

## MECHANICAL ENGINEERING SERVICES SPECIFICATION

**Project:** 102–104 Northumberland Park, Trulock Road, London, N17 0TS  
2No. Houses and 6No. Flats

**Description:** Mechanical Services Specification

**Reference:** 9522/M/SPEC01

**Issue:** One

**Status:** Tender Issue

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## DOCUMENT ISSUE REGISTER

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|---------------------------|----------------------------------------------------------------------------------------------------------|
| <b>Project</b>            | <b>102 – 104 Northumberland Park, Trulock Road, London, N17 0TS</b><br><b>2No. Houses and 6No. Flats</b> |
| <b>Document Title</b>     | <b>Mechanical Services Specification</b>                                                                 |
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**Description of Revisions Made to Document:**

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**1.0 PROJECT PARTICULARS – MECHANICAL SERVICES****1.1 Introduction**

All clauses relating to Conditions of Working and factors relating to the M & E works referred to in the Main Contract Documentation are deemed to be relevant to this document.

The extent of the works will be as detailed in Clause 1.7 of this specification and covers the building services provisions to the building.

Before submitting his tender, the Contractor is advised to visit the site so as to be thoroughly conversant with the position, conditions, character and extent of the proposed Works and the means of access thereto, also storage space for materials, sheds and temporary offices.

The Contractor must return a fully compliant bid which will be deemed to be based on the specified products, listed in the schedules, specification and/or Tender drawings. The Contractor may if he so chooses also return an alternative bid for consideration listing any savings, substitute items, products and/or practices clearly within their tender return.

**1.2 Employer and Consultants**

The following identifies the parties referred to throughout this document.

**Employer**

Billericay Electrical Ltd, Unit 6, Radford Crescent, Billericay, Essex, CM12 0DU

**Contract Administrator**

Billericay Electrical Ltd, Unit 6, Radford Crescent, Billericay, Essex, CM12 0DU

**Quantity Surveyor**

To be advised

**Architect**

BB Partnership Limited, The Trafalgar, 17 Remington Street, London, N1 8DH

**Structural Engineer**

RSA Design, 50 Queens Road, Buckhurst Hill, Essex, IG9 5BY

**Building Services Consultants**

Brontide Consulting Limited, Unit 15, Old Park Farm, Main Road, Ford End, Chelmsford, Essex CM3 1LN

**Statutory Authorities**

The following identifies the parties referred to throughout this document.

**Electricity**

UK Power Networks, Projects Gateway, Metropolitan House, Darkes Lane, Potters Bar, Hertfordshire EN6 1AG

**Water**

Thames Water, Developer Services, Clearwater Court, Vastern Road, Reading, RG1 8DB

**Gas**

N/A

**BT Telecoms**

BT Openreach, South East Region, Romford New Sites Office

Tel. No. - 0800 731 7346

Email - [newsite.romford@openreach.co.uk](mailto:newsite.romford@openreach.co.uk)

**1.3 Form of Contract**

The Form of Contract to be utilized for the project will be as defined by the Contract Administrator within the Main Contract Documentation. Please refer to this documentation for the exact Contract requirements.

**1.4 Sectional Completion**

Please refer to Main Contract documentation for sectional completion of this project.

The Contractor shall allow within their installations for sectional completion of the project.

**1.5 Definitions**

For the interpretation of the definitions used within the document the following will apply: -

For definitions roles and responsibilities of all parties involved in the project refer to the main contract preliminaries (which are available from the Contract Administrator).

- a) The Contractor will mean the Firm appointed to carry out the Works and referred to elsewhere in the Tender Documents as the Specialist Contractor and any reference to Sub-Contract will mean Specialist Contract.
- b) The Project will mean the whole of the main project works as described in the Preliminaries.
- c) The Tenderer will mean any Firm or Company who submits a Tender for the execution of the building services works specified herein.
- d) The Works will mean the supply, delivery, installation, erection, setting to work, testing and commissioning of the Works as described in the Specification and/or shown or complied on the Tender Drawings or Schedules referred to herein.
- e) The Tender Drawings will mean the drawings listed in the schedule contained in this Specification.
- f) Concealed will mean hidden from normal sight within enclosed duct spaces, shafts, ceiling spaces walls partitions.
- g) Exposed will mean visible to the building components.
- h) Provide will mean supply, install and connect complete.
- i) Install will mean install only.
- j) Working Plans & Drawings will mean documents prepared by the Contractor for Construction purposes and approved by the Contract Administrator.
- k) Approved by or Approval of will mean approved by or to the approval of the Contract Administrator.

**1.6 Description of the Building**

Demolition of the existing site has already been undertaken to provide a clear working site for the construction of 8 No. newly constructed residential properties.

The new residential units will take the form of the following: -

- a) 6 No. Flat type self-contained apartments (Plot Nos. 01-06) formed over three floor levels, ground, first and second floor level respectively. All flat units are accessed from landlord's controlled and operated communal common areas.
- b) 1 No. Two-Bedroom self-contained house (Plot No.8) formed over two floor levels, ground and first floor levels respectively. The property is accessed directly from Trulock Road street.
- c) 1 No. Four-Bedroom self-contained house (Plot No.7) formed over three floor levels, ground, first and second floor levels respectively. The property is accessed directly from Trulock Road street.

Access to the residential flat types (Plot Nos. 01-06) will be from the newly formed communal main entrance area at ground floor level serving each of the floor levels via a common staircase area. Mechanical and electrical risers are located at each floor level for main distribution of the respective services systems.

Landlord's bin store facilities are located at ground floor level, adjacent to the main entrance to the Flats. A communal car park area is formed at ground floor level and accessed from the local street area. A bike store is located at the rear of the building containing the flats.

## 1.7 Extent of Works

The works will include for the following: -

### General Scope

- a) The surveying of the site as necessary.
- b) The supply and installation of the Works in accordance with the design principles described in this Specification.
- c) Installation of the Works in accordance with the agreed contract programme.
- d) The co-ordination of interfaces with works by others
- e) The submissions described in this Specification.
- f) The statutory approvals described in this Specification.
- g) The tests described in this Specification.
- h) The protection of the Works.
- i) The drying and heating of the Works.

The final cleaning of the Works.

### Particular Scope.

The works will include for the following: -

- a) Provision of new metered incoming water infrastructure to the New Residential Units and landlords bin store.
- b) For each residential property provide and install Domestic hot and cold water infrastructure including distribution pipework throughout each residential unit.
- c) For each House and Flat, provide and install an Air Source Heat Pump including Hot Water Cylinder providing LTHW heating via radiators and domestic hot water generation.
- d) For each residential property provide and install electric towel rails in bathrooms / en-suites.

- e) Provide and install electric panel heaters to landlords common areas.
- f) Provide and install Cat 5 break tank and booster set to communal Bin Store.
- g) Provide and install all required above ground foul drainage to each Residential Unit.
- h) Within each Residential Unit provide and install mechanical ventilation.
- i) Thermal insulation to pipework and ductwork.
- j) Electrical power wiring and automatic controls.
- k) Builderswork in connection and fixings.
- l) Testing, inspection and commissioning and the production of certification.
- m) Production of working/installation drawings
- n) Production of record drawings.
- o) Production of Operating & Maintenance Manuals.
- p) Training and induction to the Client's representatives.

## 1.8 Construction Drawings

The Construction Drawings associated with the building services Contract Administrator which accompany this specification are as follows: -

| Drawing No. | Drawing Title                                                        |  |
|-------------|----------------------------------------------------------------------|--|
| M-3000      | Incoming Cold Water Layout                                           |  |
| M-3100      | Ground Floor – Domestic Water Services & LTHW Heating Layout         |  |
| M-3101      | First Floor – Domestic Water Services & LTHW Heating Layout          |  |
| M-3102      | Second Floor – Domestic Water Services & LTHW Heating Layout         |  |
| M-3103      | Domestic Water & LTHW Heating Services Schematic                     |  |
| M-3200      | Ground Floor – Above Ground Drainage & Mechanical Ventilation Layout |  |
| M-3201      | First Floor – Above Ground Drainage & Mechanical Ventilation Layout  |  |
| M-3202      | Second Floor – Above Ground Drainage & Mechanical Ventilation Layout |  |
| M-3203      | Above Ground Drainage Schematic                                      |  |

## **2.0 CONTRACT INFORMATION**

### **2.1 Interpretation of Documents and Drawings**

The Specification and tender Drawings will be read conjointly and the Tenderer will, before submitting his Tender, draw the Contract Administrator attention to any discrepancies which may appear between the Documents and/or Drawings and to anything which, in his opinion, may be unsuitable, undesirable or inconsistent with his guarantees and responsibilities.

No claim will be entertained by the Contract Administrator for additional payments, which may be required by the Contractor in respect contingencies which, in the opinion of the Contract Administrator, arise out of the failure of the Tenderer to acquaint himself thoroughly with the details of the work or the working conditions before the submission of his Tender.

Where discrepancies occur between the Small Scale Drawings and the Specification, the latter is to take precedence and Detailed Drawings will take precedence over Small Scale Drawings and the Specification. The Contractor will advise the Contract Administrator where such discrepancies occur before placing the work in hand.

Tender Drawings are primarily intended to enable Tender Costs to be prepared. Where these drawings are to a small scale, the indication of exact runs and/or positions of pipes, ducts, cables and other components of the Works are precluded.

The Contract Administrator's Specification and Drawings will be interpreted in accordance with good installation practice relevant to the circumstances.

### **2.2 Responsibility**

The Works will be carried out under the direction of the Contract Administrator acting for and in collaboration with the Client.

The Contract Administrator will be responsible for providing adequate and accurate information in this specification and Tender Drawings.

The Contractor will be responsible for:

- q) Completion of the works to the satisfaction of the Contract Administrator with regard to workmanship, materials, execution and performance according to design.
- r) Providing, up to the date of Practical Completion such supervision whether continuous or intermittent as may be necessary to maintain the Works in good conditions.
- s) Preparation of detailed builders work drawings, detailed coordinated ductwork, plant and system working drawings.
- t) Appraising the duties of all plant and equipment related to the Works (taking into account any additions which may be made during progress of the works) and informing the Contract Administrator of any matter with which he disagrees.
- u) Drawing the Contract Administrator's attention to any discrepancies in documents, drawings or instruction issued after the time of Tender, immediately upon receipt of same and prior to the commencement of any part of the Works affected thereby.

### **2.3 Defects**

The defects liability will be as listed within the Main Contract Preliminaries.

The said period will not be deemed to have expired until the Contractor has made good all defects or faults to the Contract Administrators satisfaction.

If, during this period, any defects or faults develop which, in the opinion of the Contract Administrator are due to faulty materials, workmanship of design components, then the Contractor will remedy these at his own cost.

The Contractor will indemnify the Client against any damage caused to the Buildings and/or contents and occupants caused by defects of faults.

If remedial work is carried out on a portion or portions of the works the unexpired balance of the defect Liability Period relating thereto is less than six months, then the Contract Administrator may apply the provision of this Clause to the relevant portion, for a period of six months from the certified date of completion of such remedial work.

If the Contractor fails to carry-out such remedial work within a reasonable time after having received instruction, then the Contract Administrator may make other arrangements to proceed to do the works, at the expense and risk of the Contractor and without prejudice to such other rights as the Contractor may have in respect of the works.

## **2.4 Provision of Temporary Lighting and Power - Preliminaries**

Refer to Main Contract documentation.

## **2.5 Unloading Hoisting & Distribution**

Refer to Main Contract documentation.

## **2.6 Temporary Site Accommodation**

Refer to Main Contract documentation.

## **2.7 Alternatives to Specification**

Where makes of materials or equipment are specified the Tender must be based on these. Alternative makes will not be accepted at the time of tendering.

The successful Tender may subsequently put forward alternatives for the consideration of the Contract Administrator/Contract Administrator who reserves the right to reject such alternatives. If a change is agreed, then the Tender Sum, Analysis of Tender and Schedule of Rates of such items will be subject to variation by the same amount as the difference in net costs of the respective items.

## **2.8 Quality of Materials**

The whole of the Works are to be executed with the materials indicated in the Specification of Works, where such materials are not specifically described they are to be of the best of their respective kinds and samples or Drawings of such materials are to be submitted to the Contract Administrator for approval before use.

No substitution of specified materials will be permitted except by permission of the Contract Administrator in writing and which will only be given when it can be proved that specified material is not available either by reason of delay in delivery or other like circumstances. The true intent and meaning of the Specification being that the whole of the Works is to be completed to the satisfaction of the Contract Administrator so as to be perfect in all parts.

Unless otherwise specified, all materials, equipment or work supplied or executed will comply with current Codes of Practice and with British Standards where available. Where particular Codes of Practice or British Standards are cited, such will be deemed to refer to the current editions.

## **2.9 Copy Orders**

Should he be called upon to do so, the Contractor will supply the Contract Administrator with copies of orders for the materials; the provision of such copy orders will not prejudice the acceptance by the Contract Administrator of the material concerned.

## **2.10 Site Regulations**

Refer to Main Contract documentation.

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**2.11 Regulations Notices, Fees**

Refer to Main Contract documentation.

**2.12 Site Facilities**

Refer to Main Contract documentation.

**2.13 Supervision**

The Specialist Contractor will, during the progress of the Works, keep upon the site a competent Foreman and any instruction given to him will be deemed to have been issued to the Contractor.

The Contractor will keep a competent Contract's Manager in addition to his Foreman in charge of the Works, who will be considered to be the duly accredited representative of the Contractor empowered to take instructions from the Contract Administrator and to execute same, and who must be in attendance when required at the premises until the whole of the Works have been completed and passed by the Contract Administrator and will instruct and give all information regarding the operation of the plant and/or apparatus to the Client.

**2.14 Programme**

Refer to Main Contract documentation.

The Tenderers will complete the Appendix to the tender entitled "Programme Questionnaire", without which the Tender may not be considered.

**2.15 Labour**

The Tender will allow for provision of all labour necessary for the proper execution of the Works.

The Tender will include in his prices any extra costs of importing labour, including higher rates of wages, travelling time, fares, subsistence and lodging facilities and payments in connection with the operation of Bonus Schemes as well as the productive overtime involved in executing and completing the Works under the conditions laid down in the preceding clause headed "programme".

The Tenderer will include in the Tender for the difference in cost between the basic hours per week fixed by National Agreement and any hours which he may agree with his operatives.

**2.16 Other Trades**

The Contractor will progress the works with due regard to the work of other trades, including co-operation of positions and sequences of installation.

**2.17 Instruction of Client's Representatives**

The Contractor will, at times to be agreed, instruct the Client's representative the use, and correct operation of the Works and will satisfy himself that such staff; are competent to take over the installation on completion.

The Contractor shall be fully responsible for providing a digital recording of all Client demonstrations and handing over the recorded Client demonstrations to the Contract Administrator.

**2.18 Practical Completion of the Works**

The Date of Practical Completion of the Works will be the date of practical completion agreed for the Project, provided that the Contractor will have prior to that date: -

- a) Made, in the presence of the Contract Administrator, the tests specified or reasonably required by them.
- b) Received a certificate from the Contract Administrator stating that the works are satisfactory and that the Specification requirements have been met.
- c) Handed to the Contract Administrator copies in triplicate of preliminary operating and maintenance instructions sufficient for the satisfactory operation of the Works prior to receipt of the full and final record instructions and drawings.

- d) Instructed the Client's staff in the correct operation of the installation in accordance with programme to be agreed with the Contract Administrator.
- e) Completed all labeling and circuit lists to the satisfaction of the Contract Administrator.
- f) Supplied all spares as specified elsewhere, with a duplicate receipt ready for signing.
- g) Cleaned all equipment, particularly luminaries, to the satisfaction of the Contract Administrator, and replaced ALL lamps and air filters, which have been operated prior to the date for Practical Completion of the Project.
- h) Given a written agreement to outstanding defects or items of incomplete or unacceptable work, with written undertaking that the items listed will be cleared within 28 days.

## 2.19 Provision of Records

The Contractor will supply to the Contract Administrator, prior to the Date of Practical Completion of the Contract, comprehensive record documentation for the contract works, finalised in detail and approved by the Contract Administrator.

The Contractor will prepare the record documentation in accordance with the stipulations described within BRISA Application Guide document 'Handover, O&M Manuals, and Project Feedback; A toolkit for Designers and Contractors (BG1/2007)'.

The record documentation prepared and issued by the Contractor will comprise of the following: -

Record Drawings and Schedules

Operating and Maintenance Manual Instructions

The Contractor will issue the following information to the Contract Administrator: -

- a) One set of white prints representing all record drawings, schedules and operating and maintenance manual instructions, all to be bound within A4 Files and issued to the Contract Administrator for review and approval.
- b) Two sets of Compact Disc's / USB Flash Drives containing all record drawings, schedules and operating and maintenance manual instructions, altered to incorporate all Contract Administrators comments.

The record drawings, schedules and operating and maintenance manual instructions will be adequate for the following:

- a) To record clearly the arrangement of the various sections of the Works as actually installed and to identify and locate all component parts thereof.
- b) To make it possible to comprehend the extent and purpose of the Works and the method of operation.
- c) To set out clearly the extent to which maintenance and servicing is required and how, in detail, it should be executed.
- d) To provide sufficient and readily accessible information properly to facilitate the ordering of spares and replacements.

All record drawing information shall conform to the following standards:

- a) All drawings shall be prepared on a CAD draughting system using Autocad software with all drawings being produced in "DWG" format.
- b) All drawings shall be of the international A series; no other size will be accepted.

Each record drawings prepared by the Contractor shall have the following information on the drawing:

- a) Name of Contract and where appropriate the phase number, zone or floor number.
- b) Description of drawing
- c) Drawing number
- d) Scale
- e) Name and address of the Contractor

The record drawings and schedules will be correlated so that the terminology and the numerical and/or other references used therein are consistent with and similar to those used in the physical identification of component parts of the Works.

## 2.20 Testing

The Contractor, having ensured that electricity, water, fuel and other necessary supplies are available, will set to work the completed Works or part thereof, at the selection of the Contract Administrator, and make all necessary adjustments to ensure correct functioning.

After the installation of part thereof has been set to work and adjusted, the Contractor will demonstrate its operation, at a time selected by, and to the satisfaction of, the Contract Administrator.

The tests will demonstrate, amongst other things:

- a) That equipment provided complies with the Specification in all particulars and is of adequate capacity for its full duty.
- b) That all items of plant and equipment operate sufficiently quietly to meet the specified requirements.
- c) That all instruments, protective devices, etc., are correctly calibrated and accurate.
- d) That all electrical circuits are properly fused and protected and conduit systems are electrically continuous and properly earthed.

The details and methods of carrying out and recording the tests should be agreed with the Contract Administrator. The representative of the Client and/or the Contract Administrator will be at liberty to be present and to participate in the tests. This will not relieve the Contractor of his responsibility for carrying out the tests satisfactorily.

The Contractor will make all necessary records during the tests and, on completion thereof, will provide the Contract Administrator with a test report and record, both in triplicate.

The Contractor will provide all test instruments together with skilled labour for carrying out the tests.

Electricity and water required by the Contractor in connection with setting to work adjusting and testing will be provided by the Contractor and the cost of any fuel and energy required for testing the installation together with any simulated load conditions will be included in the Tender.

If the tests fail to demonstrate the satisfactory nature of the installation thereof then the Contract Administrator will decide whether such failure is due to incorrect, inadequate or defective materials, installation and/or adjustment. If this is so, then the Contractor will, at his own expense, carry out such alterations or replacements as are required to the Contract Administrator complete satisfaction. The Contract Administrator will be at liberty to call for further tests when such alterations have been made and his decisions as to what constitute satisfactory tests will be final.

The above general requirement as to testing will be read in conjunction with any particular requirements specified elsewhere.

## 2.21 Builderswork

Formation of builderswork holes through walls, floors, slabs, wall chases, etc., and making good up to and including 150mm square or diameter will be undertaken by the Contractor. The form and extent of the Contractor's

requirements and intentions will be identified by the Contractor by production of detailed drawings to be approved by the Contract Administrator.

## **2.22 Alternatives**

Tenderers will include for all materials and equipment as specified in this Specification and on the drawings, using manufacturers and suppliers named and the quotation from such people intact and without modification, subject to their meeting the requirements of this Specification.

Unless otherwise agreed in writing by the Contract Administrator, the order for this Trade Contract will be placed on the understanding that the Contractor will comply fully with this Specification in all respects.

After being awarded the Trade Contract the Contractor will be at liberty to offer alternatives to other items, after first advising the Contract Administrator of their intentions, in order to avoid offering alternatives to items which are not negotiable.

## **2.23 Construction (Design and Management) Regulations**

The Contractor will provide all necessary method statements, information details, risk assessments, etc., as the Principle Contractor to enable the Principle Contractor and other parties to fully comply with the Construction (Design and Management) Regulations.

3.0 DESIGN CRITERIA

3.1 General

The Contractor will be responsible for the fully coordinated installation of the mechanical and electrical services systems to be provided within the building. These activities will also include the coordination with all other services, Structural and Architectural elements and associated builderswork design to achieve a fully coordinated installation.

The Contractor will be required to submit to the Contract Administrator for comment and/or approval the fully coordinated mechanical design information.

The Contractor will be a member of the HVAC trade institutions.

3.2 Mechanical Services

Basis of Design

The basis of design for the mechanical services systems and plant maximum demand operating conditions are as follows and on completion of the works commissioning of the various systems and plant must demonstrate these conditions can be achieved.

Winter design external air temperature: -4°C 100% saturated

20% overload capacity included into design in accordance with CIBSE Guide Recommendation

Winter design internal air temperatures:

Residential Units

|                |              |
|----------------|--------------|
| Bedrooms       | 18°C +/- 1°C |
| Corridors/Hall | 18°C +/- 1°C |
| Living Room    | 22°C +/- 1°C |
| Dining Room    | 20°C +/- 1°C |
| Bathrooms      | 21°C +/- 1°C |
| Kitchen        | 18°C +/- 1°C |
| Toilet         | 20°C +/- 1°C |

Heat gain allowances:

Solar : Calculated To CIBSE Guide for avoidance of solar overheating and Part L compliance

Water Temperatures

|                                             |             |
|---------------------------------------------|-------------|
| LTHW flow and return to radiator heating: - | 55°C / 45°C |
| Domestic hot water flow temperature: -      | 60°C        |

**Mechanical ventilation rates:**

| Mechanical Ventilation Rates |                                                                                                                                           |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Bedrooms                     | To Building Regulations Part F to achieve System 3 requirements.<br><br>Background passive ventilation requirements – 2500mm <sup>2</sup> |
| Bathrooms                    | System 3<br><br>8 l/s continuous<br><br>15 l/s intermittent boost                                                                         |
| Kitchen                      | System 3<br><br>13 l/s continuous<br><br>60 l/s intermittent boost                                                                        |

All internal doors between kitchen/bathrooms and habitable rooms shall have the doors undercut to the equivalent 7600 mm<sup>2</sup>.

Ventilation to occupied or habitable rooms e.g. Bedrooms/Living rooms, etc., shall have passive background ventilation to the requirements of System 3 of 2500mm<sup>2</sup>.

**Water Services:**

To comply with Local Water Authority requirements, British Standard EN806 and the latest Water Regulations. Contractor to include for sterilisation of all domestic water pipework.

**Building U Values**

|                 |                         |
|-----------------|-------------------------|
| Ground Floor    | 0.11 W/m <sup>2</sup> k |
| Flat Roof       | 0.11 W/m <sup>2</sup> k |
| Pitched Roof    | 0.11 W/m <sup>2</sup> k |
| External Walls  | 0.15 W/m <sup>2</sup> k |
| Windows U-value | 1.4 W/m <sup>2</sup> k  |

Accredited Construction Details have been incorporated.

The above 'U' values to be included within the SAP calculation and Energy Performance Certificates.

**Design Standards:**

The designs shall comply with all applicable Legislation, Regulations, Guidelines and Recommendations as stated in the following where appropriate: -

- a) Planning Consents and Conditions Current Building Regulations
- b) Current Water Regulations & Byelaws British Standards and Code of Practice CIBSE Guides and Technical Memorandum BRE Technical Bulletins

- c) Health & Safety Regulations CDM Regulations
- d) HSE Guidance Notes & Publications COSHH Regulations
- e) HVCA Guides IEE Regulations
- f) EHO – Environmental Health Officer representing Local Authority NHBC
- g) F gas Regulations

**Hot Water Temperature**

Baths – with Approved blending/mixing valve to achieve Building Regulations Compliance.

Showers – with Approved blending/mixing valve to achieve Building Regulations Compliance.

**Documentation**

Upon completion of the project the Contractor must hand to the Contract Administrator 3 copies of a User's Guide to the mechanical services for each Residential Unit.

Minimum water pressure to be achieved at any terminal fitting – 1.5 bar.

Air Permeability to New Build Residential Units  $\leq 5.1 \text{ m}^3/\text{hr @ 50Pa}$

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## **4.0 SUBMISSIONS REQUIRED FROM THE CONTRACTOR**

### **4.1 General**

The Contractor will be required to submit to the Contract Administrator for comment and/or approval the following information.

### **4.2 Tender Submissions**

#### **Written Technical Documentation**

- a) Clause by clause compliant and non-compliant statement in respect of all clauses contained within this Specification.
- b) Product information on all manufactured plant items and components for all alternative equipment offered in lieu of the specified items of equipment.

#### **Drawings**

The Contractor is not required to submit any drawings with their tender submission.

#### **Samples and Mock-Ups**

The Contractor is not required to submit any samples or mock-ups with their tender submission.

#### **Method Statement**

The Contractor will submit any method statements associated with the mechanical services installation as required by the Main Contract Documentation.

#### **Environmental and Sustainability Policy Statement**

The Contractor will submit any environmental and sustainability policy statements associated with the mechanical services installation as required by the Main Contract Documentation.

#### **Health and Safety Risk Assessment**

The Contractor will submit any health and safety risk assessments associated with the mechanical services installation as required by the Main Contract Documentation.

### **4.3 Contract Submissions**

#### **Written Technical Documentation**

The Contractor will provide the following written technical documentation prior to the installation of the mechanical services installation to the Contract Administrator for comment.

- a) Product information on all mechanical services plant and equipment employed on the project.
- b) Product information on all manufactured plant items and components. Manufacturer technical data sheets may be included but inclusion of these will not relieve the Contractor from providing Equipment Data Sheets as identified above.
- c) Certified Type test data where requested.

#### **Working Drawings**

The Contractor will provide the following working drawing documentation prior to the installation of the mechanical services installation to the Contract Administrator for comment.

- a) General arrangement plan drawings of all floor levels to a scale of not less than 1:100 with critical and repetitive areas of detail drawn to a scale of not less than 1:50 including detailed sections as considered appropriate.

- b) Schematic drawings detailing the mechanical services in full. The drawings will fully indicate the extent of the system in terms of equipment location and configuration, device selection and relevant cable types and sizes. All relevant interface connection with other building services equipment will be reflected on the schematic drawings.
- c) Fully dimensioned plan layouts and sectional elevation of the mechanical services plant rooms. The drawings will detail the equipment layout of the rooms inclusive of all equipment and support systems, routes of access and maintenance, penetrations into rooms and locations of all ancillary equipment serving the rooms. All relevant interface connection with other building services equipment will be reflected on the drawings.
- d) System schematic line circuit diagrams demonstrating the method of interface and connection of circuit wiring, terminal reference numbers, and other Contractors interface connections, etc., associated with the following systems: -  
  
Automatic controls
- e) Schematic drawings detailing the method of interface with all electrical services equipment in full. The drawings will fully indicate the extent of the system in terms of equipment location and configuration, device selection and relevant cable types and sizes. All relevant interface connection with other building services equipment will be reflected on the schematic drawings.
- f) Builders work drawings for all plant bases, holes, chases and the like in walls, floors, partitions together with "back filling " and/or "building in" details to achieve fire, acoustic and/or airtight integrities.

#### **Samples and Mock-Ups**

The Contractor will provide the following samples and mock-ups prior to the installation of the mechanical services installation to the Contract Administrator for comment.

Samples of all alternative items proposed by the Contractor, where different to specified.

#### **Method Statement**

In addition, to the method statement identified with the Main Contract Documentation, the Contractor will provide the following method statements prior to the installation of the mechanical services installation to the Contract Administrator for comment.

- a) Any abnormal plant manoeuvre.
- b) Site tests
- c) Works tests
- d) Commissioning procedures and performance testing

The detailed requirements for these elements of the works are as identified within the various technical sections of the electrical services specification.

#### **Record Information and Drawings**

Record information and drawings are required as stipulated within Section 2 of this Specification.

#### **Statutory Approval Submissions**

The Contractor is not required to submit any Statutory Approval information for the works.

#### **Building Regulations**

The Contractor will ensure the selection of materials and the method of installation and workmanship comply with the Building Regulations Approved Documents. Where required the Contractor will also provide any detailed information and will arrange for all inspections.

## **5.0 GENERAL ENGINEERING REQUIREMENTS**

### **5.1 Builderswork Drawings**

Formation of Builderswork is included within this Contract except as stated elsewhere in this Specification. The Contractor will carry out all Builderswork.

The Contractor shall provide all the necessary information to enable the required Builderswork to be executed, either by the provision of detailed drawings or schedules or by setting out his requirements on site.

Drawings must be submitted for Approval to the Contract Administrator prior to issuing for construction and these must be made available in sufficient time to allow the Contract Administrator to consider and approve the proposals.

The Contractor shall carry out all fixings using Rawlbolts, bolts, wood screws etc., including drilling of walls and other structural members. No drilling of structural elements of the building will be permitted without prior approval of the Contract Administrator. Welding to structural steelwork will not be permitted.

### **5.2 Installation Liaison**

The Contractor shall be responsible for the co-ordination of all his specialist Contractors and their installation work on site. All specialist Contractors concerned with the works will be required to co-operate with the Contractor and others before the work is commenced and to ensure the correct design intent during the course of construction. Any work which has to be re-done due to negligence in this respect will not constitute an extra. Particular care shall be taken to prevent obstruction of electrical services positions, cable routes, switch positions, access positions and obstruction of sanitary engineering services, rodding positions etc. Services installed in ducts shall be so arranged to permit maximum access along the ducts and all services, equipment and plant shall be readily accessible for maintenance.

All plant, equipment etc., are shown in approximate positions on the tender drawings. Their exact location shall be determined from the installation drawings or by consultation on site.

All Contractors concerned will be required to co-operate in planning these arrangements.

### **5.3 Protection of Materials and Work**

Piping stored on site shall be supported clear of the ground in storage racks and, together with all other stored materials, shall be suitably protected against the weather.

All equipment, plant, motors and materials, fixed or unfixed, shall be protected against ingress of dirt or moisture into working parts by means of polythene covers or equal.

Precautions against mechanical damage by other trades shall be provided where necessary.

Precautions shall be taken and all necessary protection provided to safeguard the work during frost and bad weather.

### **5.4 Manufacturer's Recommendations**

Products shall be handled, stored and fixed in accordance with the manufacturer's recommendations. Any conflict with other specified requirements shall be reported. Copies of the manufacturer's recommendations shall be submitted when requested.

### **5.5 Equipment**

All service connections shall conform with the items of equipment to which connections are to be made.

Details of operation, working pressures and temperature of equipment shall be checked and written confirmation obtained from the manufacturers before any service is first operated.

**5.6 Electrical Apparatus and Supply**

Medium voltage distribution will be 415 volts, 3 phase and/or 230 volts single-phase unless otherwise specified. All equipment covered by this Specification shall be suitable for use at these voltages and shall operate satisfactorily when the voltage at the terminals is reduced by 10% and shall comply with the current edition of the IEE Regulations.

**5.7 Sleeves, Openings and Fire Proofing**

Provide individual sleeves for pipes of same material as such pipes for the full thickness or depth of concrete and masonry construction. Increase the sleeve sizes for insulated lines to allow the full thickness of insulation.

Walls below ground level - provide cast steel pipe sleeves and pack the space between pipe and sleeve with hemp and caulk watertight with lead.

Sleeves in slabs and in fire rated walls - fill the voids around pipes with an incombustible compound. Make a water-tight seal at top of sleeve in slab.

Seal off excess area of slab or wall openings around ducts and piping; at bottom and top of each shaft and at each floor slab for openings outside of shafts. Provide firesafing construction which has the same fire rating as the work penetrated.

Utilise the openings provided in the structural concrete for mechanical and electrical installations.

Sleeve pipes for copper pipework shall be constructed from copper pipe or brass pipe as detailed. Split floor plates shall be mild steel chromium plated.

Pipe sleeves and floor plates shall be installed as follows:

|                                        |                                                                                                        |
|----------------------------------------|--------------------------------------------------------------------------------------------------------|
| Plaster Ceiling:                       | Flanges on the top side and split floor plates of the set screw pattern to the underside.              |
| Structural Walls & Floors              | Mild steel/copper/brass with split floor plates of the set screw pattern to each side.                 |
| Pipes above Ceilings and below Floors: | Cast iron/mild steel/copper/brass piping.                                                              |
| Pipes Bend in Solid Floors             | Suitably wrapped and finished with split floor plates of the set or Walls: screw pattern to each side. |

**5.8 Access**

Adequate access openings for all concerned equipment shall be provided to allow for easy maintenance.

Before work is put in hand the Contractor shall check on site the dimensions of all doorways, etc., to ensure that each piece of equipment can be admitted to its allocated position.

The Contractor shall be responsible for ensuring that any special openings are left during the building construction for the passage of equipment where necessary.

**5.9 Setting Up, Commissioning and Handover**

The Contractor shall include for the setting up, testing and commissioning and handing over the complete installation in good working order, and shall be responsible for co-ordinating with manufacturers and specialist suppliers during the setting up period to ensure that the plant has been installed in accordance with their requirements.

Prior to a test being carried out on an installation or section of installation, a general inspection of works to be tested shall be carried out by the Contractor. In the course of these inspections the following points shall be checked:

- a) That all components comprising the installation or section are as described in the specification and drawings or to revisions given in writing.
- b) That these components have been installed correctly.
- c) That such manufacturers and specialist test data and equipment for plant and components as is necessary for a complete test to be carried out have been provided.

Before permission is given by the Contract Administrator to run any system the component parts of the installation shall be checked out generally as follows:

- a) All items of plant equipment lubricated.
- b) All valves move freely from the fully open to fully closed position.
- c) All by-pass valves are closed.
- d) Free movement of pipework in guides and expansion points properly aligned and cold drawn.
- e) Check rotation of all motors, pumps and fans.
- f) Check correct overload setting of all starters.
- g) Receive confirmation from Contractors that all wiring and controls are correctly installed.
- h) Water circuits flushed out.
- i) Air circuits thoroughly cleaned ensuring removal of all foreign material.
- j) Drain lines flushed out.
- k) Thermometer, pressure and altitude gauges, indicator ranges in keeping with system requirements.
- l) Power supplied to items of equipment checked.
- m) Safety valve settings confirmed.

After all pre-run checks have been carried out and found to be as required, the Contractor shall set the installations in operation as follows:

- a) Water circuits filled, vented.
- b) Pump sets run and speed, power consumed and pressure readings taken.
- c) Fan sets run up and duty/standby meters with speed power consumed, volume and pressure readings taken.
- d) Water circuits regulated.
- e) All systems balanced.
- f) Instrumentation circuitry checkout.
- g) Setting of instruments in locked position.
- h) On completion of run-up, adjust all controls and settings ready for testing.

#### **5.10 Testing and Setting Up**

On completion of the "Pre-run" check-out the plant shall be fully functionally Tested and the setting up procedure shall commence. During this period all test results shall be recorded by the Contractor and witnessed. The

Contractor shall ensure that all specialist manufacturers and suppliers are in attendance, e.g. during the Testing and Setting-Up period.

The Contractor shall require to demonstrate that the plant performs to the requirements of the specification and drawings. The test results obtained shall be entered into the commissioning manual, together with the results of tests previously carried out during the construction period.

Reasonable notice of setting up of system shall be given to the Contract Administrator, who shall at his discretion witness same. Where test results are to be entered into the manual reasonable notice of the test shall be given to the Contract Administrator.

#### **5.11 Commissioning**

The commissioning period shall have been previously agreed by all parties and due allowance shall be made in the programme of works to allow such time as considered necessary for the following activities. The time for commissioning shall be decided by the Contract Administrator:

- a) Pre-Run checkout and Run-up.
- b) Testing and Setting Up.
- c) Proving period.

Before commissioning of any plant the Contractor shall confirm in writing to the Contract Administrator of the intention to commence commissioning allowing three working days notice. All test instruments shall be provided by the Contractor and shall be available during the testing and commissioning period. Where doubt exists as to the accuracy of testing instrumentation calibration checks shall be done at the Contractor's expense.

#### **5.12 Site Progress Tests**

Progress tests for each section of the works are specified in subsequent clauses.

Pressures shall be applied steadily and maintained for a period permitting proof and inspection.

Test pressures shall be withstood without leaking, sweating, weeping, permanent deformation or other defect occurring.

On water pipework circuits a hydraulic pressure test of twice the maximum stated working pressure shall be applied. For hydraulic tests the pipe connection to the section under test, apart from having an accurate pressure gauge fitted, shall have a blanked connection to accommodate the Engineer's check gauge.

#### **5.13 Electrolytic Action**

At all connections between copper pipework and ferrous pipework or equipment, insulating material in the form of non-metallic fittings or joint rings, shall be incorporated in order to prevent direct contact between the two metals and the setting up of electrolytic action.

#### **5.14 Dezincification**

All pipework, fittings and brazing materials used shall be made from non-dezincifiable materials whether specified in particular detail or not.

#### **5.15 Approved Installers**

Installations shall be executed by approved Gas Safety specialist Contractors only. Installations shall be supplied and installed in strict accordance with Gas Safety approved requirements and methods.

### **6.0 GENERAL MECHANICAL SERVICES**

#### **6.1 Thermal and Acoustic Insulation**

The following British Standard Specification and Codes of Practice relevant to this Section.

|             |                                                                                            |
|-------------|--------------------------------------------------------------------------------------------|
| BS 476      | Fire Tests on Building Materials and Structures.                                           |
| BS 874      | Methods of determining thermal properties, with definitions of thermal insulating terms.   |
| BS 1710     | Identification of pipelines.                                                               |
| BS 3533     | Glossary of terms relating to thermal insulation                                           |
| BS 5422     | The use of thermal insulating materials BS 3958 Thermal insulating materials               |
| BS 3974     | Pipe Supports                                                                              |
| CP 99       | Frost precautions for water services                                                       |
| CP 341 300- |                                                                                            |
| 307         | Central heating by low pressure hot water                                                  |
| CP 342      | Centralised hot water supply                                                               |
| CP 406      | Mechanical refrigeration                                                                   |
| BS 5970     | Thermal insulation of pipework and equipment in the temperature range of -100°C to +870°C. |
| CP 3009     | Thermally insulated underground piping system                                              |

## 6.2 Pipework Installation (General)

### General

The installation of all pipework shall follow the detail set out in the best accepted practice. The detail set out in the following Clauses of this Section is generally appropriate to all services but, where specifically stated, shall apply only to the particular service mentioned.

### Exposed Pipe Runs

All exposed pipe runs shall be arranged to present a neat appearance and be parallel both with one another and with the building structure. All vertical pipes shall be plumb.

Pipes shall be spaced, in relation to one another and to the building structure to allow for the required thickness of thermal insulation as required. The combined insulation of two or more pipes in one composite casing will in no case be permitted.

Where pipes pass through elements of the building structure, i.e. walls, floors, partitions, false ceilings, etc., they shall in all cases be enclosed concentrically within purpose made sleeves cut from pipe of the same material one or two sizes larger as may be required to provide reasonable clearance. Such sleeves shall be cut square at the ends, clean and flush with the finished wall and ceiling surfaces. Sleeves shall in no case be used as pipe supports, a free annular space being always provided for.

All pipework shall be arranged with a view to convenience of routine maintenance and removals.

With further view to convenience of routine maintenance, the positions of all valves, drains and supports shall be determined with this aspect in mind. Grouping of valves, drains, unions, flanges, etc., shall be preferred to scattered siting.

Attention shall be given, in the installation of all long runs of pipe to the indicated changes in direction such that, where possible the stress of expansion due to thermal changes are taken up by flexing of the cranks.

**Gradients**

All pipework shall be installed to gradients to allow for drainage and/or release of air, according to the service concerned. Gradients shall be, generally, as follows:

- a) Heating circulating pipes to rise in direction of flow to pre-determined high points where provision shall be made for venting through air vent points. Low points shall be provided with drain facilities. Rise shall be approximately at a rate of 1:400 and in no case less than 1:500.
- b) Domestic hot water piping to rise towards predetermined high points where provision shall be made for venting, either through open pipes, draw off fittings or automatic valves. Low points which cannot be drained via the central plant shall be provided with drain facilities. Rise to be approximately at a rate of 1:400 and in no case less than 1:500.
- c) Drains from tundishes shall fall to vertical drops at a rate of not less than 1:250.
- d) Gas piping shall be laid to drain to low points where pockets with plugged ends shall be fitted.

**Air Vents**

Where air vent points are provided such shall in all cases comprise the following:

- a) A vertical extension from the pipes concerned in the form of an air bottle with manual release air cock by key.
- b) An automatic air vent
- c) An outlet pipe, from the vent valve either to atmosphere or over a tundish in an adjacent drain line.

**Drains**

The guiding principle determining the provision and positioning of drain points shall be that all sections of pipework installation must be capable of being completely drained with the sectionalising or isolating valves closed.

Drain points shall thus be provided at all low points and on the dead side of all isolating valves in the form of a right angle branch from the main fitted with a cock of a type suitable for the service concerned.

**Isolating and Regulation**

Valves, cocks or stop taps for isolation and/or regulation shall be provided as required and in addition as follows:

- a) On points of pipe connection to all items of apparatus and equipment draw off fittings or ranges of draw off fittings.
- b) At the base of all risers and drops, except in cases where one item of apparatus only is served, such having its own local valve or valves, stop tap or stop taps.
- c) On mains distribution where isolation of any section or sections of the building is required.

**Temporary Plugs, Caps and Flange**

As the installation of pipework proceeds, all open ends shall be sealed with plugs, caps or blank flanges to prevent ingress of foreign matter. In no circumstances shall paper, wood or other material be used for this purpose.

When work has finished at the end of each day or for holiday periods, etc., temporary seals of the approved type shall be fitted. In the event of such precautions not having been taken, the Contract Administrator may require that the pipework adjacent to the open ends be stripped out, back to such point or points as will demonstrate that no fouling of the bores has occurred. Such stripping and the subsequent re-erection shall be carried out by the domestic Contractor at his own charge.

**Flushing**

As each system installation, or section of an installation as may be determined by the Contract Administrator Representative, is completed such shall be flushed out until such time as all swarf, sediment, weld material or other matter has been completely removed. This flushing shall be an entirely separate operation to any cleaning required subsequently.

Clean water shall firstly be pumped around the systems to waste until it runs free of any contamination.

On heating installation after initial flushing the systems shall then be filled with water to which shall be added a flushing agent and an inhibitor. This solution shall be circulated around the system for at least 10-12 hours after which the system shall again be drained.

On heating installations the system shall then be refilled and a suitable inhibitor added to the system.

On domestic water systems after initial flushing the complete systems including all pipework, equipment and brassware shall be efficiently sterilised before handover. Sterilisation shall be carried out by Specialists to comply with CP310, BS EN 806 and the specific requirements of the Latest Water Regulations.

Water treatment shall be carried out by recognised water treatment Specialist Company and full details of the proposed water treatment shall be provided to the Contract Administrator for Approval prior to application

#### **Temperature Measurement**

Provision for temperature measurement in the pipework system shall be made by installing thermometer pockets.

#### **Pressure Measurement**

Provision for pressure measurements in the pipework system shall be made by installing gauge connectors.

#### **Overflows and Other Warning Pipes**

Overflow and other warning pipes shall be fitted so as to discharge in obvious positions i.e. over building line for main storage tank warning pipes; local gullies for plant overflows and vent pipes;

#### **Supports and Fixings Accessories General**

The supports and fixings accessories described in this Section are those required in connection with piping and tubing throughout the works. The type of fixings required shall be generally as here described but the Sub-Contractor shall prepare and submit detailed workshop drawings of all supports and accessories as they are prepared. Fabrication of such items shall not be proceeded with either at manufacturer's works or on the site until the details have been approved by the Engineers.

#### **Builders Work**

Generally, all supports and fixing accessories requiring attachment to the building structure shall be provided and fixed by the Contractor. The Contractor shall in this connection provide to the Contract Administrator detailed dimensioned drawings showing the exact positions of all holes through slabs, pockets for siting standards and the like. Where small individual brackets require cutting for and pinning in to the building for structure, the Contractor shall arrange for positions to be marked out on the site by a competent workman and shall provide all other labour required to ensure that such brackets are set and fixed to his requirements.

Where supports and fixing accessories are such that attachment to the building structure is by wood screws or Rawlbolts the Contractor shall in all cases provide competent labour and suitable equipment for drilling the building structure, etc. Such work shall not be proceeded with, however, without the approval of the Contract Administrator Representative insofar as the building structure and finishes may be affected.

#### **Materials**

Materials for use in connection with the various items of piping, tubing etc., are detailed subsequently in this Section. It shall, however, be a firm principle of all fixing that the contact of dissimilar metals must be avoided.

| Nom (mm) | Steel Pipe (metres) | Copper Tube (metres) |
|----------|---------------------|----------------------|
| 12       | 1.80                | 0.90                 |
| 20 & 25  | 2.40                | 1.20                 |
| 30       | 2.70                | 1.50                 |
| 35       | 3.00                | 1.80                 |
| 50       | 3.00                | 2.10                 |

In all cases of multiple supports, for piping and tubing, where pipes of differing sizes are to be supported from a common point attached to the building structure, such common points shall be spaced at the intervals required for the smallest pipe concerned.

### 6.3 LTHW Heating

#### General

Where applicable the installation shall comply with BS COP 341, 300-307.

#### Pipework and Fittings

Maintenance joints shall be fitted in the pipe connections to all items of equipment, valves, etc., which are not provided with flanges or unions and, where necessary, in the pipework system to allow for easy erection and dismantling of the installation. Maintenance joints shall be positioned where they will be accessible on completion of the Contract.

Pipework shall not be jointed within the thickness of walls or floors and shall not be embedded in the building structure.

Ends of pipes shall be cleanly cut at right angles to the pipe axis and shall be reamed to remove burrs. Pipes shall be thoroughly cleaned before erection.

Pipework visible in rooms shall be assembled using pipe fittings. Other pipework shall incorporate formed bends wherever practical and economic.

#### Valves

Valves shall comply with the following British Standard Specifications for the temperature and pressure of the installations:

Valves of nominal sizes, 50mm and less shall have ends screwed to BS 21 Taper Thread.

#### Drain Cocks

Drain cocks shall be installed on all items of equipment and at all low points in the pipeline system and adjacent (within 250mm) to valves isolating sub-circuits to enable the whole, or sections of the system, to be drained down.

Drain cocks installed in the pipework system shall be of 15mm nominal size. The size of other drain cocks are specified with the equipment concerned.

### 6.4 Domestic Hot and Cold Water Services

#### General

Where applicable the installation shall comply with BS EN 806.

Pipework and Fittings (Within Buildings and Ducts)

Maintenance joints shall be fitted in the pipe connections to all items of equipment, valves, etc., which are not provided with flanges or unions and, where necessary, in the pipework system, to allow for easy erection and dismantling of the installation.

Maintenance joints shall be positioned where they will be accessible on completion of the Contract.

Pipework shall not be jointed within the thickness of walls or floors and shall not be embedded in the building structure without approval of the Contract Administrator.

Ends of pipes shall be cleanly cut at right angles to the pipe axis and shall be reamed to remove burrs. Pipes shall be thoroughly cleaned before erection.

### Valves

Valves shall comply with the following British Standard Specification for the temperature and pressure of the installation:

| Description                                  | British Standard |
|----------------------------------------------|------------------|
| Copper Alloy Stop Valves (Loose Jumper)      | BS 1010 Part 2   |
| Copper Alloy Wedge & Double Disc Gate Valves | BS 5154          |
| Copper Alloy Check Valves                    | BS 5154          |
| Back Flow Prevention Devices                 | BS 6282          |

Valves shall be installed in positions which permit easy access for operation and maintenance but shall not be installed where a leaking gland may drip on electrical equipment.

### Drain Cocks

Drain cocks shall be installed on all items of equipment and all low points in the pipeline system and adjacent (within 250mm) to valves isolating sub-circuits to enable the whole, or sections of the system, to be drained down.

Drain cocks installed in the pipework system shall be of 15mm nominal size. The sizes of other drain cocks are specified with the equipment concerned.

Drain cocks shall be copper alloy of the screwdown pattern to BS 2879. Each drain cock shall have inlet end screwed to BS 21 taper thread, ribbed outlet end suitable for hose attachment and Lockshield type head.

Drain cocks shall be fitted clear of pipe insulation and in positions allowing easy operation.

### Air Eliminators

Air eliminators shall be installed at all high points in the pipework system.

### Testing, Flushing and Chlorination

Hot and cold water installations shall be tested, flushed, chlorinated and proved strictly in accordance with the current British Standard EN 806 and the latest Model Water Byelaws.

## 6.5 Sanitary Plumbing

The drainage works included in this section comprise all above ground soil, waste and overflow pipework.

The point of termination of the contract is at the lowest floor level, where drainage system included under this Contract connect to drain sockets either are existing sockets or sockets left by others.

The installation shall be adequately protected against damage and deterioration and, when handed over, the installation shall be in a clean and sound condition. During the course of construction all open ends of pipework, drainage gullies, manholes etc. are to be sealed with temporary cover. The Contractor shall carry out regular checks to ensure that the covers are still effective.

All fittings shall be securely fixed and shall not be subject to movement when in everyday use.

The Contractor shall refer to the Architect's drawing for final positions of all sanitary fittings. All fittings to be true and even. The Contractor shall ensure that all installation is carried out in accordance with the relevant Codes of Practice and to Local Authority Byelaws.

All workmanship and labour shall be the best and the craftsman within the industry should have all the required and recognised qualifications.

Installation works shall be in accordance with the following British Standards and meet with the approval of the Local Authority Building Control Inspector.

Soil and waste above ground - BSCP 5572

Sanitary appliances - BSCP 6465 Drainage of roof and paved areas - BSCP 6367 **UPVC**

### **Pipework and Fittings**

Pipes and fittings and accessories for 50mm dia. and below shall be MUPVC to BS 5255 using solvent weld fittings, as "Terrain" or equal approved. Pipes, fittings and accessories for 75mm dia. and above shall be UPVC to BS 4514 using solvent weld or ring seal fittings as "Terrain" or equal approved.

Expansion joints shall be provided in accordance with manufacturer's instructions. Fixings shall be with UPVC fixing bracket as manufactured for use with the system

MUPVC pipework shall be fixed so as to allow adequate provision for thermal movement in the length of pipes.

Care is to be taken to ensure the gradient of waste pipes of UPVC conforms to the recommendations of BS 5572.

### **Access**

Where access is required to soil and waste fittings, the Contractor shall ensure that all access doors and rodding eyes are so positioned as to be accessible, particularly in connection with the positions of adjacent services. Before testing, all access doors pipe fittings shall be removed, inspected, the washer greased and then re-assembled by the Contractor.

No services shall be positioned as to block off access into a duct or false ceiling.

### **Sleeve and Fire Stopping**

Where any PVC soil, waste or rainwater pipes pass through a firebreak wall, floor or service duct, they must be fire-stopped with a sleeve of suitable material and the space between pipe and sleeve plugged with an intumescent compound.

### **Cast Iron Pipework and Fittings**

Pipes and fittings and accessories for 75mm and above shall be cast iron as manufactured by Saint-Gobain PAM UK "Ensign" system or equal approved.

Jointing shall be with one piece bolted ductile iron coupling incorporating electrical continuity clip.

All bends and tees shall be long radius.

Fixing brackets shall be ductile iron as manufactured for use with the system.

Vent pipes shall terminate with an approved connection to a ridge ventilation tile provided and fixed by others.

All cast iron pipes shall be cut square with a powered disc or wheel cutter.

Sain-Gobain PAM UK Ensign "EEZI-FIT" or time saver joints shall not be installed unless approved by the Contract Administrator.

### **Above Ground Soil and Vent**

Cast iron pipes and fittings

The systems shall be installed in accordance with BS EN 12056 code of practice for gravity drainage systems inside buildings and the relevant sections of the Building Regulations.

Soil and vent pipework of nominal diameters, 50mm to 600mm shall be installed using lightweight cast iron socketless pipe and fittings which fully comply with all requirements of product standard BS EN 877:1999 with kitemark third party approval.

Soil and vent pipework shall have been tested to BS EN 14366:2004 (Laboratory measurement of noise of waste water installations) by a recognized certified laboratory. The results to be made available for review if required.

Soil and vent pipework shall have a fire rating A2, s1,d0

Brackets

- d) Pipework shall be supported true to line by methods strictly in accordance with the manufacturers recommendations. Proprietary adjustable ductile iron hanging brackets such as EF048 or EF049 or EF048AD shall be used or brackets as recommended by the manufacturers standard guidelines.
- e) Soil, vent pipework shall be supported by acoustic brackets that ensure the pipework will not exceed 47db (A) airbourne noise and 11db (A) structure-borne noise at 4 l/s (litres per second), without insulation as recommended by the manufacturers standard guidelines.

Jointing

Standard Couplings

- f) Pipes and fittings up to 150mm diameter shall be jointed by couplings capable of withstanding up to 5bar (accidental static water pressure) when suitably restrained with support brackets. Pipes and fittings 200mm to 300mm diameter jointed by couplings capable of withstanding up to 3bar (accidental static water pressure) when suitably restrained with support brackets. Couplings shall have integral electrical continuity nibs. Coupling colour shall match the pipes and fittings.

#### Push-fit Couplings

- g) Pipes and fittings shall be jointed by push-fit couplings incorporating 2 EPDM gaskets. Meeting requirements of BS EN 877:1999. Coupling colour shall match the pipes and fittings.

#### High Pressure Couplings with Integral Grip

- h) Unrestrained pipes and fittings shall be jointed by couplings capable of withstanding 5bar (accidental static water pressure) as supplied by the manufacturer (these do not require restraining brackets).

#### Fittings

- i) Where required to connect to low level soil pipework passing through the floor slab, use long tail radius curve branches at 88 degrees (conforming to BS EN 12056-2:2000) to connect to 100mm soil and waste pipes where applicable, thereby avoiding a joint in the floor slab.
- j) Where possible all 88 degree branches shall be radius curve entry (conforming to BS EN 12056-2:2000).

Small diameter waste pipes in plastic or copper to be connected to the main soil pipework using either mechanical compression-fit or BSP threaded boss pipes, or push-fit manifolds with grommets or blank ends.

#### Cutting Pipes

- k) Where pipes are cut on site, ends shall be cut clean and square with all burrs removed. In most cases it is not necessary to re-coat the pipe ends with "touch-up paint". However, where there maybe aggressive materials passing through the drainage system (i.e., Coca-Cola, acid rain, acids or strong alkaline or similar substances), it is necessary to protect the cut ends of the pipework to the same standard as the internal coating of the pipe (as recommended by the manufacturer).

#### Coating

- l) Pipes shall be externally coated with an acrylic, anti-corrosion primer coating, red-brown in colour, average dry thickness of 40 microns. Internally coated with a two-part epoxy coating, ochre colour, with an average thickness of 130 microns.
- m) Fittings shall be protected internally with a red power epoxy resin electrostatically applied to an average thickness of 150 microns. Externally coated to an average thickness of 70 microns.
- n) Couplings/brackets shall be protected with a red powder epoxy resin applied to an average thickness of 70 microns.

#### References:

\*\*EN 13501-1 November 2002 Fire classification of construction products and building elements.

- o) Horizontal cast iron pipework shall be installed in accordance with the gradients identified with Building Regulations Part H item 2.34 Table 6 as below

Table 6 Recommended minimum gradients for foul drainage.

| Peak flow<br>(litres/sec) | Pipe size (mm) | Minimum gradient<br>(1 in...) | Maximum capacity<br>(litres/sec) |
|---------------------------|----------------|-------------------------------|----------------------------------|
| < 1                       | 75             | 1:40                          | 4.1                              |
|                           | 100            | 1:40                          | 9.2                              |
| > 1                       | 75             | 1:80                          | 2.8                              |
|                           | 100            | 1:80*                         | 6.3                              |
|                           | 150            | 1:150†                        | 15.0                             |

Notes:

\*Minimum of 1 WC

† Minimum of 5 WCs

From the cast iron passing through the ground floor slab on long radius bends, extend foul drainage to rise through floors above in cast iron with branch connections at each floor in copper or UPVC.

#### Installation General

The Contractor shall allow for the removal of existing plugs and sockets of underground drainage installed by others and connect to same with approved joints.

Special care shall be taken in order to prevent dirt and debris entering the open ends of pipes during installation.

Vertical pipework shall be installed plumb within the builder's ducts.

Horizontal pipes shall be installed to falls either gravitating to drains or rising as vent pipes. All falls shall be in accordance with BS Code of Practice 5572.

#### Testing

Sanitary fittings and pipework shall be inspected and tested.

All internal soil waste and ventilating pipes shall be subject to an air test as work proceeds.

#### Record of Tests

Complete records shall be kept of all tests made on the lengths of soil, waste and ventilation pipe. Records shall include detail of stack numbers, lengths and results of tests

#### Independent Final Test

Independent tests during installations and final tests of the whole of the work in this section will be applied by officers of the Local Authority. The fact that any part of the work has been passed by test will not relieve the Contractor of any of his obligations and any defect shown in the independent final test. Any faults appearing during the period of maintenance shall be located and made good at the Contractor's expense.

#### Sanitary Fitting Schedule

Refer to Main Contract documents.

## **7.0 MECHANICAL SERVICES SCOPE OF WORKS**

### **7.1 Project Description**

Demolition of the existing site has already been carried out for a clear site. New Construction to form 8 No. newly constructed residential properties.

The new residential properties will be formed over three floor levels, ground, first and second floor level respectively. The new properties shall consist of 6no. 2 bed Flats, 1no. 2 bed House and 1no. 4 bed House.

Access to the residential units will be from the newly formed communal main entrance area at ground floor level serving each of the floor levels via a common staircase area. Mechanical and electrical risers are located at each floor level for main distribution of the respective services systems.

Landlord's bin store facilities are located at ground floor level, adjacent to the main entrance to the Flats. A bike store is located at the rear of the building containing the flats.

### **7.2 Mechanical Engineering Services Contract Scope of Works**

The Contractors Tender shall include their Costs to achieve a fully operational residential housing units providing the mechanical engineering services installation as described in this document and outlined on the Tender drawings and be capable of meeting all of the Contract specification requirements.

All of the engineering services installation work to include

- a) The co-ordination of services routing and positioning with other services, structural design and architectural finishes
- b) Termination locations
- c) Establishing system plant capacities/capabilities
- d) Agreement with the Contract Administrator/Architect/Services Consultant Engineer on all aspects of installation proposals prior to installation.

#### **Scope of Works**

The works shall generally include all items as detailed within the Tender drawings and Specification documents.

If in the opinion of the Contractor there is any item of one document, which appears at conflict with another, then this is to be brought to the attention of the Contract Administrator.

Should the Contractor not be in possession of the full contents of any of the Client's specification documents he should contact the Client immediately as any claims for lack of knowledge at a later date will not be accepted.

This section sets out the requirements of the required installation but does not relieve the Contractor of his responsibilities for all or any part of the services to achieve the necessary installation from the design intent expressed.

The Contractor shall be inclusive of: -

- a) the preparation and issue of all detailed Builderswork Schedules or Sketches
- b) the preparation and issue of all necessary schedules
- c) the procurement of all equipment and material
- d) the supply, delivery, positioning and fixing of all necessary equipment and plant
- e) liaison and co-ordination with all other trades

- f) the preparation and issue of all co-ordination drawings
- g) the attendance for Testing & Commissioning
- h) the provision of Operation & Maintenance Manuals and Record drawings for each residential property
- i) the supply of spare parts and special tools for each residential property systems
- j) the training of Client's representatives
- k) providing, in accordance with the details outlined in this specification, a completely functional system, full adjusted and ready for use by the Client

The Contractor shall therefore: -

- a) Procure, supply, install, commission and set to work all systems described within this document
- b) Allow all necessary costs, equipment and installation procedures, etc., to provide a safe, efficient and quality installation to the approval of the Client.

Assessment of installation requirements within the residential properties will require full interpretation by the Contractor during the tender period, taking into account the structure of the building and its subsequent effect for services routes together with secondary supports.

### 7.3 Mechanical Engineering Services and Associated Electrical Works to be Provided

Project Works to include the installation of the following mechanical engineering services.

#### Public Utility Connections

All existing Utilities serving the site, have been disconnected and removed to allow demolition of the existing building. Any works associated with the demolition and clearing of the site do not form part of this contract. (subject to confirmation from the Client / Contract Administrator).

The Contractor prior to commencement of any new works shall carry a detailed electronic scan of the whole site to locate any unknown utilities. The Contractor from the scan shall locate and identify location and depth of any unknown services upon a drawing and issue to the Contract Administrator.

### 7.4 Towns Cold Water Main

#### Existing Water Mains

It has been assumed that the existing water supply has been removed by the Demolition Contractor. Subject to confirmation from the Contract Administrator.

#### New Water Main Infrastructure

Each residential unit to be provided with a direct cold water main supply.

Each residential unit and Landlords areas to be individually metered for water consumption as provided through Thames Water.

The new incoming cold water mains infrastructure shall be made into the Thames Water infrastructure water mains, within Trulock Road by Thames Water. The Contractor shall connect to the water main and distribute throughout the site accordingly.

The Contractor is fully responsible for organizing, programming and executing the Public Utilities works associated with the cold water mains associated with Thames Water including updating or revising the quotations included with the Main Contract documents.

Public Utility quotations shall be obtained in the successful Contractor's name and details. For the Thames Water quotation, refer to main contract documentation.

Thames Water no longer offer a 7 day logger water pressure test installation on their existing water mains. Therefore the Contractor shall be responsible for pressure testing the water services onto site to determine if suitable water pressure is available to all floor levels.

The Contractor shall issue their findings to the Contract Administrator for further instruction.

Based upon the measured results provided by the main Contractor, instruction shall be given regarding requirement for central storage and boosting.

Provide and install a Landlord's water supply and meter. Landlords water supply to be through a Cat 5 cold water booster pump set and terminate with a hose union bib with integral double check valve and isolating valve.

Any new rising cold water mains installed within unheated areas and at risk of freezing, shall be provided with electric trace heating and thermal insulation to protect pipework.

### **Pipework**

For the purpose of the Tender the Contractor shall include for all new cold water main buried pipework to be Barrier protected pipework. If the Contractor determines the site is not contaminated and with agreement of Thames Water, the Contractor can install MDPE (blue).

## **7.5 Works to be Provided within each of the Residential Units**

From new meters on incoming town mains water supplies extend individual services into each Residential unit.

Cold water supplies to be provided to basins, sinks, W.C's, baths, showers, external taps and appliances with mains cold water supply to cylinders.

Domestic hot water within each House to be generated by Hot Water Cylinder via Air Source Heat Pump.

Domestic hot water within each Flat to be generated via Direct Hot Water Cylinders.

### **Water**

Each residential unit to be provided with a mains water supply

Each residential unit to be individually metered for water consumption. Each residential unit to include anti-scale device

The cold water main supply shall be extended through ceiling voids to serve all terminal fittings (W.C's, whb's, sinks, washing machines, external taps) and the hot water cylinder.

### **Domestic Hot Water**

Each **House** shall be provided with hot water from the pre-plumbed unvented water heater in conjunction with the Air Source Heat Pump. Each **Flat** shall be provided with hot water from the direct fed unvented water heater.

The cylinders shall be controlled from the central programmer.

The domestic hot water shall be distributed to the following:

- a) individual showers (max. 38°C outlet temperature)
- b) bath mixer (max. 38°C outlet temperature)
- c) Wash hand basins
- d) kitchen sink
- e) washing machine

Provide Thermostatic Mixing Valves to Baths/showers limited to 38°C in compliance with Building Regulations.

### **Ventilation**

The residential units shall be designed to comply with the Building Regulations Part F for continuous local extract System 3.

Local extract mechanical ventilation to be provided to internal bathrooms and Kitchens continuous operation with boost facilities.

Extract fans to bathrooms and en-suites, to be through the wall type models or ducted to roof integrated terminals.

Kitchens shall be provided with a continuous operating through the wall extract fan positioned close as practical to the cooker.

## **7.6 Town Mains Cold Water Installation**

The Contractor shall be fully responsible for liaising with Thames Water to ensure the cold water installation and is in full compliance with Thames Water's requirements and standards.

Town mains cold water supplies to be provided with isolation valves at meter location and entry into each residential property.

Each direct mains cold water supply to be provided to basins/baths/showers/W.C's, sinks, appliances and feed to hot water cylinders.

Landlords cold water supply to be provided to Communal Bin Store Watering Point via Cat 5 Break tank.

All fitting supply connections to be provided with service valves, main branches with isolation valves and line drain cocks.

Upon the incoming cold water main(s) to the residential the Contractor shall supply and install an anti-scale device as manufactured by Scalebuster, Sentinel, Liff Industries, Water King or equivalent. Anti-scale device to be submitted to Contract Administrator for approval prior to installation.

## **7.7 Heating System to Residential Units**

Each House and Flat shall be provided with Air Source Heat Pump (ASHP) installation to provide a low temperature hot water supply, providing heating and hot water load of the Building.

Installation to include a packaged heat pump units to be installed external to the building within the ground floor garden area fixed to concrete slab. The ASHP shall be mounted upon Big Foot supports with condensate tray discharge to local soakaway.

The refrigeration pipework shall be insulated, protected and buried to a depth as per manufacturer's recommendation.

Heat pump system primary and secondary circulation systems to include "fill" and expansion provision. Provide water treatment (glycol) as recommended by the ASHP manufacturer. Water quality and quantity shall be as per manufacturers installation requirements.

The LTHW from the ASHP shall require expansion vessel and correctly selected safety valve. Both to be installed as ASHP's manufacturer's recommendations.

The ASHP's shall also be connected to a pre plumbed indirect unvented hot water cylinder. The domestic hot water generation takes priority over heating demand via integral manufacturer's controls.

The Contractor is fully responsible for the installation including pump arrangements and shall include for all equipment to manufacturers recommendations, etc.

Distribution pipework to radiators shall be via the floor and ceiling voids. Distribution pipework will be generally concealed within ceiling voids, or pipework boxing / enclosures.

Radiators to be of the plain fronted pressed steel type with chromium plated adjustable Thermostatic Radiator Valve local control and lockshield valve.

Upon completion of works, all new heating systems shall be fully flushed out to remove debris, etc. and treated with the ASHP manufacturer's recommended water treatment.

Each House shall be provided with an electronic heating programmer to provide automatic control to meet the requirements of Part L of the Building Regulations.

Copper pipework safety valve discharge pipes or condensate drains from pre-plumbed cylinder shall discharge via an approved WRAS tundish and self-sealing trap arrangement into the SVP.

All plant and systems to be provided with automatic control and safety systems to maintain economic and efficient operation in compliance with Part L Building Regulations.

The Contractor must supply and install all ancillaries e.g. room thermostats, etc. for a complete controls installation.

Electric Towel Rails within Bathrooms to be fitted with a length of flexible cable for connection to the fixed wiring of the premises through a suitable connection and isolator box positioned adjacent to the heater.

The supply circuit to each heater must incorporate a double pole isolating switch having a contact separation of at least 3mm.

Contractor shall supply and install Electric Panel Heaters to **Landlords** stair core areas to be wall mounted within close proximity of power fused spur outlets to allow connections. Fused spur must be accessible following installation as indicated and scheduled on the Brontide Mechanical Tender drawings.

## 7.8 Internal Cold Water Main to Residential Units

From cold water main supplies make connections to serve terminal fittings within each dwelling consisting of WC cisterns, wash hand basins, showers, baths, sinks, washing machine, dishwasher, external tap, etc.

Extend cold water main to serve Hot Water Cylinder. The Contractor shall provide and install all necessary ancillaries including WRAS approved unvented kits with safety valves, expansion vessels, etc. and be installed in accordance with manufacturer's recommendations when connecting to combination boilers.

Cold water main shall be generally distributed through each residential unit within the new ceiling void and shall have thermal insulation applied.

The Contractors attention is drawn to the Water Regulations. The Contractor shall arrange with Thames Water to:

- a) Submit his working drawings and materials schedule to Thames Water for comment and approval prior to commencement on site, and if requested by Thames Water, meet with their representatives on site.
- b) Thames Water to inspect the completed installation. Any defects found by Thames Water to be actioned and rectified by the Contractor(s) at no expense or variation claim.

## 7.9 Domestic Hot Water Services

Each property shall be provided with pre-plumbed cylinder specifically designed to be installed in conjunction with the Air Source Heat Pump complete with FTC4 control centre. Each cylinder shall also come complete with 1no. 3Kw immersion heater.

The Contractor shall also supply and install additional components including but not limited to: Fix it foot, Antifreeze, Wireless Remote Controller transmitter and receiver etc.

The system shall operate on a hot water priority basis with pipework configuration that of a standard S-plan layout.

The contractor shall commission the cylinder based upon a typical and predictable hot water demand with a timed schedule. This can be adjusted to an 'auto reheat' by the tenant as required.

House 7 to include Hot Water return circulation pump: Grundfos Comfort with Integral Timer. Secondary hot water pipework from the pre-plumbed cylinder shall be kept to minimum pipework lengths to ensure rapid hot water through put to terminal fittings.

For each individual hot water cylinder the Contractor shall supply and install a domestic hot water controller/programmer, together with all associated wiring and accessories for a complete installation.

Each hot water cylinder Heater provided with integral thermal insulation.

For each unvented **Hot Water Cylinder**, shall be installed complete with WRAS Approved Unvented Control Kit including but not limited to; Expansion vessel, safety valve, non-return valve. Safety valve to discharge into tundish and self sealing trap (WRAS Approved) high temperature arrangement as manufactured by Hepworth or equivalent.

Unvented hot water systems must be installed by a 'competent person' as defined in approved document G3 of the Building Regulations.

This person must be registered as a UDHWS (Unvented Hot Water Storage Systems) installer.

It is also a requirement that the person who intends to carry out the installation or make a material change to an existing installation shall:

- a) Give notice of the work to be carried out to the Local Water Authority
- b) Deposit plans with the local authority

It is a criminal offence to install and unvented hot water system without notifying the Local Authority; the unit or package must be installed fully in accordance with the Local Authority Regulations.

To ensure optimum performance of the DHW system the available dynamic water pressure at the inlet to the unit must be a minimum of 1.5 Bar.

Each property shall be provided with a shower as scheduled in the Architects/Contract Administrator's sanitarywareschedule. Provide hot and cold water services to concealed shower mixer valve.

Provide Thermostatic Mixing Valves to Baths limited to 38°C and in accordance with Building Regulations Part G

## 7.10 Thermal Insulation

Thermal insulation to be provided to:

- a) All pipework in ceiling /roof void/risers/plant rooms/enclosures/boxings/etc.
- b) All domestic hot water pipework and cold water main
- c) Pipework within stores/cupboards.
- d) All foul drainage within boxings, encasements, roof / ceiling voids, etc.
- e) Acoustic insulation to be applied to all SVP's vertical and horizontal. All sections of an SVP including those which do not pass through other rooms e.g. ground floor stub stacks, should be fully soundproofed in accordance with the details shown in NHBC Standards clause 8.1 – S8 (c).

The acoustic wrap to the drainage to be as manufactured Karma Acoustic solutions or equivalent

Wrap tightly around the pipe, and seal with the self-adhesive fixing tapes to prevent the risk of the fibre padding slumping to the bottom of the pipe.

Where 2 lengths of Karma Acoustic Pipe Wrap meet, overlap the lengths by 30mm so that noise will not escape through any gaps.

Seal any voids or gaps in the masonry or timber construction around the pipe with flexible acoustic sealant, as noise will pass through any gaps

To the requirements of BS5422, BS5449, BS EN 808 and Building Regulations. All insulation used for pipework must have a thermal conductivity not exceeding 0.4W/m<sup>2</sup>k at 20°C.

## 7.11 Mechanical Services Automatic Control Systems

### General

All electrical power cabling to items of mechanical plant will be carried out by the Electrical Contractor. The Mechanical Contractor is responsible for providing wiring diagrams and electrical loadings of mechanical plant, including control panel wiring to the Electrical Contractor. All automatic controls wiring to be carried out by the Contractor.

Each individual property shall be provided with a programmer/controller shall be installed and shall consist of but not limited to: -

- a) Multiple adjustable time programmer for operation for LTHW heating and hot water.
- b) An appropriate wiring junction box.
- c) Master control thermostat (if not integrated with programmer)
- d) Primary pumped (single head) circulation.

All plant and systems to be provided with automatic control and safety systems to maintain economic and efficient operation in compliance with Part L Building Regulations.

ASHP plant controls to be as provided by unit manufacturer with additional interlock control of circulating pumps, alarm lockout, frost control and time schedule of control with local external override.

Controls for ASHP, associated circulating pumps to be incorporated within a central controller.

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**7.12 General Extract Ventilation to Residential Units**

The residential units shall be designed to comply with the Building Regulations Part F for continuous local extract System 3.

Local extract mechanical ventilation to be provided to internal bathrooms and Kitchens continuous operation with boost facilities.

Mechanical extract ventilation shall be provided to the bathrooms providing constant trickle ventilation and activation to boost shall be controlled via the light switch or infra-red detector and incorporate a run-on timer before returning to constant trickle ventilation.

Extract fans to bathrooms to be through the wall type models or ducted to wall or roof integrated terminals.

The preferred colour of external wall and roof terminals to be agreed with the Contract Administrator prior to ordering.

Kitchens shall be provided with a continuous operating through the wall extract fan positioned close as practical to the cooker.

Recirculation Cooker Hoods above Kitchen Hobs to be provided by others.

**7.13 Soil/Waste Drainage Installations**

Extend from floor sockets provided by others, rising Soil and Vent Pipes (SVP's). SVP's to rise internally.

Contract Works shall include the extension of soil vent pipes from the ground to roof. SVP's soil/waste drainage pipework from sanitary fittings, sinks, washing machines, etc., including venting of systems.

The final SVP locations to be agreed with the Contract Administrator.

All drainage connections to sanitary fittings, to be provided with deep seal anti-vacuum traps and service access points.

Where required install air admittance valves on Main soil stacks and excessive length branch connections, all in accordance with Building Regulations and manufacturers recommendations.

The Contract works shall include the handling, positioning and installation of "Free Issue" sanitary fittings as scheduled within Architects specification / schedule.

Fixing of sanitary fittings shall include installation of water taps, plugs, cisterns flush pipe overflows, shower trays, WC, pans and seats, urinals, sinks, wash basins all including bracketry.

All exposed waste pipes wash hand basins, etc., including the trap and connecting pipework shall be chromium plated.

Acoustic insulation to be applied to all SVP's vertical and horizontal. Acoustic insulation to be applied to all SVP's vertical and horizontal. All sections of an SVP including those which do not pass through other rooms e.g. ground floor stub stacks, should be fully soundproofed in accordance with the details shown in NHBC Standards clause 8.1 – S8 (c).

Surface and Rainwater systems provided by others.

All soil and waste drainage to be in compliance with Building Regulations Part H.

All SVP's installed within the undercroft of the car park / vehicle entrance shall be black cast iron pipework.

**Sanitary Fittings**

The Contract Works shall include the handling, positioning and installation of "free issue" sanitary fittings as Scheduled within Architects specification.

Fixing of sanitary fittings shall include installation of water taps, plugs, overflows, sinks, wash basins all including bracketry.

All brassware and terminal fittings shall be of the low pressure type due to available water pressure.

#### **7.14 Condensate Drain and Safety Valve Discharge Pipes**

Copper pipework safety valve discharge pipes or condensate drains from Hot Water Cylinders shall discharge via an approved WRAS tundish and self-sealing trap arrangement into the SVP

Contractor shall include for all brackets, fittings, cleaning eyes, etc., for condensate/safety valve discharge pipes.

#### **7.15 Mechanical Services Support Systems**

The Mechanical Contractor shall provide all necessary support facilities for his installation, including unistrut or equal approved type of support bracketry, spaced at regular intervals to satisfy the support centres for pipework etc.

The Tenderer shall familiarise himself with the details of construction methods for the building, to ensure compatible provision of support systems.

#### **7.16 Electrical Services**

The mechanical services Contractor shall be responsible but not limited to the following:

- a) Field/power control system wiring from Air Source Heat Pump.
- b) Field/power control system wiring from Hot Water Cylinders.
- c) Field/power control system wiring from Electric Panel Heaters
- d) Field/power control system wiring from Electric Towel Rails
- e) Field/power control wiring from ventilation systems
- f) Field/power control wiring from the heating programmer

The electrical services Contractor shall be responsible for:

- a) Power feed to isolator for Air Source Heat Pump
- b) Power feed to isolator Hot Water Cylinders
- c) Power feed to isolator Electric Panel Heaters
- d) Power feed to isolator for all the heating programmer
- e) Power feed to isolator to ventilation systems
- f) Power Feed to electric towel rail in bathrooms.

#### **7.17 General**

##### **Pipework & Fittings**

Pipework shall be arranged such that it is self-venting or will be fitted with non-hygroscopic automatic air vents at all high points. Drain cocks will be provided at all low points to ensure that the system can be fully drained.

All pipework is to be adequately clipped to provide a secure and neat installation. Maximum spacing for fixing of central heating system copper pipework are given in Table 7 of BS5449. Maximum spacing for a variety of materials for use in water systems is given in Table 14 BS6700.

With plastic pipework fixing distances will be as per the manufacturer's recommendations.

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**Insulation**

Thermal insulation where required, shall be installed fully in accordance with the manufacturer's instructions. The insulation shall be securely fixed to the insulated pipework using a recognised fixing method (i.e., heat resistant tape) at regular fixing centres to avoid sagging.

Where insulated pipework passes through elements of the building structure wall sleeves or other suitable protection shall be provided to stop the insulation being damaged during natural pipework movement owing to expansion and contraction.

**Commissioning**

The hot and cold water systems shall be flushed, sterilised and performance tested in accordance with the requirements of EN806.

**Electrical Works**

All electrical work shall conform to the current edition of the IEE wiring regulations.

The electrical contractor shall provide suitably sized fused spur(s) in accordance with manufacturer's requirements and controls wiring fully in accordance with manufacturers guidelines and wiring diagrams.

Earth bonding shall be carried out fully in accordance with the current edition of the IEE wiring regulations and BS7430.

**Pipework**

The pipework shall be adequately supported throughout with non-ferrous supports, brackets, or clips. The routing and supporting of pipes shall take into account, thermal movement and correct grading to permit both air venting and drainage.

Adequate drain down points shall be provided to permit the complete drainage of the system.

In the case of domestic hot and cold water systems all valves and fittings shall be suitable for an 'unvented system' and shall be of copper or gunmetal construction and have the approval of the Water Supply Company. The installation shall be in accordance with the Water Supply Regulations (1999) issued by the Department of the Environment. The services shall be installed to achieve adequate water discharge at all draw-off points.

Domestic hot water pipework systems shall be provided with either a pumped circulation return or with electric trace heating to ensure design temperatures are achieved at draw off points within 30 seconds. Design temperature is 50° C for systems without thermostatic blending valves at point of use and where thermostatic blending valves are installed the design temperature shall be the set point of the valve. Long dead legs at final connections to sanitaryware and appliances shall be avoided unless provided with electric trace heating.

All pipework to be suitable for sealed and unvented pressurised systems.

The system must be installed with room and water temperature controls in accordance with the current Building Regulations Parts L1 (Energy – Dwellings) and L2 (Energy – Non Dwellings) for England and Wales.

**Pressure Testing**

Pipework system should be pressure tested in accordance with BS EN806-4:2010 or Water Regulation 1999, using potable cold water before the system is operational. The test should be 10 bar or 1.5 times the maximum pressure rating of the lowest rated component in the system for 30 minutes. The pressure should then be dropped to 0.5 times the operating pressure and tested over 90 minutes visually checking for leaks.

**Corrosion Inhibitors**

Contractor to ensure all corrosion inhibitors added to systems are compatible with both the gas fired boiler and the selected installed pipework material.

**Disinfecting**

The system should be disinfected after installation and pressure tested in accordance with the procedure in BS EN 806-4:2010.

In the case of domestic hot and cold water systems all valves and fittings shall be suitable for a closed system and shall be of copper or gunmetal construction and have the approval of the Water Supply Company. The installation shall be in accordance with the Latest Water Supply Regulations. The services shall be installed to achieve adequate water discharge at all draw-offpoints.

**Acoustic and Vibration protection.**

Provide all necessary sound attenuation and vibration isolation to ensure that the design criteria is met and external noise levels do not exceed the criteria set by the Local Authority, Environmental Health Officer, and relevant design guidelines and legislation.

The Contractor must refer to all Architect detailing incorporating acoustic properties or robust details. All services penetrations or fixings must not nullify the acoustic integrity of the building structure and separation between residential units.

All necessary acoustic protection to the fabric, i.e., walls, floors, roof, louvres, etc., shall be provided to reduce break out sound levels to the defined acceptable minimum.

Acoustic protection shall include but not be limited to:

- Atmospheric attenuation
- In-duct primary attenuation Cross talk attenuation
- Anti-vibration mountings/inertia bases.
- Duct and pipe flexible connections

It is the Contractor's responsibility to ensure all acoustic criteria is satisfied.

**SCHEDULE ONE**

The Tender will be based strictly on the specified manufacturers, suppliers and specialist contractors as detailed in this Schedule. However, if any savings can be made by including alternative suppliers and manufacturer's equipment, of similar quality, the appointed Contractor maybe invited to offer such savings, complete with full details of the alternative equipment.

Where alternative equipment is offered later, the cost element quoted will include the cost of any alterations or modifications to specified equipment.

Wherever possible the Tenderer is to include for the supply and installation of equipment and materials produced by companies manufacturing them in the United Kingdom.

The plant specified shall be as manufactured by the following list of approved companies to quality and technical standards specified herein, or equal and approved.

- |     |                                       |                                                                       |
|-----|---------------------------------------|-----------------------------------------------------------------------|
| 1)  | Air Source Heat Pump:                 | Mitsubishi Electric, Daikin                                           |
| 2)  | Domestic Ventilation Fans:            | Vent Axia, Nu-aire, Greenwood Airvac, Vortice (suitable for System 3) |
| 3)  | Domestic Valves:                      |                                                                       |
|     | Domestic Water Services:              | Pegler "Ballofix" type valve                                          |
| 4)  | Hot Water Cylinder:                   | Heatrae Sadia Megaflo, Ariston                                        |
| 5)  | Circulating Pumps:                    | Grundfos                                                              |
| 6)  | Shower Mixing Valves:                 | Refer to Architects Schedules                                         |
| 7)  | Showers and Brassware:                | Refer to Architects Schedules                                         |
| 8)  | Dry Riser Cabinets and Accessories:   | Landon Kingsway                                                       |
| 9)  | Cooker Hood:                          | Refer to Architects Schedules                                         |
| 10) | Scale Inhibitor:                      | Liff Lime Beater                                                      |
| 11) | Ensuite/Bathroom Towel Rails:         | Not Applicable                                                        |
| 12) | Underfloor Heating                    | Not Applicable.                                                       |
| 13) | Radiators                             | Stelrad, Jaga, Myson                                                  |
| 14) | Cold Water Booster Pump:              | Not Applicable                                                        |
| 15) | Thermostatic Radiator Valves:         | Drayton TRV4 with matching chromium plated return Lockshield valves.  |
| 16) | Residential Programmers/ Controllers: | Honeywell, Drayton,                                                   |
| 17) | Underfloor heating Roomstats:         | Not Applicable                                                        |
| 18) | Blending Valves                       | TM2 Scheme approved.                                                  |

**APPENDIX ONE - ANALYSIS OF TENDER SUM****TO FORM OF TENDER**

| Item | Description of Work                                                                             | Labour £ | Materials £ |
|------|-------------------------------------------------------------------------------------------------|----------|-------------|
| 1.   | Provide an electronic scan of the site to identify any unknown public utilities. Issue drawing. | £        | £           |
|      |                                                                                                 |          |             |
|      | <b>Flat No 1</b>                                                                                |          |             |
| 2.   | Air Source Heat Pump incl. cylinder installation                                                | £        | £           |
| 3.   | Radiator Heating Installation                                                                   | £        | £           |
| 4.   | Domestic hot and mains cold water installation                                                  | £        | £           |
| 5.   | Soil/waste drainage installation including fixing of sanitaryware                               | £        | £           |
| 6.   | Extract ventilation installation                                                                | £        | £           |
| 7.   | Thermal insulation applied to mechanical engineering services                                   | £        | £           |
| 8.   | System controls and wiring                                                                      | £        | £           |
| 9.   | Testing/commissioning and provision of O&M Manuals & "As Fitted" drawings                       | £        | £           |
|      | <b>Total for Flat No 1</b>                                                                      | <b>£</b> | <b>£</b>    |
|      |                                                                                                 |          |             |
|      | <b>Flat No 2</b>                                                                                |          |             |
| 10.  | Air Source Heat Pump incl. cylinder installation                                                | £        | £           |
| 11.  | Radiator Heating Installation                                                                   | £        | £           |
| 12.  | Domestic hot and mains cold water installation                                                  | £        | £           |
| 13.  | Soil/waste drainage installation including fixing of sanitaryware                               | £        | £           |
| 14.  | Extract ventilation installation                                                                | £        | £           |
| 15.  | Thermal insulation applied to mechanical engineering services                                   | £        | £           |
| 16.  | System controls and wiring                                                                      | £        | £           |
| 17.  | Testing/commissioning and provision of O&M Manuals & "As Fitted" drawings                       | £        | £           |
|      | <b>Total for Flat No 2</b>                                                                      | <b>£</b> | <b>£</b>    |

|     |                                                                           |          |          |
|-----|---------------------------------------------------------------------------|----------|----------|
|     |                                                                           |          |          |
|     | <b>Flat No 3</b>                                                          |          |          |
| 18. | Air Source Heat Pump incl. cylinder installation                          | £        | £        |
| 19. | Radiator Heating Installation                                             | £        | £        |
| 20. | Domestic hot and mains cold water installation                            | £        | £        |
| 21. | Soil/waste drainage installation including fixing of sanitaryware         | £        | £        |
| 22. | Extract ventilation installation                                          | £        | £        |
| 23. | Thermal insulation applied to mechanical engineering services             | £        | £        |
| 24. | System controls and wiring                                                | £        | £        |
| 25. | Testing/commissioning and provision of O&M Manuals & "As Fitted" drawings | £        | £        |
|     | <b>Total for Flat No 3</b>                                                | <b>£</b> | <b>£</b> |
|     |                                                                           |          |          |
|     | <b>Flat No 4</b>                                                          |          |          |
| 26. | Air Source Heat Pump incl. cylinder installation                          | £        | £        |
| 27. | Radiator Heating Installation                                             | £        | £        |
| 28. | Domestic hot and mains cold water installation                            | £        | £        |
| 29. | Soil/waste drainage installation including fixing of sanitaryware         | £        | £        |
| 30. | Extract ventilation installation                                          | £        | £        |
| 31. | Thermal insulation applied to mechanical engineering services             | £        | £        |
| 32. | System controls and wiring                                                | £        | £        |
| 33. | Testing/commissioning and provision of O&M Manuals & "As Fitted" drawings | £        | £        |
|     | <b>Total for Flat No 4</b>                                                | <b>£</b> | <b>£</b> |
|     |                                                                           |          |          |
|     | <b>Flat No 5</b>                                                          |          |          |
| 34. | Air Source Heat Pump incl. cylinder installation                          | £        | £        |
| 35. | Radiator Heating Installation                                             | £        | £        |
| 36. | Domestic hot and mains cold water installation                            | £        | £        |
| 37. | Soil/waste drainage installation including fixing of                      | £        | £        |

|     |                                                                           |          |          |
|-----|---------------------------------------------------------------------------|----------|----------|
|     | sanitaryware                                                              |          |          |
| 38. | Extract ventilation installation                                          | £        | £        |
| 39. | Thermal insulation applied to mechanical engineering services             | £        | £        |
| 40. | System controls and wiring                                                | £        | £        |
| 41. | Testing/commissioning and provision of O&M Manuals & "As Fitted" drawings | £        | £        |
|     | <b>Total for Flat No 5</b>                                                | <b>£</b> | <b>£</b> |
|     |                                                                           |          |          |
|     | <b>Flat No 6</b>                                                          |          |          |
| 42. | Air Source Heat Pump incl. cylinder installation                          | £        | £        |
| 43. | Radiator Heating Installation Incl. pipework                              | £        | £        |
| 44. | Domestic hot and mains cold water installation                            | £        | £        |
| 45. |                                                                           |          |          |
| 46. | Soil/waste drainage installation including fixing of sanitaryware         | £        | £        |
| 47. | Extract ventilation installation                                          | £        | £        |
| 48. | Thermal insulation applied to mechanical engineering services             | £        | £        |
| 49. | System controls and wiring                                                | £        | £        |
| 50. | Testing/commissioning and provision of O&M Manuals & "As Fitted" drawings | £        | £        |
|     | <b>Total for Flat No 6</b>                                                | <b>£</b> | <b>£</b> |
|     |                                                                           |          |          |
|     | <b>House No 7</b>                                                         |          |          |
| 51. | Air Source Heat Pump incl. cylinder installation                          | £        | £        |
| 52. | Radiator Heating Installation                                             | £        | £        |
| 53. | Domestic hot and mains cold water installation                            | £        | £        |
| 54. | Soil/waste drainage installation including fixing of sanitaryware         | £        | £        |
| 55. | Extract ventilation installation                                          | £        | £        |
| 56. | Thermal insulation applied to mechanical engineering services             | £        | £        |
| 57. | System controls and wiring                                                | £        | £        |

|     |                                                                                                                                                    |          |          |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------|
| 58. | Testing/commissioning and provision of O&M Manuals & "As Fitted" drawings                                                                          | £        | £        |
|     | <b>Total for House No. 7</b>                                                                                                                       | <b>£</b> | <b>£</b> |
|     |                                                                                                                                                    |          |          |
|     | <b>House No 8</b>                                                                                                                                  |          |          |
| 59. | Air Source Heat Pump incl. cylinder installation                                                                                                   | £        | £        |
| 60. | Radiator Heating Installation                                                                                                                      | £        | £        |
| 61. | Electric Towel Rail Installation                                                                                                                   | £        | £        |
| 62. | Domestic hot and mains cold water installation                                                                                                     | £        | £        |
| 63. | Soil/waste drainage installation including fixing of sanitaryware                                                                                  | £        | £        |
| 64. | Extract ventilation installation                                                                                                                   | £        | £        |
| 65. | Thermal insulation applied to mechanical engineering services                                                                                      | £        | £        |
| 66. | System controls and wiring                                                                                                                         | £        | £        |
| 67. | Testing/commissioning and provision of O&M Manuals & "As Fitted" drawings                                                                          | £        | £        |
|     | <b>Total for House No. 8</b>                                                                                                                       | <b>£</b> | <b>£</b> |
|     |                                                                                                                                                    |          |          |
| 68. | Distribution cold water mains into each individual Residential Units from the new water meter installation including excavation and reinstatement. | £        | £        |
| 69. | Landlords distribution cold water mains into bin store including Cat 5 break tank                                                                  | £        | £        |
| 70. | Landlords Electric Panel Heater installation                                                                                                       | £        | £        |
| 71. | Any others not listed above.....<br>.....<br>.....<br>.....<br>.....<br>.....                                                                      | £        | £        |
|     |                                                                                                                                                    |          |          |
|     | <b>Mechanical Services Sub Total</b>                                                                                                               | <b>£</b> | <b>£</b> |
|     | <b>Provisional sums</b>                                                                                                                            |          |          |

|     |                                                                                                                                                                                                                                      |  |            |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|------------|
| 72. | For the possible supply of additional cold water main boosting, should it be determined that the cold water main connections provided by Thames Water have insufficient water flow and pressure to serve upper level flats / houses. |  | £ 5,000.00 |
|     |                                                                                                                                                                                                                                      |  |            |
|     |                                                                                                                                                                                                                                      |  |            |
|     | <b>Tender Total for Mechanical Services Carried Forward to Form of Tender</b>                                                                                                                                                        |  | £          |

SIGNED.....

FOR AND ON BEHALF OF .....

ADDRESS.....

DATE.....

**APPENDIX TWO – PROGRAMME QUESTIONNAIRE****TO BE COMPLETED BY THE TENDERER**

The periods required

For submission of any further sub-contractors drawings, etc., (co-ordination, installation, shop or builders work or other as appropriate)

\_\_\_\_\_ Weeks from receipt of all necessary information

For execution of any Sub-Contractor works off site

\_\_\_\_\_ Weeks from approval of drawings or establishment of site – dimensions as appropriate

For notice to commence works on site

\_\_\_\_\_ Weeks

For execution of Sub-Contract Work on-site

\_\_\_\_\_ Weeks from the date stated in the notice under (3) above

SIGNED.....

FOR AND ON BEHALF OF.....

ADDRESS.....

DATE.....

**APPENDIX THREE - ALTERNATIVES TO SPECIFIED EQUIPMENT**

The Tenderer is required to indicate below basic details of any alternatives offered, to specified equipment.

All alternatives offered on this list are to be supported by means of full technical and pictorial information submitted separately with the Tender.

| Equipment / Material | Type | Manufacturer | Total Cost Saving £ |
|----------------------|------|--------------|---------------------|
|                      |      |              |                     |
|                      |      |              |                     |
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