

BUILDING ENGINEERING SERVICES TENDER SPECIFICATION FOR CAMDEN ROUNDHOUSE CAMPUS BUILDING

CHECKING AND REVISION								
Revision	Description	Originator	Checked	Approved	Date			
00	Tender (Mech)	HW	TS	WH	27/03/2020			
01	Tender (Mech)	HW	TS	WH	17/04/2020			

This document has been prepared for the titled project or named part thereof and should not be relied upon or used for any other project without an independent check being carried out as to its suitability and prior written authority of Ingleton Wood being obtained. Ingleton Wood accepts no responsibility or liability for the consequence of this document being used for a purpose other than the purposes for which it was commissioned. Any person using or relying on the document for such other purpose agrees and will by such use or reliance be taken to confirm his agreement to indemnify Ingleton Wood for all loss or damage resulting there from. Ingleton Wood accepts no responsibility or liability for this document to any party other than the person by whom it was commissioned.

Mechanical Ventilation Extract for Discharge of Planning Condition 17 September 2020



SECTION 1.2

MECHANICAL INSTALLATION

PARTICULAR WORKS



1.2.6.3	TESTING AND COMMISSIONING DOCUMENTATION	66
1.2.6.4	WATER REGULATIONS	66
1.2.7	HEAT PUMP SYSTEMS	67
1.2.7.1	GENERAL	67
1.2.7.2	INDOOR FAN COIL UNITS	67
1.2.7.3	BS BOXES	68
1.2.7.4	VRV OUTDOOR HEAT PUMP UNITS	68
1.2.7.5	SPLIT HEAT PUMP UNITS	69
1.2.7.6	HEAT PUMP UNITS FOR VENTILATION PLANT	70
1.2.7.7	PIPEWORK AND ISULATION	71
1.2.7.8	CONTROLS	72
1.2.7.9	REFRIGERANT LEAK DETECTION AND PUMP DOWN SYSTEMS	73
1.2.7.10	REFRIGERANT COILS FOR AHUS	74
1.2.7.11	TESTING AND COMMISSIONING	74
1.2.8	MECHANICAL VENTILATION	75
1.2.8.1	VENTILATION PLANT – GENERAL INSTALLATION REQUIREMENTS	75
1.2.8.2	VENTILATION DUCTWORK	76
1.2.8.3	ACOUSTIC TREATMENT TO DUCTWORK	78
1.2.8.4	DUCTWORK WITHIN FLOOR VOIDS	78
1.2.8.5	AIR HANDLING UNITS	78
1.2.8.6	ATTENUATORS	80
1.2.8.7	DUCT MOUNTED ATTENUATORS	80
1.2.8.8	VENTILATION WEATHER TERMINALS	80
1.2.8.9	SUPPLY AND EXTRACT GRILLES	81



1.2.8.10	DISPLACEMENT VENTILATION TERMINALS
1.2.8.11	EXTRACT FANS
1.2.8.12	DOOR TRANSFER GRILLES
1.2.8.13	DUCTWORK FIRE & SMOKE DAMPERS82
1.2.8.14	DUCTWORK FIRE DAMPERS
1.2.9	AUTOMATIC CONTROLS AND POWER
1.2.9.1	AUTOMATIC CONTROLS AND POWER WORKS
1.2.9.2	CONTROL REQUIREMENTS
1.2.9.3	MECHANICAL CONTROL PANELS
1.2.9.4	PROPOSED NEW ELECTRICAL POWER INSTALLATIONS
1.2.9.5	BMS HEAD END91
1.2.9.6	CONTROLS AND POWER: DESCRIPTION OF OPERATIONS
1.2.9.7	CONTROLS AND POWER: COMMISSIONING
1.2.9.7 1.2.9.8	CONTROLS AND POWER: COMMISSIONING
1.2.9.7 1.2.9.8 1.2.10	CONTROLS AND POWER: COMMISSIONING
 1.2.9.7 1.2.9.8 1.2.10 1.2.10.1 	CONTROLS AND POWER: COMMISSIONING
1.2.9.7 1.2.9.8 1.2.10 1.2.10.1 1.2.10.2	CONTROLS AND POWER: COMMISSIONING
1.2.9.7 1.2.9.8 1.2.10 1.2.10.1 1.2.10.2 1.2.10.3	CONTROLS AND POWER: COMMISSIONING
 1.2.9.7 1.2.9.8 1.2.10 1.2.10.1 1.2.10.2 1.2.10.3 1.2.10.4 	CONTROLS AND POWER: COMMISSIONING
1.2.9.7 1.2.9.8 1.2.10 1.2.10.1 1.2.10.2 1.2.10.3 1.2.10.4 1.2.10.5	CONTROLS AND POWER: COMMISSIONING
 1.2.9.7 1.2.9.8 1.2.10 1.2.10.1 1.2.10.2 1.2.10.3 1.2.10.4 1.2.10.5 1.2.10.6 	CONTROLS AND POWER: COMMISSIONING
1.2.9.7 1.2.9.8 1.2.10 1.2.10.1 1.2.10.2 1.2.10.3 1.2.10.4 1.2.10.5 1.2.10.6 1.2.10.7	CONTROLS AND POWER: COMMISSIONING94TESTING AND COMMISSIONING DOCUMENTATION95ABOVE GROUND DRAINAGE95ACOUSTIC INSULATION96ABS PIPEWORK AND FITTINGS96PVC-U PIPEWORK AND FITTINGS96INTUMESCENT FIRE COLLARS97SHOWER OUTLETS97AIR ADMITTANCE VALVES97INSTALLATION GENERALLY97
1.2.9.7 1.2.9.8 1.2.10 1.2.10.1 1.2.10.2 1.2.10.3 1.2.10.4 1.2.10.5 1.2.10.6 1.2.10.7 1.2.10.8	CONTROLS AND POWER: COMMISSIONING



р

£

manufacturer's recommendations. All tools, equipment, refrigerant, oils etc. required shall be provided by the installer.

All pressure tests shall be completed when the building is not occupied.

All refrigerant volumes shall be recorded and noted within the O&M Manuals.

All refrigerant installations, testing and commissioning shall be carried out by F-Gas certified installers.

1.2.8 MECHANICAL VENTILATION

Mechanical Ventilation shall be provided to the Studios and Office and Breakout areas by heat recovery ventilation units as supplied by Nuaire. Mechanical extract shall be provided to the toilet, shower and kitchen areas.

Natural ventilation through windows shall be provided to some rooms as shown on the drawings. Openable windows shall provide additional purge ventilation.

All builders work in connection with the ventilation plant installation are to be provided, including builders work holes through roofs, walls, floors, ceilings, fixings brackets and supports, making good, etc.

The Contractor shall include for all cranage, lifting equipment to transport the new ventilation plant into the final installation positions.

The Contractor shall also provide all scaffolding, lifting equipment and safety equipment to ensure safe installation of the ventilation equipment at roof/high level and within ceiling voids etc.

The roof levels vary considerably, the Contractor shall visit site and review the Architectural drawings to appreciate installation requirements and access difficulties.

1.2.8.1 VENTILATION PLANT – GENERAL INSTALLATION REQUIREMENTS

The mechanical Contractor shall be responsible for the supply, delivery, installation, setting up and setting to work of the new mechanical ventilation plant and ancillaries.

DELIVERY, TRANSPORTATION AND FINAL ASSEMBLY

All costs and arrangements associated with transporting of the ventilation plant to site and cranage to its final installation location shall be provided by the mechanical Contractor.



£

р

Following the final positioning of the ventilation plant, the Contractor shall be responsible for any final site assembly of the ventilation plant and installation of any accessories, including sealing of the ventilation plant and sections and filling /gap sealing etc. plus the installations of controls etc.

The Contractor shall provide protection to the ventilation plant against impact damage, as well as protection to the ventilation plant inlet/outlets and any other openings against weather, dust and vermin.

The Contractor shall provide all fixings, together with any additional supporting steelwork for the ventilation installation.

All air handling plant shall be installed with anti-vibration mounts, flexible duct connections to minimize the sound and vibration transmission to the building structure and ductwork distribution system.

ACCESS AND MAINTENANCE

Maintain access requirements around the units to suit manufacturer's recommendations, particularly to damper actuators.

The installation of ductwork, pipework, metalwork, dampers, actuators, control equipment, wiring, supports etc. shall leave sufficient clearance around the plant for access and maintenance, including the removal and replacement of ventilation plant internal components such as dampers, actuators etc.

The ventilation plant including AHUs, ductwork, dampers, louvres and grilles shall be given a full clean upon practical completion.

COMMISSIONING

The Contractor shall provide ventilation systems testing and commissioning.

CONTRACTOR WORKING DRAWINGS

The Contractor shall provide his own working drawings for the ventilation plant and systems.

The Contractor shall submit his working drawings to the engineer and architect for comment prior to commencing installation or ordering of materials.

1.2.8.2 VENTILATION DUCTWORK

The ductwork systems shall comply with HVCA DW 144 "Specification for Sheet Metal Ductwork". The supply and extract ductwork shall be in accordance with CEN Class A Low Pressure Ductwork.



£

р

Ductwork shall be constructed from hot dipped zinc coated galvanized steel to BS EN 10142:1991 grade DX51D+Z type Z275. Minimum sheet thickness shall be in accordance with DW144 Table 2.

The use of bolt through ductwork supports shall not be permitted. Flexible ductwork is only permitted for connections to plant and final grille connections, and flexible ducts must not exceed one meter in length.

Volume control dampers shall be of the opposed blade type. VCD's shall be located at each main duct branch, as shown on the drawings and necessary to satisfactorily balance and commission the ventilation system.

The Contractor shall provide test points within the ductwork at all branches plus on the main duct run to/from the fan. Test points shall be fitted with caps, and test point locations shall be shown on the record drawings and commissioning data.

The Contractor shall provide duct cleaning access panels upstream of each obstruction (e.g. damper, balancing device, air turns, turning vanes) and at 10 metre intervals.

ALL DUCTWORK LOCATED EXTERNALLY TO BE LINED WITH INTERNAL DENSE ACOUSTIC INSULATION IN ADDITION TO EXTERNAL THERMAL INSULATION.

Thermal insulation shall be provided to all supply and extract ductwork in accordance with BS 5422:2009. Ductwork insulation thickness shall be in accordance with BS 5422:2009 Table 12 for control of condensation, Table 13 and 14 for control of heat loss and heat gain. All supply ductwork shall be vapour sealed.

ALL SUPPLY AND EXTRACT DUCTWORK, BOTH ROOM SIDE AND ATMOSPHERE SIDE SHALL BE THERMALLY INSULATED. ALL DUCTWORK LOCATED EXTERNALLY SHALL BE FULLY WEATHERPROOFED.

All supply and extract ductwork shall be fitted with labels, colour coded in accordance with BS 4800.

Waterproof ductwork thermal cladding may be used for external ductwork as an alternative to insulation and weatherproofing, such as Venture Clad or equal and approved.

1.2.8.3 ACOUSTIC TREATMENT TO DUCTWORK

In order to meet the stringent acoustic requirements for this project, acoustic insulation shall be fitted to ductwork located externally and where indicated on the schematic drawings.

The dense acoustic insulation shall be in the form of internal lining. Internal duct linings shall be mineral insulation or Class 0 spread of flame insulation.

All internal linings shall be stitch quilted, to prevent delamination or migration of insulation fibres.

Internal duct linings shall be supported to prevent movement or collapse. Support systems and installation methods shall allow the duct internals to be cleaned using vacuum systems without damage. Internal linings shall not allow blockage or obstruction to dampers including fire and smoke dampers.

All plenums serving the studios A, B, C and Recording Studio shall be internally lined with acoustic insulation.

1.2.8.4 DUCTWORK WITHIN FLOOR VOIDS

Sections of the ductwork will be installed within floor voids. This ductwork shall be supported from the slab using Unistrut and brackets, providing acoustic separation from the structure using rubber pads/mountings.

All ductwork within the floor voids shall be fully accessible for inspection, maintenance and future replacement. All ductwork shall be thermally insulated.

An airgap of not less than 25mm shall be maintained all around the duct to prevent possible buildup of moisture and to minimize sound and vibration transfer.

Floor mounted grilles shall bear any weight load onto the floor supporting structure, not the ductwork. Ductwork plenums shall be airtight and sealed against the floor openings.

1.2.8.5 AIR HANDLING UNITS

Heat recovery air handling units shall be supplied and installed as shown



Ingleton

£

р

Ingleton Wood

£

р

on the drawings.

Air handling units shall be of double skinned aluminum construction, with all panels infilled with dense acoustic insulation. Base frames shall be supplied for the AHUs to be assembled upon, providing a solid structural base.

All units shall be suitable for external installation and shall include weather tents/roofs, IP rated enclosures for all controls and electrical equipment and connections.

All fans shall be high efficiency, inverter speed controlled EC motors.

All air handling units are to be supplied and installed with the manufacturer's attenuators, to be fitted both room side and atmosphere side of plant.

The air handling plant will additionally include refrigerant coil modules.

Please refer to the equipment schedules for further information on each AHU and accessories.

All system duties and pressures are external to the air handling plant.

The Contractor shall ensure that the manufacturer's recommended clearance is allowed for adjacent to the unit when installing, to allow maintenance and inspection. The unit will require a condensate connection which shall be taken to the nearest drain via condensate traps.

The units have an electric heating coil which shall provide frost protection/reheat. The heating coil shall be controlled by the Ecosmart controls, to maintain a tempered supply air set point.

Before ordering the units, the Contractor shall review the unit handing to suit the contractor's working drawings and system pressure drops.

The HRU installation should be complete with flexible duct connections and anti-vibration mountings.

The AHUs shall each include their own Nuaire Ecosmart Connect controls which are fully BMS compatible. All AHUs shall be fully interfaced with the BMS system to provide full control and operation from the BMS. The contractor shall liaise with his controls specialist to ensure all necessary interface equipment is provided.



£

р

The following shall be provided from the BMS for AHU plant:

- Timeclock on/off control
- Supply air temperature control (including control of heating and cooling coils)
- Fan speed and air volume control
- Room temperature, CO2 and humidity monitoring
- Fault monitoring

The unit Ecosmart connect controls will be sited adjacent to the mechanical control panel/within the room space being served and the Contractor must ensure that the controls are ordered with the appropriate cable length. The Ecosmart connect LCD touchscreen controls and be programmed with timeclock control for hours suited to the client.

Electrical connections – The Contractor shall allow for electrical connections to the AHU's, each AHU is to be provided with their own power supply and isolator. The Contractor shall wire from the mechanical control panels to the plant, with local power isolators provided for all plant.

1.2.8.6 ATTENUATORS

All air handling plant shall be installed with the air handling unit manufacturer's attenuators as detailed in the equipment schedules.

1.2.8.7 DUCT MOUNTED ATTENUATORS

The Contractor shall install additional attenuators to supply and extract ductwork serving the Recording Studio and Breakout space, details below:

Manufacture: TROXtechnik Type: Inline XSA silencers Sound Level: 25dbA to Breakout Space, 20dbA to Recording Studio

Please refer to Accusations Report.

1.2.8.8 VENTILATION WEATHER TERMINALS

The Contractor shall supply and install weatherproof terminals as shown on the drawings and detailed within the equipment schedules.



р

£

Note: Waterloo louvres have colour options referenced by figures in brackets, the final colours shall be agreed with the Architect prior to ordering (white/brow/terracotta/beige/grey).

Louvres shall be special RAL colour finish to suit the Architect's requirements.

The contractor shall provide ductwork transformation pieces to suit the transition from duct size to weather louvre size, all ductwork transitions are to be insulated.

The Contractor shall liaise with the main Contractor to coordinate opening positions and sizes. This shall include for the dampers and actuators access requirements

1.2.8.9 SUPPLY AND EXTRACT GRILLES

Supply and install grilles for the ventilation systems as detailed within the equipment schedules.

Grilles shall be special RAL colour finish to suit the Architect's requirements.

All grilles are to be supplied with PBD (plenum box for D diffusers with top/side entry to suit contractor's installation drawings) for louvre-faced diffusers. Air velocities to be less than 2m/s for plenum boxes.

1.2.8.10 DISPLACEMENT VENTILATION TERMINALS

Low velocity displacement ventilation terminals shall be provided for Studio C. Studio C will be used as a multifunctional space and full flexibility of operation of the room and ventilation system is required. The low velocity is essential for Circus training.

The ventilation system to Studio C shall be commissioned to minimize temperature stratification through the room height.

Displacement ventilation terminals shall be as indicated on the drawings and equipment schedules.

Displacement terminals shall be lined with acoustic insulation.

1.2.8.11 EXTRACT FANS

The contractor shall supply and install local extract fans, controls and accessories as detailed on the drawings and within this specification.

The new inline fans shall be installed on drop rods with anti-vibration

mounts and flexible duct connections, to serve the rooms via rigid ducting.

Extract fans, accessories and controls shall be as detailed within the equipment schedules.

The fans shall be provided with timeclock PIR sensors and overrun timers.

Local fused isolators shall be provided by the electrical contractor, from which the mechanical contractor shall undertake final power wiring to the mechanical plant and controls. Fans shall be supplied and installed with a 3 pole isolator and PIR sensors. This fan shall be wired to allow the PIR sensors to provide activation and adjustable run on timer.

Containment shall be provided by the mechanical contractor from the fused isolator to the 3pole isolator, PIR sensor and extract fan. All cabling shall be installed in single cables.

The mechanical contractor shall provide all power and control wiring for this installation.

1.2.8.12 DOOR TRANSFER GRILLES

The Contractor shall supply and install fire rated door transfer grilles to doors complete with intumescent core to doors as shown on the drawings. The door transfer grille shall be as supplied by Waterloo, or equivalent and approved.

Grilles shall be special RAL colour finish to suit the Architect's requirements.

Do not compromise door fire or structural integrity. Liaise with main contractor to ensure the transfer grilles are fitted at the appropriate point in the program.

Please refer to the equipment schedules for further details.

1.2.8.13 DUCTWORK FIRE & SMOKE DAMPERS

The fire and smoke damper system shall be a contractor design portion.

The new supply and extract ductwork systems shall be fitted with fire and smoke dampers (combined fire and smoke dampers) to the fire compartment and floor penetrations as shown on the drawings. Fire and smoke dampers shall be activated by the automatic detection of smoke by the fire alarm system, in addition to the failsafe automatic thermal/electrical link release mechanism, to allow the damper to close

To collection:

£ p



£

р

in the event of loss of power.

The detection of smoke by any detector shall cause the motorised smoke damper to close to prevent spread of smoke through the ventilation system and in accordance with BS 5588-9. Automatic thermal link type fire dampers shall be of the multi-blade type, and close off the duct at temperatures of $72^{\circ}C \pm 4^{\circ}C$.

Fire and smoke dampers shall be installed in strict accordance with the manufacturer's recommendations and each damper shall be installed complete with a duct access panel for inspection, testing and resetting of the links, actuators and dampers.

All necessary control panels, smoke and fire damper interfaces, and control modules, power supplies etc shall be supplied and installed.

Fire and smoke damper control equipment shall be as supplied by ActionAir (Swegon Air Management) or equal and approved, complete with uninterruptible power supply, together with sufficient capacity of outputs/inputs to suit the number of fire and smoke dampers shown on the drawings. All fire and smoke dampers shall be supplied and installed complete with actuators together with damper test units. Damper test units shall include switches, and damper status lamps.

All power and control wiring associated with the fire and smoke dampers, network and damper interfaces and panels installations shall be provided.

All dampers, interfaces etc shall be 230V AC mains type, and shall fail closed.

All interfacing with the fire alarm panel, smoke detectors shall be provided.

Fire and smoke dampers shall be SmokeShield PTC Automatic Smoke and Fire Control Dampers as supplied by ActionAir, or equal and approved.

The complete fire and smoke damper system installation shall be installed in accordance with BS9999-2008.

Fire and smoke dampers shall be suitable for installation to CLT (cross laminated timber) and concrete constructions and shall be installed in accordance with the manufacturer's recommendations.

A full system test shall be performed.



£

р

1.2.8.14 DUCTWORK FIRE DAMPERS

The new supply and extract ductwork systems shall be fitted with fire dampers to all penetrations through fire sub-compartments. Fire dampers shall be of the multi-blade thermal link type and close off the duct at temperatures of 72°C +4°C. Fire dampers shall be as supplied by Actionair or equal and approved.

Each fire damper shall be installed in accordance with HVCA DW/TM3 and each fire damper shall be complete with a duct access panel for inspection, testing and resetting of the links and dampers.

Fire dampers shall be suitable for installation to CLT (cross laminated timber) and concrete constructions and shall be installed in accordance with the manufacturer's recommendations.

1.2.9 AUTOMATIC CONTROLS AND POWER

This section details the requirements for the automatic controls works including BMS, automatic controls and electrical power supplies associated with the mechanical plant and ancillaries for the building.

The design of control installations will be a contractor design portion, to meet the operational and performance requirements of this specification, and will include automatic controls, power installations and site head end BMS graphical representation/interface. This section must be read in conjunction with the all other sections of the specification.

There will be two number new control panels, one for each roof plant area. The new BMS control system shall be Trend based.

The MCP's shall be the two compartment type, with all field wiring from the MCP's to the mechanical plant, to be installed by the Mechanical Contractor.

A data point shall be provided by the electrical contractor for each control panel. The controls contractor shall connect to the data points and complete all works and commissioning to allow the new control panels to be interfaced and accessed via the client's IT system.

The controls installation shall include all field power and control wiring, sensors, actuators etc. to form a fully working functional automatic controls system. Any claims for power or control wiring, or components not being provided as part of this contract shall be excluded.

Building Services Specification Appendices Camden Roundhouse Campus Building Job No. 500057 Date: April 2020



APPENDIX A

MECHANICAL SERVICES

MECHANICAL SERVICES SCHEDULE

AHU Ref.		AHU-1	AHU-2	AHU-3	AHU-4	AHU-5	AHU-6
Location		Plant (R.E.03)	Plant (R.E.03)	Plant (R.E.05)	Plant (R.E.05)	Plant (R.E.05)	Plant (R.E.05)
Areas Being Served		Co-Working Space, Meeting Room and Breakout Space.	Studio C	Studio A	Studio B	Recording Studio	Reception, Multi-Use Space and 3rd Floor WC's
Size excl.	(L)	2500	2500	1900	1900	1600	1700
ancillaries	(H)	1476	1476	470	470	260	340
(mm)	(W)	954	954	1560	1560	1000	1150
АНU Туре		Nuaire Vertical AHU XBC75-V- NCOWP	Nuaire Horizontal AHU XBC75-V- NCOWP	Nuaire Horizontal XBC55-H-NCO	Nuaire Horizontal XBC55-H-NCO	Nuaire Horizontal XBC15-H-NCO	Nuaire Horizontal XBC25-H-NCO
Design Flow Rate	(m3/s)	0.950	0.600	0.400	0.400	0.080	0.150
Heating / Cooling Coil		CON-3, 33kW	CON-4, 33kW	CON-5, 15.5kW	CON-6, 15.5kW	CON-7, 4kW	CON-8,8kW
Power Supply	(ph/V/ Hz)	3/400/50	3/400/50	1/230/50	1/230/50	1/230/50	1/230/50

Comments: AHU-1- Co-Working Space, Meeting Room and Breakout Space.

Inlet/outlet terminal, shut-off damper, 2No. Double deck silencers, frost coil, DX coil. Fully Weather proof.

AHU-2 - Studio C

Inlet/outlet terminal, shut-off damper, 2No. Double deck silencers, frost coil, DX coil. Silencer and DX coil modules inline ductwork, rather than connected to AHU. Fully Weather proof.

AHU-3 - Studio A

Inlet/outlet terminal, shut-off damper, 2No. Double skinned silencers, frost coil, DX coil. Fully Weather proof.

AHU-4 - Studio B

Inlet/outlet terminal, shut-off damper, 2No. Double skinned silencers, frost coil, DX coil. Fully Weather proof.

AHU-5 - Recording Studio

Inlet/outlet terminal, shut-off damper, 1No. Double skinned silencer, DX coil. Fully Weather proof.

AHU-6 - Reception, Multi-Use Space and 3rd Floor WC's

Inlet/outlet terminal, shut-off damper, 2No. Double skinned silencers, frost coil, DX coil. Fully Weather proof.