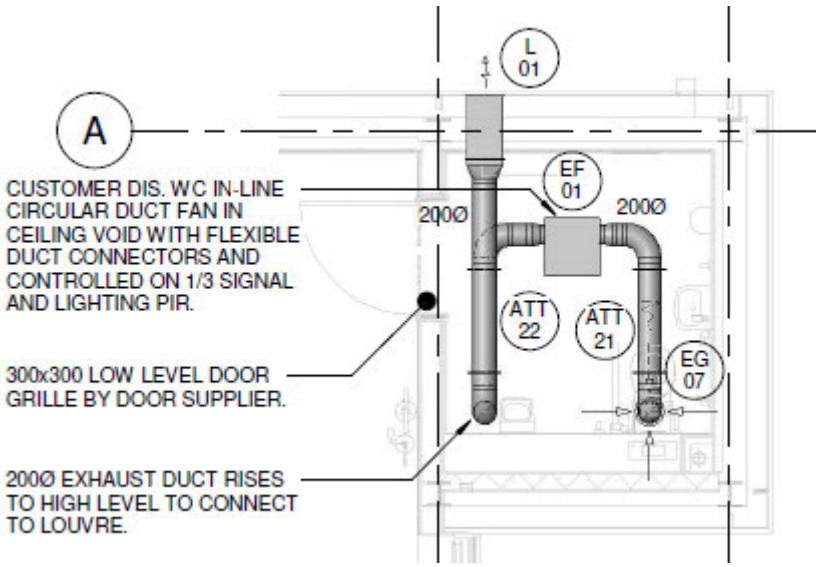

Figure 4 - General Customer WC Extract (BBS 2021)

The ventilation system is sized to provide general ventilation only and comprises of:

- 1 No 200Ø ceiling mounted extract valve.
- Galvanised steel spiral ducting, connecting the grilles to outside air.
- In-line duct mounted silencers to control room side and atmospheric noise.
- In-line multi-box extract fan.
- Discharge side wall louvre at high level.

The extract fan will be driven by an EC rotor motor, which is 100% speed controllable. This means the system air volume will be set up at commissioning, to ensure no more air is extracted than is required.

The EC fans and low-pressure created by correctly sized ductwork and attenuators, ensures the extract fan Specific Fan Power (SPF) is <0.5W/l/s. This ensures compliance with all relevant ventilation legislation and performance guidance.

The extract fan controls strategy will be run via a 1/3 lighting signal and lighting motion sensor, whereby, if the room is occupied the system shall operate. The fan is provided with an adjustable run-on timer, ensuring the fan will continue to operate for at least 5 minutes after the end of the occupancy period. This ensure ventilation rates are maintained, whilst reducing energy consumption.

The noise level from the fan is likely to be in the region of 45dBA at 3m; however, the Fit-out Contractor will be responsible for confirming the final fan details once the Stage 4 design is completed. Based on Lidl's model design, the noise spectrum for the fan inlet and outlet is expected to be similar to the values provided in Fig 5.

Sound power level		63	125	250	500	1k	2k	4k	8k	Tot
Inlet	dB(A)	49	52	55	45	41	36	27	21	58
Outlet	dB(A)	53	59	67	63	62	56	44	35	70
Surrounding	dB(A)	19	34	41	35	31	28	23	14	43

Figure 5 - Typical Customer WC Extract Fan Acoustic Details

Duct mounted silencers will be provided on the room side and atmospheric side of the fan. The room side silencer will be selected to ensure the noise rating in the customer toilet does not exceed NR40. The atmospheric silencer will be selected to ensure the noise level does not exceed the maximum limits stated in the acoustic survey and recommendations report, provided with the planning submission.

The extract system in the toilet is provided for general ventilation purposes only. The standard extract air volume is 65 litres/second and will be discharged at high level through a side wall louvre. The customer toilet make up air shall be via a door transfer grille.

5.00 MECHANICAL VENTILATION HEAT RECOVERY (MVHR) SYSTEMS

The store will be supplied with 2 No. Mechanical Ventilation with Heat Recovery (MVHR) systems. System 1 will serve the DRS room, cash office and meeting room. System 2 will serve the staff room, cloakroom and staff toilets. The zones shall be supplied with a mechanical ventilation with heat recovery system to provide general extract and fresh air supply requirements. These will be installed and controlled in accordance with Lidl's BBS 2021 specification, as shown in Fig 6 and Fig 7 below.

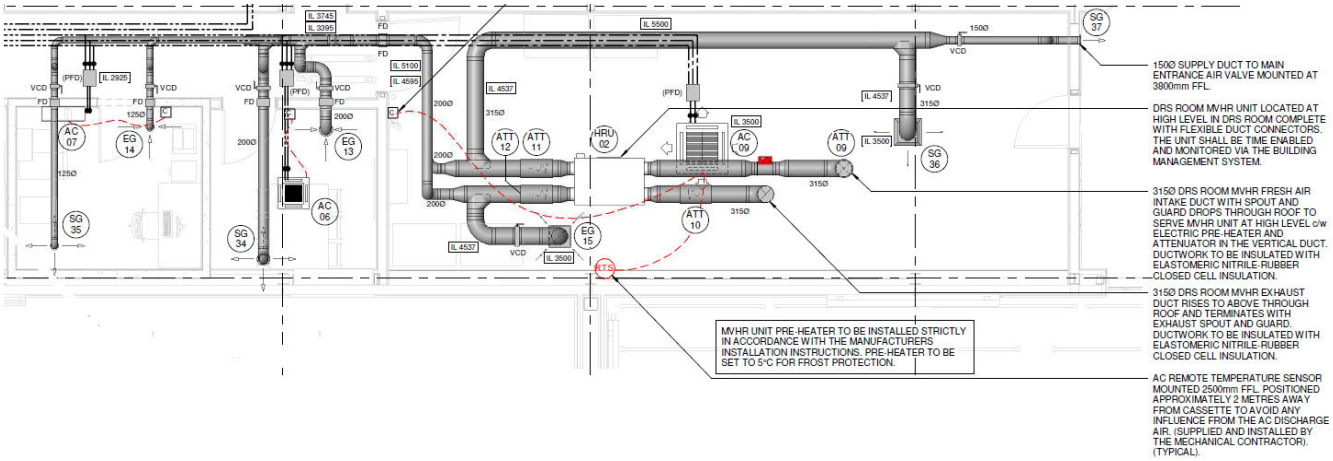

Figure 6 – General System 1 MVHR System 1 (BBS 2021)

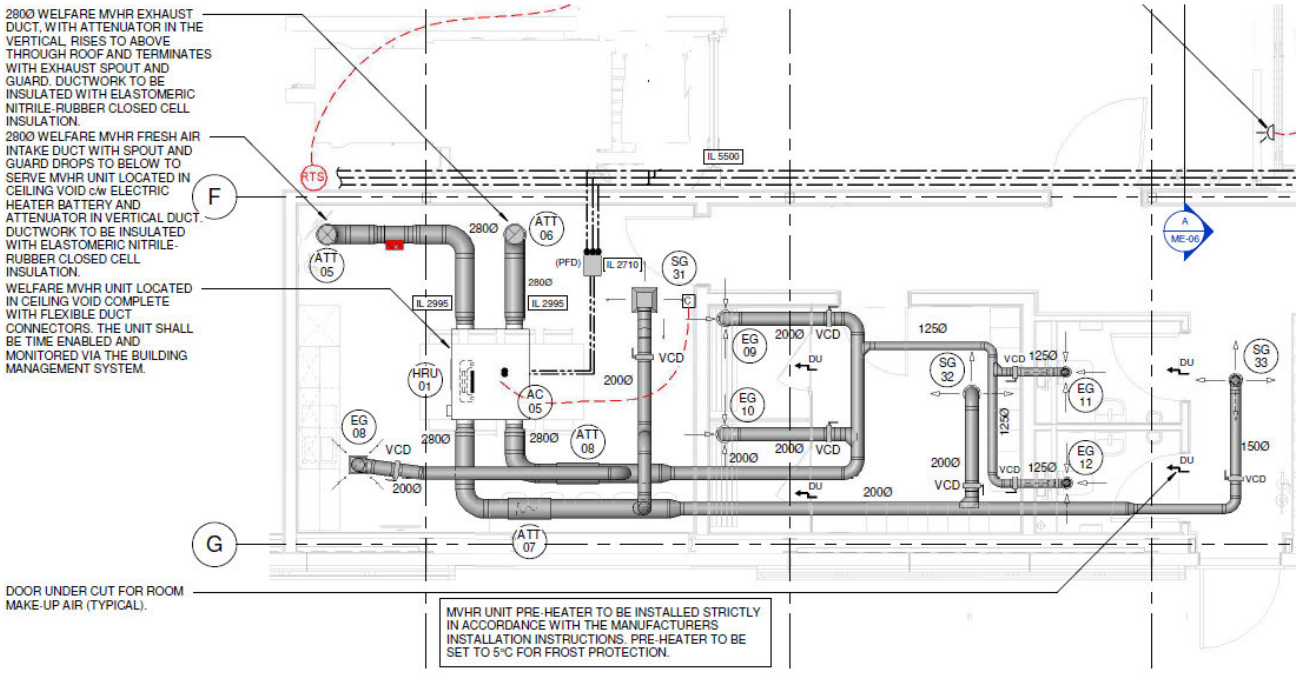

Figure 7 – General System 2 MVHR System 1 (BBS 2021)

The ventilation system is sized to provide general ventilation only and comprises of:

- Low specific fan power extract fan
- High efficiency plate heat exchanger with bypass
- Panel filter
- Low specific fan power supply fan
- Access panel
- Integral controls
- BMS fault and enable via MODBUS
- Fan manufacturer's flexible fan connection

The MVHR units are provided with a matching duct mounted electric heater, which shall be installed on the fresh air inlet duct connection to each unit, complete with airflow fail switch, duct mounted thermostat (SET TO 5°C MAX) and safety cut-outs (manual and automatic).

The MVHR units are installed with suitable anti-vibration mountings to prevent structure borne acoustic transmission.

The MVHR unit operates on a full fresh air volume basis, according to the BMS time signal, via a Modbus gateway.

Intake and exhaust ducts shall connect to the MVHR unit and to roof mounted terminals. Separation shall be maintained between intake and discharge louvres to prevent recirculation of stale air.

The fresh air intake and exhaust ductwork are insulated throughout with elastomeric nitrile-rubber insulation that is closed cell, flexible sheet with a built-in vapour barrier. The supply and extract ducts are insulated with foil face mineral wrap. This will prevent heat loss where ductwork passes through unconditioned voids, thus, aiding the efficiency of the heat recovery.

The units will be driven by an EC rotor motor, which is 100% speed controllable. This means the system air volume will be set up at commissioning, to ensure no more air is extracted than is required.

The EC fans and low-pressure created by correctly sized ductwork and attenuators, ensures the extract fan Specific Fan Power (SPF) is <1.9W/l/s. This ensures compliance with all relevant ventilation legislation and performance guidance.

The noise level from the unit is likely to be in the region of 40dBA at 3m; however, the Fit-out Contractor will be responsible for confirming the final fan details once the Stage 4 design is completed.

Duct mounted silencers will be provided on the room side and atmospheric side of the fan. The room side silencer will be selected to ensure the noise rating in the customer WC does not exceed NR40. The atmospheric silencer will be selected to ensure the noise level does not exceed the maximum limits stated in the acoustic survey and recommendations report, provided with the planning submission.

6.00 COLDROOM VOID RECIRCULATORY VENTILATION SYSTEM

2No. recirculatory supply air systems shall be provided for the chiller and freezer cold room voids, as shown on the generic BBS 2021 model drawing in Fig 8.

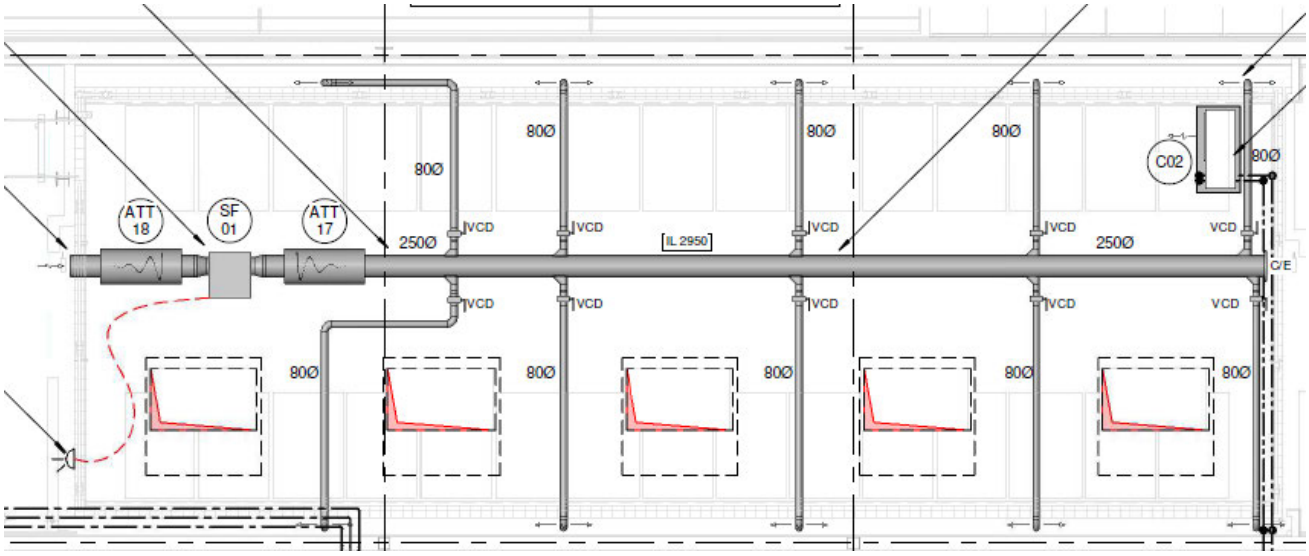

Figure 8 – General Cold Room Void Recirculatory Supply (BBS 2021)

The recirculatory supply air systems will be used to heat the voids between the sides of the cold rooms, to a suitable temperature above the surrounding air dew point, to prevent condensation forming.

Design Parameters:

- Winter Supply Air Temperature - 17°C
- Summer Supply Air Temperature - 23°C
- Maximum Relative Humidity of voids and space - 75% RH
- Minimum temperature of voids and space - 5°C

The ventilation systems shall be complete with recirculatory supply fan, attenuators, volume control dampers, bird guards, ductwork system and controls. Vertical ducts will be placed in the voids and the lower edge of the ducts shall terminate 250mm FFL. All vertical ductwork shall have volume control dampers to ensure that the systems can be balanced and ensure that all areas of the voids are supplied with enough warm air to keep the area above dew point.

The EC fans and low-pressure created by correctly sized ductwork and attenuators, ensures the recirculatory fan Specific Fan Power (SPF) is <0.5W/l/s. This ensures compliance with all relevant ventilation legislation and performance guidance.

The power supply for the fan shall be fed via the BMS control panel.

The recirculatory supply fan shall operate 24-hours, but the current shall be monitored by the BMS Head Control, via a current transformer (CT). Should current not be detected, then a white flashing light shall signal a fan fault.

The noise level from the fan is likely to be in the region of 43dBA at 3m; however, the Fit-out Contractor will be responsible for confirming the final fan details once the Stage 4 design is completed.

As the fans and associated ductwork are all internal, and there is no interaction with the external environment. Acoustic attenuation will be sized to maintain and internal acoustic level of NR40 with no external requirements necessary.