



**THAMES QUARTER, READING
BUILD TO RENT**

**MECHANICAL SERVICES
SCOPE OF WORKS**



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SCOPE OF WORKS

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1.01 INTRODUCTION

This Scope of Works and the associated drawings detail the requirements for the mechanical services associated with the proposed construction of the new Build to Rent development at Thames Quarter, Reading. It is envisaged that the development shall comprise of 315 N° Apartments, Management space, Amenity space and car parking, although this is all subject to confirmation. This scope of works covers the requirements for the mechanical services associated with all elements of the development.

The Apartments are split as follows:

- Studios – 34 No.
- 1 bed 2P – 100 No. Standard, 1 No. Duplex
- 2 bed 3P – 64 No.
- 2 bed 4P – 95 No. Standard, 5 No. Duplex
- 3 bed 6P – 14 No. Standard, 2 No. Duplex

The Landlord spaces will comprise:

- Entrance Lobby
- Waiting/Seating Area
- Reception
- Post Room
- Parcel Storage
- Cold Store
- Leasing Suite
- Staff Room
- WC
- Bike Storage
- Refuse areas
- General circulation
- Workshop (Level 1)
- Residents' Storage (various)
- Main Amenity (Level 10)
- Amenity Dining Room (Level 10)
- Amenity Cinema Room (Level 10)
- Amenity Tech Room (Level 11)
- Plant spaces (various)

There is no BREEAM or HQM (Home Quality Mark) rating required for the development.

This Specification should be read in conjunction with the Mechanical and Electrical Services Drawings, Architect's drawings, Structural drawings, Specifications, Room Data Sheets and other Tender Documentation.

It is the Mechanical Services Installer's responsibility to fully co-ordinate the mechanical installation with other services including electrical services and building structure. Any services which need to be altered due to full co-ordination not being undertaken shall be carried out at the Mechanical Services Installer's expense.

1.02 STANDARDS AND REGULATIONS

- a) All materials, equipment and workmanship shall be in accordance with the specification and drawings.
- b) Unless otherwise specified all materials shall be new and these, together with equipment or work supplied or executed, shall comply with current Codes of Practice and with British Standards where available. Where particular Codes of Practice or British Standards are cited, such shall be deemed to refer to the current editions.

- c) Any instrument, rule or order made under any Act of Parliament or any regulations of any Local Authority or of any statutory undertaking which has any jurisdiction with regard to the Works or with whose systems the same are or shall be connected, shall be complied with, and it shall be ascertained that any necessary notices have been given to the Authority concerned.
- d) All electrical apparatus and work in connection therewith shall comply with the current edition of the Regulations for Electrical Installations produced by the Institution of Electrical Engineers.
- e) All works and materials shall also comply with the requirements of the following: -
 - i. Local Authority Regulations, Recommendations, Requirements and Bylaws;
 - ii. Water, Gas, Electricity, Fire Officer, British Telecom and all Public Authority and Statutory Regulations and Recommendations;
 - iii. Health and Safety at Work Act, including all current regulations and statutory instructions issued by the Health and Safety Executive;
 - iv. Chartered Institution of Building Services Engineers current recommendations as described within this Specification.

1.03 PROTECTION OF THE WORKS

- a) All new equipment, materials and components shall be in perfect condition, when handed over. Adequate protection shall be provided against rough treatment, dust, grit, frost, etc, and immediate action taken if any such protection is removed or displaced by following trades or other unauthorised persons.
- b) Uncompleted sections of the Works shall be left in a safe condition and any temporary works necessary to give protection from unauthorised interference shall be provided.

1.04 BUILDER'S WORK AND DRAWINGS

- a) In all cases the necessary information to define requirements for builder's work, either by the provision of drawings and/or schedules, or by setting out requirements on site shall be provided by the Services Installer.
- b) The methods to be adopted shall be agreed with all interested parties but in general shall be as follows: -
 - i. Where builder's work is to be defined, drawings shall be provided;
 - ii. Where builder's work is to be cut it shall be marked on site.
- c) The submission of, and subsequent approval to, drawings shall in no way relieve the responsibility for the accuracy of the information provided which shall remain at the sole risk of those preparing the data.

1.05 PRACTICAL COMPLETION OF THE WORKS

- a) The date of Practical Completion of the Works shall be the date when:
 - i. practical completion of the Works has been achieved;
 - ii. the tests, specified or reasonably required, have been made and accepted.

1.06 DEFECTS LIABILITY PERIOD

- a) The Defects Liability Period shall be 12 months and shall operate from the date of Practical Completion of the Works or part thereof as certified. A Certificate of Final Completion shall not be granted until all defects or faults have been made good.

1.07 EXTENT OF WORK

- a) The work shall comprise the whole of the labour and, unless otherwise indicated, all the materials necessary to form a complete installation and such tests, adjustments and commissioning as are prescribed in subsequent clauses and as may otherwise be required to give an effective working installation to the satisfaction of the Engineer.

- b) The words ‘complete installation’ in the previous paragraph shall mean not only the major items of plant and equipment covered by the tender documents, but all the incidental sundry components necessary for the complete execution of the works and of the proper operation of the installation, with their labour charges, whether or not these sundry components are mentioned in detail in these tender documents.

1.07 DEFINITIONS

The following terms are used within this specification and shall be construed accordingly:

- i. **Architect** – Architect and Contract Administrator for the works;
- ii. **Contractor** - person or persons appointed to carry out the Contract works;
- iii. **Employer** - person or persons employing the Contractor to carry out the Contract works;
- iv. **Engineer** - person or persons appointed by the Employer to represent him in connection with the installation of works described in this Specification;
- v. **Mechanical Services Installer** - For the purposes of the Tender, the Services Installer shall be the person or persons invited to prepare a Tender for the works described within this Specification, including all ancillary work and information requirements.

1.08 SERVICES TO BE PROVIDED

The Mechanical Services Installer shall undertake the supply, delivery, off-loading, positioning, installation, setting to work, testing and commissioning of the Engineering Services Systems as set out below:

1.09.1 General

The undertaking of the work in this section shall infer responsibility for: -

- a) Providing necessary drawings, diagrams and schedules;
- b) Executing the works in a competent, informed and diligent manner;
- c) Co-operating fully with other trades, to ensure that there are no impediments to the progress and completion of the works as a whole;
- d) Demonstrating satisfactory performance and installation in accordance with the design intent and the accessibility of plant and services to facilitate maintenance work;
- e) Ensuring that, up to the date of taking over, all parts of the works are maintained in good condition;
- f) Appraising the specified duties of all plant and equipment related to the works (taking into account any additions and/or variations which may be made during the progress of the works) and informing the Engineer of any matter which is at variance;
- g) Drawing attention to any discrepancies in documents, drawings or instructions issued immediately upon receipt of same and prior to the commencement of any part of the works affected thereby;
- h) Making good any damage to building fabric and systems caused by their installation.

1.09.2 General

The items below list out the various proposed mechanical and associated services for the development, with detailed descriptions following:

- a) Incoming water services
- b) Gas services
- c) Heating services
- d) Hot and cold water services
- e) Ventilation
- f) Management areas VRF and heat recovery
- g) Main comms air conditioning
- h) Controls and electrical wiring
- i) Dry riser services
- j) Sprinkler services
- k) Wet riser services
- l) Above ground drainage
- m) Builderswork
- n) Testing and commissioning
- o) Design drawings and technical submissions

- p) Working drawings
- q) Record drawings and operating and maintenance manuals
- r) Maintenance of Building Services Systems

a) Incoming Water Services

The Mechanical Services Installer shall be responsible for the design, supply, installation, testing and commissioning of the incoming main to the development in accordance with:

- Building Regulations and all associated Approved Documents
- CIBSE guidance documents, including all main Guides, Technical Memoranda and Applications guidance as required by this development
- Water Supply (Water Fittings) Regulations
- BS EN 806, BS8558 – Design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages, including Loading Units
- Institute of Plumbing Design Guide
- HVCA TR/20 – Installation and testing of pipework systems
- HSC Approved Code of Practice – Legionnaires Disease, The control of Legionella bacteria in water systems
- All components shall be WRAS approved

The Mechanical Services Installer shall provide a dedicated metered water supply from the Statutory main.

A line size double check valve and stop cock shall be provided on mains water entry at ground floor level. A large traffolite label shall be provided next to the valves.

Marker tape shall be laid by the Mechanical Services Installer above the main. A precise record shall be kept of the routing of the pipe.

There is no requirement for leak detection monitoring, however a BMS link shall be provided to the meter on the Statutory or incoming main (for monitoring purposes only).

b) Gas Services

The Mechanical Services Installer shall be responsible for the design, supply, installation, testing and commissioning of the entire gas services for the building in accordance with:

- Building Regulations and all associated Approved Documents
- CIBSE guidance documents, including all main Guides, Technical Memoranda and Applications guidance as required by this development
- The Institution of Gas Engineers' "Utilisation Procedures I.G.E./UP/2, Communication 1598 – Gas Installation Pipework, Boosters, and Compressors on Industrial and Commercial Premises"
- Gas Safety Regulations

The Mechanical Services Installer shall supply, install and commission gas pipework from the proposed gas meter position to the gas appliances (boilers and CHP unit).

All work shall be strictly in accordance with British Gas recommendations and safety requirements, and shall be tested, commissioned and put to work.

Gas Piping and Fittings

All gas piping downstream of the entry point into the building shall be heavy grade to BS1387 with welded joints.

Painting of all gas pipework, with two coats of red oxide, one oil-based undercoat, and one gloss topcoat of standard yellow, shall be by the Mechanical Services Installer.

Valves

A line-sized manual valve and solenoid valve shall be provided on entry to the Boiler Room. Line size valves shall be provided on connection to each appliance. Purge points shall be provided as necessary.

Metering

The statutory gas meter shall be provided with a 'chatterbox' facility to allow connection to the BMS (for monitoring purposes only). The CHP unit shall be separately sub-metered.

Line Diagram

A diagrammatic arrangement of the Gas Installation shall be provided at the incoming position and in the Boiler Room to the requirements of British Gas publication 1M/146, secured to the wall in a purpose frame.

c) Heating Services

The Mechanical Services Installer shall be responsible for the design, supply, installation, testing and commissioning of the entire heating services in accordance with:

- Building Regulations and all associated Approved Documents
- CIBSE guidance documents, including all main Guides, Technical Memoranda and Applications guidance as required by this development

Gas-fired condensing boilers shall be located in the Boiler Room on the ground floor. These boilers shall provide heat to 1 No. constant temperature circuit serving the HIUs (heat interface units).

1 No. CHP unit and associated buffer vessel shall be provided. This unit shall provide the lead heating and be configured as detailed by the manufacturer, complete with pump kit, condensing kit, automatic controls (for BMS interface) and all valves and gauges.

A line-size strainer shall be provided on the return to the CHP unit.

Condense and pressure relief from the CHP unit shall be run to drain, as agreed with the Engineer.

The flue design, supply and installation shall be carried out by a Flue Specialist employed by the Mechanical Services Installer. The flue system shall be DF twin-wall Grade 316 stainless steel, inner seam welded, 25mm insulation and Grade 304 stainless steel outer skin. The CHP unit and boilers shall be separately flued.

Heating design flow and return temperatures shall be as indicated on the drawings and as shown in the Design Parameters section of this Specification.

The route of the distribution mains and take-off points shall be carefully arranged to allow for natural expansion and contraction of the pipes. Expansion facility shall be provided as necessary on all straight pipework lengths, comprising proprietary expansion devices (not loops). The number and configuration shall be dependent on the precise arrangement of the installed pipework.

Heating pipework shall not rise or drop to Apartments above or below the Apartment served from the corridor, ie pipework distribution shall be within Landlord space with final feeds into each Apartment.

The constant temperature circuit to the HIUs shall be configured to be self-balancing.

Each HIU shall be indirect and provided with 2 No. heat exchangers for independent control of heating and hot water. **The HIUs shall have individual pressure control valves for each plate (not PICVs), thereby ensuring minimum possible return temperature on the system, irrespective of whether the HIU is providing heating or hot water.**

Each individual HIU shall be provided with mBus heat metering, linked to the BMS. The metering shall be MID Class 2 approved to EN1434.

Each HIU shall be selected to operate at up to 10Bar on the primary connections with the exception of the HIUs in the Tower which shall be selected to operate at up to 16Bar.

The radiators in the Apartments shall be controlled with a TRV.

Isolating and drain valves shall be provided on the feed off the mains to every HIU.
Drain-off cocks shall be provided on all low points in the system to allow for drain down.

Temperature and/or pressure gauges shall be provided as necessary. The gauges shall be 100mm diameter brass-cased with setting pointers and complete with gunmetal shut-off cocks.

All pumpsets within the Boiler Room shall be duty/standby configured and inverter controlled.

The constant temperature pumpset feeding the HIUs shall be configured to operate at constant pressure, with pressure sensors positioned towards the end of the index run to ensure good and economic control.

Condense and pressure relief from the boilers shall be run to drain, as agreed with the Engineer.

Pressure relief from the HIUs shall be run to drain via a visible tundish, as agreed with the Engineer.

The entire heating services shall be insulated, including drops and low level pipework (unless exposed), with 30mm Class O foil-faced phenolic foam. Aluminium cladding and insulated valve bags shall be provided on all pipework services within the Boiler Room.

A pressurisation set and expansion vessel shall be provided for the heating system. The pressurisation set shall be complete with duty/standby pumps and the facility for status monitoring through the BMS.

The whole of the primary heating pipework within the Boiler Room and to each HIU shall be run in medium weight steel to BS1387 or copper to BS EN 12449:1999. The secondary pipework from the HIUs shall be run in copper to BS EN 12449:1999 or unjointed Hep2O from flow and return manifolds above each HIU. Sufficient brackets shall be provided to ensure no pipework deflection. Carbon Steel shall not be used for any heating pipework.

d) Hot and Cold Water Services

The Mechanical Services Installer shall be responsible for the design, supply, installation, testing and commissioning of the entire hot and cold water services for the building in accordance with:

- Building Regulations and all associated Approved Documents
- CIBSE guidance documents, including all main Guides, Technical Memoranda and Applications guidance as required by this development
- Water Supply (Water Fittings) Regulations
- BS EN 806, BS8558 – Design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages, including Loading Units
- Institute of Plumbing Design Guide
- HVCA TR/20 – Installation and testing of pipework systems
- HSC Approved Code of Practice – Legionnaires Disease, The control of Legionella bacteria in water systems
- All components shall be WRAS approved

The Mechanical Services Installer shall extend from the incoming mains position to the sectional cold water storage tank, located within the ground floor Tank Room.

The Mechanical Services Installer shall carry out a check on the water hardness of the existing incoming mains water. An electro-magnetic water treatment unit shall be provided, sized as dictated by the HIU manufacturer, to ensure no possibility of scaling within the HIUs. This shall be provided on the boosted feed (rather than on the incoming mains supply to the tank).

The sectional water tank located in the ground floor Tank Room shall feed the entire domestic water services within the building and the sprinkler services.

The sectional water tank shall be located on a level concrete plinth, minimum height 200mm, to allow a gravity feed from the base of each tank section to a 3-pump booster set.

The sectional water tank shall be pre-insulated and externally flanged, Bylaw 30 compliant and constructed from pre-insulated moulded panels. The tank shall be provided with external and internal ladders (if required due to height), access hatches, vents, overflows, warning and drain pipes and raised Keriflow ball valves.

A temperature sensor shall be provided in each tank section, linked to the BMS.

The booster set shall be a packaged unit with 3 N° pumps, each operating at 50% of design duty. The pumps shall be inverter controlled and an accumulator shall be provided to minimise the number of starts and to allow minimum flow (for instance at nighttime). The booster set shall be complete with pumpsets, accumulator, control panel and float switches for connection into each tank section.

The HIUs shall be positioned such that the hot water pipework length is no longer than 20m. Where this is not possible or practical, the HIU shall be provided with a packaged hot water return pump kit or the hot water pipework trace heated. This pump shall be inverter controlled, with temperature and time function.

One-quarter turn isolating ball valves shall be provided on connection to all appliances/outlets.

Thermostatic blending valves shall be provided on every hot water outlet serving assessable rooms unless incorporated within the sanitaryware.

Pipework shall distribute within the corridors and risers to allow feeds to be provided to each Apartment and room that requires water services. The Mechanical Services Installer shall extend from the risers or services mains within the corridors, through isolating valves within the risers or corridor ceiling voids, via the HIU to connect to each appliance/outlet as scheduled by the Contractor. The exact schedule of sanitaryware and appliances shall be provided by the Contractor. It shall be noted that pipe sizes under 15mm copper shall not be used.

The pipework distribution shall be designed such that pressure control can be provided on the main runs, rather than a multitude of high-maintenance/low efficiency individual pressure control valves. All cold water distribution pipework within the building pressure shall be designed to be within the range of 1 to 3 Bar at all outlets.

A WRAS approved double check valve shall be provided on the cold feed to each Apartment.

A 22mm SureStop valve and switch shall be provided on the water supply to each Apartment, located after the manual isolating valve but before the double check valve. The switch shall be clearly labelled, easily accessible and located within the HIU cupboard.

Boosted cold water shall be extended within the Boiler Room to the pressurisation unit.

The entire water services shall be insulated, including drops and low level pipework, with 25mm Class O foil-faced phenolic foam. Aluminium cladding and insulated valve bags shall be provided on all pipework services within the Boiler Room.

All pipework shall be installed in copper to BS EN 12449:1999. The jointing methods shall be suitable for the operating and maximum pressures. Sufficient brackets shall be provided to ensure no deflection.

A bib tap shall be provided in the Bin Store.

There shall be no requirement for Cat 5 water.

e) Ventilation

The Mechanical Services Installer shall be responsible for the design, supply, installation, testing and commissioning of the entire ventilation services for the building in accordance with:

- Building Regulations and all associated Approved Documents
- CIBSE guidance documents, including all main Guides, Technical Memoranda and Applications guidance as required by this development

Apartments (up to and including Level 7)

It is a requirement for this development for all accommodation up to and including Level 7 that, due to high external pollution levels, heat recovery ventilation shall be provided within each Apartment to provide background and boost ventilation (to meet Part F). Carbon filtration shall be provided on the main supply duct off each heat recovery unit.

The heat recovery units shall be wall-mounted within a cupboard in the Apartment Kitchen and selected to comply with the specified noise criteria (refer to Noise Report for the development).

Apartments (Level 8 and above)

Trickle/boost extract ventilation shall be provided within each Apartment to each Bathroom and Kitchen to provide background and boost ventilation (to meet Part F). The boost ventilation within the Kitchen shall be controlled on humidity and/or local switch.

Separate cooker extract from each of the Kitchens shall also be provided.

Where mechanical heat recovery is not provided, the Mechanical Services Installer shall provide ducted attenuated trickle ventilation. This shall be achieved by the use of an attenuated uPVC duct connected to the external facade. Ductwork shall turn through 90deg with a user-adjustable grille within the ceiling of each room. These trickle vents shall be sized to provide at least 5,000mm² free area. The systems shall be as Rytons ACH75HP or equal and approved and designed to meet the specified acoustic criteria for the building.

Toilets

Toilet extract ventilation shall be provided to the Management area WCs. The extract fans shall be complete with integral run-on timer and with operation linked with the lighting within the respective room.

Car Park

The car park shall be provided with impulse shunt fans for pollutant dilution and smoke dispersion. This shall supplement the natural ventilation and designed and selected according to a CFD model, carried out by a Specialist employed by the Mechanical Services Installer.

The design and installation shall be in full compliance with Part F and to the satisfaction of Building Control and Fire Consultant.

f) Management Areas VRF and Heat Recovery

The Mechanical Services Installer shall provide ducted heat recovery ventilation and cassette/ducted fan coil ac units within the Management Areas, Main Amenity Area, Amenity Dining Room, Amenity Cinema Room and Amenity Tech Room. The system shall be Mitsubishi VRF or equal and approved, complete with heat recovery ventilation (same manufacturer).

The heat recovery units shall be selected to provide the minimum required fresh air rate and extract and ducted to purpose plenums on the rear of the louvres within the external fenestration. Fresh air intake ductwork shall be insulated.

Carbon filtration shall be provided on the supply from the heat recovery units as it is not permissible to rely on natural ventilation on all floors up to and including Level 7.

The systems shall be controlled locally, ie not through the BMS.

The condenser units shall be located in positions to be agreed with the Engineer.

g) Main Comms Air Conditioning

The Main Comms room (not the Sub Comms rooms) shall be provided with a dedicated ac unit linked to an external condenser located in positions to be agreed with the Engineer. The systems shall be Mitsubishi or equal and approved.

Extract ventilation shall be provided from each Sub Comms, controlled on a room thermostat.

A room sensor shall be provided within each of the rooms (Main Comms and Sub Comms), linked to the BMS.

h) Controls and Electrical Wiring

The Mechanical Services Installer shall be responsible for the design, supply, installation, testing and commissioning of the entire controls services for the building in accordance with:

- Building Regulations and all associated Approved Documents
- CIBSE guidance documents, including all main Guides, Technical Memoranda and Applications guidance as required by this development

The Controls Specialist shall be appointed by the Mechanical Services Installer.

The heating, water and plant monitoring systems shall be controlled utilising the current Trend IQ controls system.

The works shall include the provision of a wall-mounted control panel within the Boiler Room to provide controls interface of the boilers, CHP unit, gas solenoid valve, pumpsets, cold water storage tank (low level alarm within each tank section), cold water booster set and pressurisation unit.

There is no requirement for BMS monitoring or control of the HIUs within each Apartment , with exception of the requirement for heat metering.

A temperature sensor shall be located within the Main Comms room, linked to the BMS.

The control panel shall be Form 2, with run and fault indication for all pumps, boilers, heat pump (if provided), CHP units and pressurisation units. The panel fascia shall be provided with a current Trend IQ View display. The control panel shall be provided with an ethernet connection to allow full remote control and monitoring by access to dedicated IP address.

All graphics shall be prepared on the front-end pc to be provided by others and located within the Management Area. Trend Supervisor software shall be provided (and installed) within this Contract.

A thermal cut-out shall be provided above each boiler and CHP unit and a knock-off button next to the door into the Boiler Room, to shut down the gas supply to the boilers and CHP unit on activation.

A fire alarm interface shall be provided to the control panel.

The following meters (mBus protocol) shall be monitored through the BMS:

- Incoming mains water (at boundary)
- Incoming gas (chatterbox on Statutory meter)
- Gas to CHP unit
- CT heating to HIUs
- CT heating from CHP unit
- Cold water to each Apartment
- Heating/hot water to each Apartment (heat meter within each HIU)
- Electric main Statutory meter
- Landlord's sub-meters
- Electric supply to each Apartment

The Mechanical Services Installer shall be responsible for supplying and setting up software to allow automatic billing to apartments of energy consumption (heat, water and electric). This should be in conjunction with the HIU supplier.

All new mains voltage wiring shall be carried out utilising single core LSF cables enclosed in galvanised steel trunking and conduits. Controls cabling shall be screened/twisted pair cables, enclosed in trunking and conduit (flexible kopex shall be used on final connections to field-mounted controls, boilers and pumpsets). All wiring accessories shall be by MK Electric Ltd from the Metalclad Plus range.

All power and controls cabling, including containment, shall be by the Controls Specialist, excluding the feeds to the control panels, and feeds to the booster set which shall be by the Electrical Services Installer.

Earthing and bonding of all pipework shall be carried out in accordance with the 17th Edition of the IEE Wiring Regulations.

i) Dry Riser Services

The Mechanical Services Installer shall design, supply, install, test and handover dry riser installations to the satisfaction of Building Control and the Fire Consultants report/recommendations where required to meet the development Fire, Life and Safety Strategy.

Dry risers shall be installed in accordance with building control and the Fire Officer's requirements, and shall comply with BS9990, BS5306-3, BS EN 3-7.

The dry riser system shall include inlet boxes at ground level and a landing box/valve at each subsequent floor.

Pumping-in breeches (2 or 4-way as determined by Fire Officer/Building Control) shall be provided for the water connection to the water supply.

The Mechanical Services Installer shall install a screwed flange suitable for a minimum of 2 No instantaneous male inlets, c/w non-return valves. The pumping inlet breech shall be supplied with a drain as standard, and shall be housed within an inlet box, recessed into the wall of the building. The Mechanical Services Installer shall liaise and co-ordinate this works with all other members of the construction team.

Each draw off point from the dry riser shall consist of a landing fire valve accommodated within a recessed cabinet, and valve coupling complying to BS336.

Each cabinet box shall be constructed from 1.5mm steel plate, finished in red powder coated finish, manufactured to BS5041 Part 5. Automatic air vents shall be installed at the highest point of each individual riser.

j) Sprinkler Services

The Mechanical Services Installer shall design, supply, install, test and commission a residential sprinkler system to the satisfaction of Building Control, Fire Officer and in compliance with the Fire Report for the building.

The sprinkler system shall be designed, installed and commissioned in accordance with: BS9251:2014 and BAFSA Technical Guidance Notes 1, (TG1)

Company accredited by FIRAS

Member of the British Automatic Fire Sprinkler Association, (BAFSA).

The sprinkler system shall be fed from the domestic water services tank located within the main Tank Room.

The sprinkler system shall be interfaced with the building's fire alarm system on each floor that has sprinkler protection. On activation of a sprinkler head, the water shall flow through the sprinkler valve group and thus operate the sprinkler flow switch.

The pipework system shall be approved by the Building Insurer, Fire Officer and Engineer.

k) Wet riser services

A wet riser sectional tank, pumps and controls shall be provided in compliance with BS9990. The tank and pumps shall be located at ground floor level with a single riser through the building (main tower only). The drain from the test valve on each floor shall be routed back to the tank.

The wet riser tank shall be minimum capacity 45,000 litres, split into two interconnected equal sections and with duty/standby pumpsets plus jockey pump if required to maintain required pressures.

l) Above Ground Drainage

The Mechanical Services Installer shall design, supply, install, test and commission above ground foul drainage system to collect and dispose foul and waste water to the below ground drainage system in accordance with the Structural Engineer's external underground drainage layout and the Architect's internal layouts.

Soil and waste water shall be collected from sanitary and waste water appliances within each Apartment, and from all Landlord areas including Boiler Rooms, Cycle Store/Bin Stores, and Boiler Rooms.

A uPVC pipework system shall convey the soil and waste water, by gravity, down through the building to points of discharge to the underground drainage system.

Drainage pipework within the car park and where collected on lower levels shall be cast iron or welded HDPE.

Pipework shall be insulated where passing through acoustically sensitive areas.

The Mechanical Services Installer shall ensure that each SVP is provided with a reference number. A numbered test sheet shall be provided which correlates with the reference number to the SVP.

The Mechanical Services Installer shall provide rodding access facilities within the above ground system immediately prior to connection to the below ground system. The above ground drainage pipework within the lower floors ceiling voids shall be provided with acoustic insulation to achieve specified acoustic levels inside the building, where required.

Rodding access shall be provided to gain access to any length of discharge pipe which cannot be reached by removing traps or appliances with internal traps and any changes in direction.

Rodding points shall be provided in discharge stacks above the flood level of all appliances. In kitchens, all SVPs shall be provided with rodding access above the worktop level.

All connections to sanitary fittings, floor gullys etc. shall be the responsibility of the Mechanical Services Installer.

The system shall be ventilated by means of vertical discharge stacks being continued up through the building to terminate through the roof to atmosphere.

Ventilating pipes open to outside air shall finish at least 900mm above any opening into the building within 3m and shall be finished with a wire cage or other perforated cover. Vent stacks shall be shared to minimise roof penetrations but compliant with British Standards and Building Regulations.

m) Builderswork

The Mechanical Services Installer shall be responsible for all builderswork and making good associated with this Contract, with exception of plant bases and building penetrations of over 50mm diameter which shall be carried out by the Contractor.

n) Testing and Commissioning

The entire mechanical services installation forming this Contract shall be tested and commissioned in accordance with this Specification, including chlorination of installed water services and dosing of the heating systems (including the secondary system within each Apartment).

The Mechanical Services Installer shall provide complete demonstrations of all systems to the Engineer and Employer prior to handover and at completion of each phase. This shall include full demonstration of the controls by the Controls Specialist.

o) Design Drawings and Technical Submissions

The Mechanical Services Installer shall submit full details of their proposals for all of the mechanical services for the project for the approval of the Engineer. All information shall be submitted a minimum of

four weeks prior to commencement on site. The Engineer shall comment on the submissions within two weeks of receipt and any revisions to the system and further information required shall be provided at least one week prior to commencement.

The submission of, and subsequent approval of information, shall in no way relieve the Mechanical Services Installer of responsibility for fully complying with the specification and all necessary standards and regulations.

The submissions shall include, as a minimum, the following items:

- a) Detailed drawings for all systems on building plan layouts at minimum 1/50 scale. Boiler Rooms and details to be at minimum 1/20 scale;
- b) Schematic drawings indicating clearly the proposed arrangement for hot/cold water services, heating and ventilation;
- c) Full calculations for all systems demonstrating compliance with current CIBSE recommendations for a building of this type and any appertaining current legislation. This shall include full design calculations on Hevacomp (or similar);
- d) Manufacturers' literature giving full details of all proposed systems and equipment (laid out as a 'product board' with all details of all equipment, complete with photographs);
- e) Full details of any specialist sub-contractors to whom it is proposed to sub-let specific sections of the works;
- f) Description of operation for the automatic controls;
- g) Record drawings and operating and maintenance manuals.

p) Working drawings

Working drawings shall be provided for approval at least 3 weeks before any works commence.

q) Record Drawings and Operating and Maintenance Manuals

3 N° sets of record drawings and operating and maintenance manuals shall be provided as a prerequisite of award of practical completion, as follows:

- Record drawings shall be provided. If required ACAD files can be made available to the Contractor to assist this process.
- Operating and maintenance manuals shall be provided. The manuals shall incorporate full manufacturer's details of all equipment utilised together with copies of all Test and Completion Certificates and shall be bound in heavy duty plastic ring binders. The information shall be issued for comment at least 4 weeks prior to Practical Completion.
- 1 N° electronic copy of the manual (including record drawings) shall be provided on CD and shall be a prerequisite of practical completion. The electronic version shall mimic the hard copy version in such a way that the manual can be printed in sections or in its entirety to exactly match the hard copy version.

r) Maintenance of Building Services Systems

The Mechanical Services Installer shall include for 24 months full planned and preventative maintenance on all building services systems (this shall include maintenance where required at 12 months). The 24 month period is to run from the date of Practical Completion of the building in line with the Defects Liability period.

1.10 SERVICES SUPPORTS

The Mechanical Services Installer shall include for the design and installation of all services bracketry.

1.11 BUILDERSWORK

The Mechanical Services Installer shall include for the provision of all builderswork associated with this Contract, as outlined above.

1.12 PROVISIONAL SUMS

Provisional sums shall be expended in part or in whole, or entirely omitted at the sole discretion of the Contract Administrator.

SECTION 2.0 SCHEDULES

INDEX

2.01 DESIGN CRITERIA

SCHEDULE 2.01

DESIGN CRITERIA

The services shall be designed to the following design criteria:

TEMPERATURES

Winter external	-4degC
Summer external	28degC
Winter infiltration	1ac/h general, 2ac/h entrance
Summer infiltration	0.25ac/h

Apartments

Bedrooms	21degC heating
Kitchens/Lounges	21degC heating
Bathrooms	21degC heating

Landlord Areas

Corridors	No heating
Stairs	No heating
Management Areas	21degC heating and cooling
Amenity Spaces	21degC heating and cooling
Landlord WCs	16degC heating
Workshop	16degC heating

VENTILATION

To meet Part F Building Regulations and the requirements stipulated within the Noise, Air Quality and Overheating Reports (for Part L compliance)

NOISE CRITERIA

Refer to Acoustic Report for building

OVER-HEATING CHECKS

Over-heating checks will be carried out on 'occupied spaces' to ensure compliance with the recommendations of CIBSE TM52 and TM59.