



A Breath Of Fresh Air

PROJECT TITLE:	KINGSPPOINT
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CLIENT:	HENRY CONSTRUCTION PROJECTS LTD
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DOCUMENT TITLE:	AIR-CONDITIONING/ VENTILATION SYSTEM REPORT
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INTRODUCTION

PURPOSE

This report has been prepared to summarise the Ventilation and Air-conditioning design and operation of building services at the Kingspoint development. This development will be using the following proposed ventilation system. The development consists 103 No. of Apartments and 2 No. Commercial Units.

The objectives of this report are:

OUTLINE

EDC have been employed to provide MEP, BREEAM & Sustainability services for the project, with the scope of disciplines including:

- Mechanical HVAC Services
- Public Health Domestic Water & Above Ground Drainage Services
- Electrical Services
- Fire Protection Engineering
- Above Ground Drainage
- BREEAM
- Part L (Over heating)
- SAP
- Sustainability & Energy report

PROJECT TEAM

- Architect : Geraghtytaylor
- Structural Engineer : Manhire Associates
- Building Services Engineers : EDC
- Fire Consultants : EDC
- Sustainability Consultants : EDC

BUILDING DESCRIPTION

The site is located at 120 Kings Road, Reading RG1 3BY and consists of Basement, Ground, Mezzanine, First floor to Sixteenth floor which has 103 No. of Apartments & Roof level and also 2 No. Commercial Units in the Ground and Mezzanine level.

Basement level consist of car parking & small bit of plant space for lift.

Ground floor consist of main M&E plant room, 2 No's of commercial units, Refuse store, Cycle store, Electrical Substation & Concierge.

Mezzanine level consist of LV room, BT room, Tenant plant room & upper level of large commercial unit.

From level First floor to Sixteenth floor has 103 no's of apartments.

Roof level has M&E plant room and BMU (by others).

HVAC SYSTEMS

SYSTEM DESCRIPTION:

The HVAC system for the new project shall consist generally of the following:

Each Apartment on the 11th floor and above shall be provided with comfort cooling system. The cooling & Heating of the apartment (Level 11 & above) shall be provided via Variable Refrigerant flow (VRF) heat pump system which provides heating and cooling simultaneously.

The multiple VRF fan coil units are provided at the room side for cooling and recirculation system which provides heating and cooling simultaneously. The external condenser unit is located at the roof level, the refrigerant pipework will be distributed from outdoor unit to the indoor unit (FCU) via BC box (Branch controller) to each of the unit. The fan coil units shall be located at high level within the ceiling void, the units will draw in air from the space and cool or heat depending on the space requirement before delivering back into the space via ceiling grilles/diffusers.

The mechanical contractor shall employ a specialist subcontractor to supply and install a comfort cooling system based on a VRF multi split air conditioning system. The complete VRF system, shall include fan coil units within the dwellings, BC controllers located in the utility cupboard and condenser units located in the roof area. BC box shall be acoustically enclosed to achieve the required noise level. Boxing arrangement to be provided for all the FCU where unit is placed above the wet rooms so that the return air from the space routed back to the unit via return duct and grille arrangement at high level with in ceiling void.

A separate concealed horizontal chassis fan coil unit shall be installed within the ceiling void of the Lounge / Kitchen Diner of each Apartment. A wall mounted controller shall be provided for each fan coil unit.

Each fan coil unit shall be ducted to a ceiling or bulkhead mounted slot type supply diffuser. Return air to the ceiling void shall be provided by a ceiling or bulkhead mounted 'dummy' type slot diffuser.

Bulk head or ceiling drawing to be confirmed by architect and client.

The fan coil units shall be linked to a Roof Mounted Outdoor Condensing unit by insulated refrigerant quality pipework routed through Corridor ceiling voids & Mechanical risers.

Refrigerant for the systems shall be R410a.

Access panel shall be provided in the ceilings adjacent the fan coil units for maintenance.

Pumped condensate drains from fan coil units shall run within ceiling voids to connect to waste or soil stacks via a HEP Vo valve.

Controls for the cooling systems shall be configured so ensure cooling does not occur simultaneously with the underfloor heating systems.

For corridor summer air-conditioning system please refer to above ventilation topic.

The commercial area is shell & core type, tenant shall have their own VRF system for comfort cooling. The concierge area shall be proposed with dedicated VRF system for comfort cooling (design by others).

100.020 DESIGN PARAMETERS:

All livable spaces are to be cooled to achieve internal temperatures as listed below, when the cooling Installations are run continuously.

All habitable areas to be cooled by fan coil units.

Design Conditions:

Heat loss & Heat gain calculations, to verify the sizes given, must be calculated in accordance with CIBSE standards on the basis of:

External Conditions

Summer:

30°C dry bulb/20°C wet bulb

Winter :

-5°C / Saturated

Internal Conditions

Living/Dining/Kitchens:

22°C

Bedrooms:

21°C

U Values:

External Walls:

0.15 W/m²K

Floor:

0.20 W/m²K

Roof:

0.18W/m²K

External Glazing:

1.50 W/m²K (g-value 0.63)

Doors

1.4 W/m²K

Air Permeability:

5 m³/m²/hr @ 50Pa

Internal Condition & 'U' value and room lighting & small power load to be confirmed.

Indoor Units: The indoor units will have a heat exchanger which shall be constructed from copper tubing with aluminum fins. The flow of refrigerant through the heat exchanger will be controlled by a linear expansion valve. The valve will be controlled by two pipe thermistors and a return air thermistor and shall be capable of controlling the variable capacity of the indoor unit between 25% and 100%.

In general, all indoor fan coil units shall be concealed within the ceiling void at high level. The units will serve the spaces via ductwork connecting to a plenum, located on the void of the ceiling. Return air will be brought in through ceiling grilles on the bulk head of each room. Refer to the dwelling drawings for details.

Outdoor Units: Outdoor condensers units located on the roof level. The centralised controller shall be provided near the BS box for each apartment.

Condensate Drain: The contractor shall supply and install a suitable trapped condensate drain from the indoor fan coil units & BS box and discharge the condensate to the nearest stack via HEPVO. The condensate shall drain under gravity.

VENTILATION

Apartment Ventilation:

Ventilation to each dwelling shall be mechanically ventilated by with its own dedicated Mechanical Extract Ventilation unit (MEV) with separate cooker hood extract system shall be provided by others.

Apartment ventilation will consist of openable windows/doors with trickle vents to all habitable rooms together with a continuous central extract ventilation system. The fans will be located above the ceiling level within the utility cupboards and will be accessed through a hatch on the ceiling. The continuous central extract system shall be provided with trickle, medium and boost speeds.

Internal doors shall be undercut to facilitate the transfer of air from habitable rooms to the air extraction points.

Utility cupboards containing washing machines or Heat Interface Unit's (HIU's) shall be ventilated via a ceiling vent extracting to the central extract system. Utility cupboards containing washing machine spaces should not be located next to bedrooms.

Separate cooker hoods to be provided in all kitchens (by specialist) with an adjacent ceiling vent extracting to the central extract system.

Ventilation ducts should be terminated as shown in the mechanical typical apartment layouts with minimum louvre free area of 0.02 m² to be confirmed by architect.

Extract ventilation to each Apartment will be provided by a dedicated continuous central mechanical extract fan unit as defined by Building Regulations Part F, system type 3. The central extract unit shall continuously operate at its "trickle ventilation" mode 24/7. The trickle ventilation mode being the minimum requirement to satisfy building Regulations part F 2006 (refer to mechanical schedules for air volumes)

The central extract unit shall be provided complete with a boost facility operated for bathroom via light switch / humidity sensor for kitchen area separate switch.

The minimum setting will be the "trickle" mode whilst the maximum setting is booster mode.

Ductwork to be 204mm x 60mm or 220mm x 90mm plastic flat duct system, as indicated on the drawings shall be complete with all associated fittings, connectors and fixings etc. all joints to be sealed and tested. Undercut internal doors are provided to facilitate air transfer from habitable rooms to air extraction points.

The exhaust air shall be ducted from the MEV units discharge to atmosphere with suitable insulation. The louvres will be positioned to ensure that exhaust air does not short circulate into the openable windows and / or trickle vents. Distribution ductwork shall be installed at high level within ceiling void in the corridor route where possible.

The kitchen cooker extract hood extract shall not be connected through the central extract system. Re-circulating cooker hoods to be provided in all kitchens with an adjacent ceiling vent extracting to the central extract system.

Purge ventilation provision is required in each habitable room. The requirements for adequate purge ventilation depends upon the style of window or door being relied upon to provide the required equivalent air change to be confirmed by an architect

Linen cupboards containing washing machines or boilers shall be ventilated via a ceiling vent extracting to the central extract system. Linen cupboards containing washing machine spaces should not be located next to bedrooms.

Bin Stores

The bin stores will be ventilated through the use of mechanical extract system. This will draw the stale air from the room pulling fresh air in from outside. The fresh air for the bin stores comes directly from outside through fully louvred doors.

Cycle Stores

The fresh air for the cycle stores achieved naturally comes directly from outside through fully louvred doors or Louvered facade.

Plantroom

The internal main mechanical plantroom containing a CHP & 2 no. boilers & water storage tank area has been designed to incorporate a mechanical supply and extract system. An allowance to cover the combustion air intake for the CHP& Boilers has been designed for in accordance with BS 6644/ manufacturer recommendation. The supply air to the plantroom will be insulated to prevent any risk of condensation from forming. The supply air will be directed across the boilers& CHP discharge low level to accommodate the combustion process. The CHP ventilation/exhaust air directly discharged to atmosphere via external louvre. For more details please refer to Plant room drawing.

Basement Lobby ventilation

Basement lobby shall be naturally ventilated as per fire services requirement. Fire rated duct minimum of 2 no's of 0.4 sq.m each from the basement lobby discharge to atmosphere via external louvre at high level of cycle store area as shown in the drawing.

Commercial units

Commercial units are shell & core only but provision has been made for air intake & exhaust air to the atmosphere. Also provision made in the riser for kitchen exhaust air discharge to the atmosphere at roof level. Also future Plant space shall be provided at the roof to accommodate kitchen exhaust fans for both the commercial units.

Concierge unit

Concierge shall be provided with mechanical heat recovery ventilation system shall be designed by others.

Basement Car park ventilation

Fresh air will be drawn into the car park via the builders-work opening (through external louvre) in the ground floor slab. Two soffit mounted induction fans will be utilised to dilute the air & ensure the absence of any dead spots. Contaminated air will be pulled through the opening in the ground floor slab and exhausted via the two 500 Ø main extract fans located in the ground floor plant room and discharge the air to atmosphere via external louvre as shown in the EDC drawing.

Car park ventilation system must comply with BS standards and building regulation.

The system shall be demand driven and operate as per the below cause and effect:

Condition	System Function	Air Change Rate
Daily Vent	Main Extract Fans run at 15%.	1.5
CO > 20ppm	Main Extract Fans run at 30% via inverters. Selected Induction fans at Low Speed.	3
CO > 30ppm	Main Extract Fans run at 60% via inverters. Selected Induction fans on Low Speed.	6
Fire Condition	Main Extract Fans activate at 100%. Induction fans initially switched off for a period of 3 minutes or as advised. Induction fans then switch to Full Speed.	10

The Mechanical Contractor shall employ PVE Ecopark exhaust fans (or equal & approved) to design, supply, install, test & commission an impulse type smoke extract ventilation system to the Basement covered Car Park.

Lift Lobby / Corridor Ventilation System

Independent Lift lobby / Corridor Smoke extract systems shall be provided to serve the development.

During 'normal' summertime operation the systems shall provide supply & extract ventilation to limit over heating within the Corridor & Lobby areas. This is only applicable to floors without openable windows.

During a fire condition the systems shall provide smoke extract & make-up air ventilation to the Corridor & Lobby areas.

The Contractor shall employ a specialist to carry out CFD modelling to demonstrate system performance in accordance with Building Control & Fire Officers requirements.

System Components

The system shall comprise the following:

- Weatherproof, fire rated duty / standby variable speed smoke extract fans at roof level complete with attenuators, mounting feet, AV mounts & supports.
- Fire rated ductwork (rated for integrity, stability & insulation) from the fans to the top of the vertical smoke extract builders work shaft.
- A weatherproof supply air handing unit located at roof level complete with attenuator, mounting feet, AV mounts & supports (the unit shall comprise panel filter, space for future DX cooling coil & variable speed, centrifugal supply fan with inverter speed control).
- Insulated supply air ductwork from the AHU and down the entire length of the pipework riser.
- A high level AOV at each floor level for the smoke shaft (mounted above the riser door to provide 0.5m² free area below the false ceiling). The riser door shall be of a reduced height type (by Main Contractor) to accommodate the AOV, and to enable access to the Tenants vertical builders work shaft (Landlords provision for Tenants kitchen extract ductwork). Mesh floors to be provided at each floor level within smoke shaft (by Main Contractor).
- Insulated supply ductwork branch shall leave the pipework riser at high level with motorised smoke damper, and run within the ceiling void of the Lift Lobby / Corridor, at each floor level to serve ceiling mounted supply grilles at each end of the corridor.
- An automatic opening vent (AOV) at roof level in the adjacent staircase (to Architects detail).
- A smoke detector within the Lift Lobby / Corridor at each floor level.
- A temperature sensor within the Lift Lobby / Corridor at each floor level.
- A Form 1 motor starter control panel with fire override, visual / audible alarm, indication lamps, fuses, contactors & relays, remote Fireman's override switch & fire alarm system interlock.
- A remote indicator panel in the Concierge Area.
- All control wiring, FP600 power wiring and containment to fans, dampers, sensors and detectors.

Mode of Operation

Normal Summertime Operation

- During normal Summertime Operation the supply & extract fans shall remain off until the internal temperature within the lobby / corridor exceeds 23°C. At this point the respective floor supply air smoke damper & extract air AOV shall motor open and the supply & extract fan speeds shall increase as necessary to suit the number of floors served. As temperatures within the lobbies / corridors fall below 23°C, the respective floor supply air smoke damper & extract air AOV shall motor closed & the supply & extract fan speeds shall decrease to suit.

- The fresh air handling unit is located on the roof and supplying the fresh air via ducts & grilles as shown in the drawing and schematic.

Fire Condition

- Under a fire condition the smoke detector shall enable the extract fan to draw smoke from the respective Lift Lobby / Corridor in conjunction with the high level extract air AOVs. Smoke shall be discharged to atmosphere at Roof level.
- Make up air shall be provided to the Lift Lobby / Corridor from an automatic opening vent (AOV) at the top of the adjacent Staircase



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