DETAILED SPECIFICATION

For the

PROVISION AND INSTALLATION OF THE MECHANICAL SERVICES

Associated with the provision of a

NEW MULTI- STOREY BLOCK OF FLATS AT

63 – 67 BRIGHTON ROAD

SHOREHAM-BY-SEA

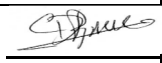
By

6 North Row, Uckfield
East Sussex, TN22 1ES

For

BEAUFORT DEVELOPMENTS SOUTHERN LTD.
SOUTHDOWN LODGE,
BRIGHTON ROAD,
LEWES, BN7 1EB

DOCUMENT ISSUE RECORD

ISSUE No.	REV. No.	DATE	ISSUED BY	SIGNED	CHECKED BY	SIGNED
01	0	27.9.17.	G.D. BROWNE		D. BROWNE	

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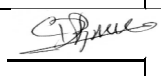
0	27.9.17	FIRST ISSUE FOR TENDER	G.D. BROWNE		D.BROWNE	

CONTENTS

SECTION 1.0	INTRODUCTION
SECTION 2.0	CONTRACTUAL ITEMS
SECTION 3.0	GENERAL MECHANICAL SPECIFICATION
SECTION 4.0	MECHANICAL WORKS
SECTION 5.0	PIPEWORK STANDARDS & INSTALLATION
SECTION 6.0	SCHEDULE OF SUGGESTED EQUIPMENT AND SYSTEMS

G.B. CONCEPTS (Int) Ltd.
1564 NEW BLOCK OF FLATS,
63 – 67 BRIGHTON ROAD SHOREHAM-BY-SEA.

1.0 INTRODUCTION

1.1 The Project

This specification relates to the proposed provision of a new multi-storey block of flats at 63-67, Brighton Road, Shoreham-by-Sea as detailed on the accompanying Tender Issue drawings from Saville Jones Architects, Worthing.

The works as described herein and depicted on the design drawings accompanying this specification are to be developed into Detailed Design drawings and associated Schedules by the appointed design/construction mechanical Contractor who will also install, test, and commission the new Installations.

1.2 The Site

63-67, Brighton Road,
Shoreham-by-Sea,
West Sussex.

It shall have been deemed that all tenderers have visited site prior to submission of quotations, as no claims for extras shall be entertained due to lack of knowledge of site conditions.

1.3 The Employer

Beaufort Developments Southern Ltd,
Southdown Lodge,
Brighton Road,
Lewes, BN7. 1EB.

1.4 The Extent of Works

The Works include:
i). Disconnections and making safe of existing Gas and water Statutory, supplies to the existing building on the site to allow demolition and to allow provision of ground works, etc., for the new building as indicated on Saville Jones Architects detailed drawings.

ii). The installation of the Mechanical installation works associated with the new building are to generally to include, but are not limited to, the following where appropriate in association:-

- Manufacture
- Delivery to site
- Unloading
- Storing
- Distribution around site
- Removal of redundant existing services
- Production of Installation standard drawings for review prior to starting on site.
- Installation and/or provision of works detailed in tender documentation

- General Builderswork Items.
- Testing
- Commissioning
- Operating and maintenance instructions. To include 'one to one' teach-in for Client by Specialist Contractors/installers.
- Guarantee of the Works for the specified Defects Liability Period
- All labour and supervision necessary for the satisfactory execution of the Works
- Liaison and co-ordination of your element of the works with local authorities and statutory suppliers
- Liaison and co-ordination of your element of the works with other trades
- Provision of site "log Book"

Inspection of Existing Installations and Areas

It will be deemed that the Contractor has visited the site and is fully acquainted with the existing engineering services in/on the site for the new Building and all access ways.

The Contractor shall ensure that:-

The existing services, below and above ground, that are to remain or be modified/extended under these works are protected, and where necessary kept energised, and remain fully operational at all times. The Contractor is to liaise with the Primary Services Statutory suppliers in connection with all works associated with disconnections, diversions, and re-connections of these supplies.

All redundant materials are to be removed.

Drawings and Workmanship

The Contractor shall carefully examine all drawings and specifications and should inform the Client's Representative/Project Manager of any discrepancy. It is important to note that any drawings which accompany this Specification indicate the basic conceptual requirements of the Mechanical installations and are not 'design' drawings. The appointed Contractor is responsible for production of all necessary installation drawings for the Mechanical Engineering Services described in this Specification.

In every respect for the installation of the actual works the Contractor shall be deemed to have included for materials to comply with the designated Regulations and standards in the Specification.

The workmanship shall at all times be executed to a high standard and comply with relevant recognized and acceptable working methods within the industry.

1.5 The Specification

Ensure all clauses in this Specification are applied to all the works described in all sections of this specification and shown on the

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1564 NEW BLOCK OF FLATS,
63 – 67 BRIGHTON ROAD SHOREHAM-BY-SEA.

Tender Drawings including any additional work subsequently instructed under the Contract.

All preliminary and contractual clauses are as the Main Contract. These are current at the date of issue.

1.6 Programme and Progress

Main Contract:

- Start: See Main Contract details.
- Completion: See Main Contract details.

Provide weekly progress reports during the entire contract period. Show, and give precise reasons for, all variations to the programme and propose remedial action necessary to achieve the original agreed programme.

2.0 CONTRACTUAL ITEMS-To be read in conjunction with the main contract preliminaries

2.1 Definitions

a) The Works shall mean the works to be carried out in accordance with the Contract, all as described herein and as shown on the Tender Drawings. This shall include for all materials and equipment to be used in the Contract and shall include the supply, installation, testing and commissioning of such materials and equipment. The term shall also include all variations to the Contract that may be requested.

b) The main works contract will be as detailed within the Saville Jones Architect's Tender Stage drawings.

c) The Consultant/Architect shall mean Saville Jones Architects.

d) Comments and approval shall mean comments that relate to design aspects concerning drawings, equipment, samples etc. The Contractor is responsible with respect to relevant design development, installation, fitness for purpose, and compliance with the Specification.

e) As Installed Drawings are defined as the drawings prepared by the Contractor showing accurate finally installed layouts and details of the Works as performed by the Contractor.

f) Commissioning is defined as the setting the systems to work and adjusting such systems in order that they operate so as to satisfy the design intent and this specification.

g) The Contractor is defined as the firm appointed to carry out the Works outlined in the Specification.

h) Contractor's Equipment is defined as tools, tackle, stores and other such items brought and required on Site by the Contractor for the purpose of executing the contract Works but not for incorporation therein.

i) Design is defined as producing or carrying out all calculations, investigations, studies, drawings, schedules of equipment and reports required to ensure that the installation proposed meets the requirements of the Specification.

j) The Employer is defined as the person(s) or organisation named in section 1.0 or any person or body authorised to represent the employer.

k) The Contract Administrator (CA) is defined as the person(s) or organisation named in section 1.0 or any person or body authorised to represent the Employer.

l) Installation Drawings are defined as drawings prepared by the Contractor and submitted to the Contract Administrator for approval prior to beginning installation.

m) The Site is defined as the place as described on the tender drawings, where the work is to be undertaken and the systems are to be installed by the Contractor.

n) Tender Drawings are defined as drawings listed in the invitation to tender.

o) Tests are defined as such tests as given in this Specification or otherwise agreed between the CA and the Contractor.

2.2 Interpretation of Specifications and Drawings

This Specification and any drawings or other documents attached and issued by the Employer or his representatives shall be deemed to include, whether or not specifically mentioned or shown, any materials, accessories or works as may be necessary for the satisfactory completion of the works in accordance with the accepted current practice or procedure. The Contractor shall make due allowance in his tender for such materials or works.

It must be noted that the locations of Mechanical equipment shown on the drawings is diagrammatic only and does not indicate final detailed locations which the Contractor is to clarify and include in his Detailed Installation drawings. All equipment, sets, and fittings required for the installation works must be allowed for in the Tender.

Where a discrepancy exists between the drawings and the Specification the drawings shall take preference. However, where the interpretation of either is in doubt, the Contractor shall obtain clarification from the Project Administrator prior to the submission of the Tender. Such clarification shall form part of the Contract Documents.

Consequently this Specification shall be read in conjunction with the Design drawings listed in the detailed specification and all relevant Architect and Structural Engineer's drawings. All additional information or specific instructions contained in the drawings shall be understood to be part of the Specification.

The Contractor will be deemed to have made provision in his Tender

for the production of fully detailed installation drawings as required and execution of the installation of the Mechanical sub-contractor works according to the true intent and meaning of the drawings and this Specification. No adjustment of the sub-contract sum will be made by the Contractor or allowed by the Employer excepting in respect of authorised variations. The Contractor shall be deemed to have studied the full working drawings of the buildings to be erected under the Contract, to include all Architect's, Structural Engineer's and any other relevant drawings, and to have visited the site and included in his tender for everything necessary to leave the said installation complete and in proper working order to the satisfaction of the Project Administrator whether or not the whole of the works to be executed are shown on the drawings or described in this Specification.

2.3 Extent of Works

The Contractor shall provide, install and hand over in a satisfactory working order, the complete installation as detailed in this Specification and associated design intent drawings. He shall include for the installation and commissioning of all items which are to be supplied by others for incorporation into the installation.

The Contractor shall prepare from the Tender design intent drawings all necessary installation drawings to show in detail the Contractor's proposed installation.

The Contractor shall provide all accessories, supports, fixing devices and other sundry items necessary for the satisfactory completion of the installation.

The Contractor shall provide As Installed Record Drawings, test records, Operating & Maintenance manuals and detailed operating instructions as required in this Specification.

The Contractor shall carry out any builderswork that may be required in connection with the Contract and making good to the satisfaction of the Contract Administrator.

The Contractor shall remove all rubbish and redundant materials from site.

2.4 Builders Work

The Contractor shall be held responsible for identifying all builders work and general attendance requirements and for clearly setting out and afterwards checking the proper alignment and levels of the works during and after erection and for supplying such drawings as are required of all machine bases and other builders work. Any instruction or drawing issued for buildings work must be given by Saville Jones Architects or the Employers Representative and no cutting away shall be done until such instructions have been given.

The Contractor shall be required to supply and use templates, if necessary, for the setting out of holes in new structural work, for holding down bolts and other supports.

The Contractor shall provide details of any proposals made by him for builders work required in connection with the works.

2.5 Variations and Dayworks

The Contractor shall notify the Main Contractor of any additional expenditure and any claims or variations to the Tender price.

The Main Contractor will issue in writing, all agreed additions, omissions or variations to the works. No allowance is to be made for any loss of profit due to omitted work by the Main Contractor.

2.6 Defective Work

Where, in the opinion of the Main Contractor any of the finished work or materials or workmanship in any part of the works fails to comply with the Specification, that part of the works will not be accepted and may be assessed as defective.

All work identified as defective shall be replaced to satisfy the standards laid down in this Specification and to the satisfaction of the Main D & B Contractor.

2.7 Co-Operation with Other Trades

The Contractor shall be required to co-operate with any other operatives who may be working or connected with the works. In positions where construction work and other services are to be installed, adjacent to or in the vicinity of his sub-contract works, he shall co-operate in every respect to determine the most suitable sequence of installation.

3.0 GENERAL SPECIFICATION - MECHANICAL INSTALLATION

3.1 Scope

The work comprises the whole of the labour and all materials necessary to disconnect and make safe all existing incoming primary services to the existing building to allow demolition and to form a complete installation in/for the new building. Works to include such tests, adjustments and commissioning as required and which are described in subsequent Sections of this Specification and including all works as may otherwise be required to give an effective working installation to the satisfaction of the Client's appointed Representative/Project Manager.

The words 'complete installation' in the above clause means not only the major items of plant and equipment covered by this Specification; but also all the incidental sundry components and activities necessary for the complete execution of the works and for the proper operation of the installation, including any labour charges, regardless of whether or not these sundry components and activities are mentioned in detail in the tender documents issued in connection with the Contract.

No clause in this section in any way takes precedence or over-rides those contractual liabilities laid down in the Conditions of Contract and Preliminaries of this specification.

The Client's appointed Representative/Project Manager reserves the right to reject any part of the installation not complying with this Specification and the Contractor shall carry out the necessary remedial work or replacement, free of charge, without delay to the Contract.

3.2 British Standards and Codes of Practice

All materials and items of equipment covered by the current British Standards, whether detailed in this Specification or not, shall comply with the material and test requirements of the particular document.

Where alternatives are permitted by the BS and this Specification does not identify the option required, the most durable materials shall be used and the most onerous set of tests shall be applied.

Unless otherwise stated in this Specification, the installations shall confirm to current requirements of the following:

a) Latest relevant BS Standards and Codes of Practice
b) Health and Safety at Work Act
c) Building Regulations
d) Local Authority Regulations and By-Laws
e) Electricity Supply Regulations
f) Control of Pollution Act 1974
g) HVCA Ductwork Specification DW 142
h) Statutory Authorities/By-laws, Reg's and Recommendations
i) CIBSE Guides and Commissioning Codes

j) IEE Regulations 17th Edition including all the latest amendments
k) Local Water Authority By-laws
l) The Gas Safety (Installation and Use) Regulations
m) Gas Acts 1986 & 1995.
n) Gas Safety (Management) Regulations 1996.
o) Gas Appliances (Safety) Regulations 1995.
p) Environmental and Public Heath Approvals
q) The Electricity at Work Regulations 1989
r) CIBSE Energy Code
s) Health and Safety Executive Guides and Books
t) Communities and Local Government Domestic Heating Compliance Guide.
u) Copper Development Association Publication 24 – Copper for Domestic Natural Gas Installations.
(v) The Clean Air Act
(w) Gas Safe requirements
(x) IGEM UP10

The Contractor is to obtain a full understanding of the above and ensure that the installations comply in all respects.

If compliance with the design or Specification may result in non-compliance with any Regulations or Codes of Practice when systems are installed or in operation, the CA must be informed.

Submission of a Tender will be taken as confirmation that the completed installation will comply with all the Regulations listed or referred to in the Specification.

3.3 Plant Location

Major items of plant and equipment are to be installed generally in the locations shown on the Design intent Tender drawings. However, the positions of equipment, etc., indicated on the drawings are given for tendering purposes and the exact positions are to be decided during the Contractor's installation period. The Contractor's price shall include for any modifications that may be necessary.

3.4 Supervision and Labour

The Contractor shall provide all skilled and unskilled labour as may be required to complete the Contract successfully.

The Contractor shall, during the entire Contract, provide on the Site a qualified competent foreman who shall be authorised to take and carry out on behalf of the Contractor any instructions given to him by the Client's Representative/Project Manager. The Contractor shall provide adequate supervision from his office and he shall attend any meetings as may be required by the main Design & Build Contractor.

The Contractor shall, at all times, employ during normal working hours as many men as is practicable to suit the progress of the Contract. If, for any reason, the Contractor considers it necessary for his workman to work overtime, his Tender shall be based on the working week he considers advisable.

The Contractor shall immediately remove any member of his staff or labour force from the Site and provide a suitable replacement, if so directed by the Client's Representative/Project Manager whether this be on the grounds of incompetence, misconduct, or any other reason.

The Contractor shall not withdraw labour from the Site without giving prior notice of his intention to the main Design & Build Contractor.

The Contractor shall ensure that all operatives are properly trained and skilled for the tasks undertaken. All welding is to be carried out by Welders with the H&V NJIC Certificate of Competence issued by the HVAC.

3.5 Setting Out

The Contractor shall allow for setting out and shall be responsible for the correctness of the positions, levels and dimensions of the whole of his works on site.

The Contractor shall be responsible for taking all his own dimensions on site, checking runs and levels and marking out for builders work and shall allow for such work in his tender.

Any unnecessary work carried out by the Contractor due to inaccuracy of their detailed Installation drawings, dimensions, or marking out, shall be paid for by the Contractor.

Detailed drawings are to be prepared by the Contractor in accordance with later clauses including working/installation drawings to ensure that the setting out of plant and equipment permits it to fit into the space allocated and allows access for maintenance and replacement purposes.

3.6 Local Authorities and Public Utilities

The Contractor shall ensure that, where applicable, his work and any materials used in the execution of the works in accordance with this Specification, comply with the requirements of the particular supply undertaking.

The Contractor shall carry out all necessary liaison and produce all information to ensure that the requirements of the Local Authority, Local Fire Officer, the Statutory Water and Gas providers are met.

The Contractor shall, where necessary to comply with regulations, inform the supply undertakings of the proposed works and to obtain from them any written approval that may be required.

The Contractor shall make any arrangements that may be necessary to allow the connection of the new works to the undertakings supply network.

3.7 Packing and Delivery

All installation materials, components, parts or complete items of equipment, shall be delivered and stored on site in boxes, crates or containers, suitably designed and constructed to give protection against transportation and handling damage.

All plant equipment and appliances shall be delivered with the manufacturers name and a description of the contents on the outside of the packing.

All installation materials shall be packed and secured in a manner to avoid damage and facilitate the checking of quantities. Materials and equipment shall be stored on site in a sequence to facilitate easy access.

All equipment and materials shall be delivered to site in accordance with the requirements of the programme.

It shall be the Contractors responsibility to examine all materials and equipment, supplied under his contract, on delivery to site. The Contractor shall replace, at his own cost, any such materials or equipment which is damaged or faulty.

3.8 Site Protection of Equipment

Electrical and Mechanical equipment, or equipment with electrical component parts, shall be delivered to a secure store area/building on site with vapour-proof protection.

Equipment or component parts of equipment specifically designed in normal room conditions shall be delivered to and stored on site with a suitable waterproof protection.

Where a piece of equipment or an appliance comprises more than one part, the pieces shall be separately packed and be clearly identified on the outside with the manufacturers name and component reference.

Particular care shall be taken to ensure that all factory applied finishes which are designed as visible finished surfaces, are adequately protected whilst stored on site.

Particular care shall be taken to protect component parts specifically designed to act as heat transfer surfaces. These surfaces shall have purpose designed packing to protect them whilst in transit or stored on site.

3.9 Protection and Painting

The Contractor shall be responsible for the protection of his work during and after erection, and allow for necessary casing and protection after the work has been executed and incorporated in the main building works.
Where particular methods of finish and painting are not specified elsewhere, the following requirements shall be met:

i) All metal work shall be adequately protected against corrosion and oxidisation.

ii) All frames, cladding and the like, of mild steel construction, shall be thoroughly cleaned to remove all scale, rust, oil and grease before painting and treated with a rust inhibiting solution. One coat of metallic primer shall then be applied followed by two coats of oil bound enamel paint to BS 381C, colour to be approved.

iii) Parts which are normally plated shall be heavily plated in hard chromium finish or parkerised, which ever is more suitable. Cadmium or tin zinc plating will not be accepted.

Any damage to finishes on equipment and plant after leaving the manufacturers works shall be made good immediately as follows:

i) Where a metal coating is damaged it shall be cleaned to the parent metal and coated with a zinc rich epoxy (Armour 1527), or similar.

ii) Damaged areas of paintwork shall be repaired locally by cleaning to bare metal and repainted using the complete paint system previously applied.

3.10 Operation of Plant Prior to Completion

The Contractor may be required to operate the installation or complete portions thereof before the date of completion. Such operation shall not reduce the Contractors responsibility for handing over the works in good condition on the date of practical completion, fair wear and tear excepted. Should the Contractor be so required to operate the installation or part thereof, he shall be entitled to reimbursement by the Contractor.

3.11 Labels and Identification

The Contractor shall include for the following as part of the works:

a) Provide and install labelling on valves, ductwork, dampers and pipe work. Indicate corresponding labelling on the record drawings.

b) Provide identification of all services in accordance with the requirements detailed in Sections 4 & 5 herein to the Works.

3.12 Maintenance and Defects Liability

The defects liability period (See main Contract) for the works shall commence from the date that the works are handed over to the Employer.

If, during the designated period, any defects or faults develop which, in the opinion of the Client's Representative/Project Manager are due to faulty workmanship, goods or materials, then the Contractor shall rectify these at his own cost.

The Contractor shall indemnify the Employer against any damage caused to the building and/or contents and occupants caused by such defects or faults.

If any component normally carries a Manufacturer's guarantee for a period extending beyond the general guarantee of the works, the benefits of this extended guarantee shall be passed to the Employer.

The Contractor shall maintain the works, at no cost to the Employer, to the satisfaction of the CA, until a practical completion certificate for the works has been issued by the Client's Representative/Project Manager.

3.13 Maintenance during Defects Liability Period

The Contractor is to include in this Tender for the provision of providing 12 months maintenance. The 12 month period is to commence on the date of official handover of the completed building and its associated services
The maintenance is to be carried out in full compliance with the manufacturer's requirements for all plant items
The maintenance shall also include routine chemical dosing of the completed heating distribution services

3.14 Guarantees

Notwithstanding the Contract conditions, all equipment normally guaranteed for a time beyond the termination date of the defects liability period for the Contract shall be held to remain under guarantee for the maximum period.

3.15 Radio and TV Interference

All apparatus, where the normal operation is such that interruption of low frequency of direct electric currents occur, shall be fitted with means for suppressing the radio and TV interference frequencies so caused.

The equipment and methods to be used in determining the level of radio interference shall be as specified in BS 727 (and subsequent revisions) and the limits of interference shall in all cases be those specified in BS 800: Part 1 (or subsequent revisions).

Reference shall be made to CP 1006 (or subsequent revisions) for guidance on the provision and installation of equipment to meet the above standards.

3.16 Items of any One Classification

Any items, fittings or accessories which are used in quantity shall in each case be the product of one manufacturer and shall be used for the service recommended by the manufacturer.

3.17 Noise Control

The Contractors attention is drawn to the Control of Pollution Act 1974 with particular reference to the control of noise on construction sites (Part III, Sections 60 and 61) and to the Control of Noise (Code of Practice for Construction Sites) Order 1975 (Statutory Instrument 1975 No. 2115).

It is the Contractors responsibility to advise the Principal Contractor should any noisy work be necessary and gain agreement to the time and extent that this work is to be carried out.

3.18 Asbestos Regulations

The Contractor shall allow for all precautions required by the Asbestos Regulations 1969 and all subsequent revisions.

3.19 Avoidance of Bacterial Growth

The Contractor must exercise due care and attention during the installation of all water services, so as to avoid any situation likely to give rise to potential breeding grounds for bacteria and pseudomonas.

3.20 Fire Precautions

The Contractor shall be responsible for fire precautions in respect of workshops, stores etc. If a naked flame or welding equipment must be used in the execution of the works, permission shall be obtained in writing from the CA and where combustible materials are use, adequate protection shall be given to other adjacent materials and personnel. Fire extinguishers shall be made available adjacent to where such work is proceeding.

Where internal corridors etc exist, these shall be kept clear of all obstructions and rubbish which could constitute a fire hazard or block an escape route in the event of a fire.

3.21 Positioning of Services/equipment

The position and /or quantities of all services and equipment shown on the tender design intent drawings which accompany this Specification are to be assumed as being correct for the purpose of Tendering. The appointed Contractor shall verify with the Client's Representative/Project Manager all final, accurate, positions of outlets before commencing work. The agreed final accurate positions and quantities shall be indicated on the Contractor's detailed Installation drawings. The tender design intent drawings shall not be used to position outlets.

3.22 Protection

The Contractor shall take all necessary precautions in the execution of the works to prevent damage to the buildings fittings or equipment. In the event of such damage occurring, the Contractor shall bear the cost of the necessary replacement or making good.

The Contractor shall protect all items from weather and physical damage upon arrival on site. Particular care shall be taken where systems containing water are involved, to ensure that damage from water does not occur. Ensure all services are protected from frost damage or from causing damage.

The Contractor shall take every precaution to protect the building and to prevent damage to any part of the installation for which he is responsible under his Contract and he shall make good any such damage without charge as directed by the Client's Representative/Project Manager. Protection shall be provided to avoid damage from other trades. Should damage be caused by other trades working on site, it shall be the Contractors responsibility

to claim the cost of making good from the other contractors.

The Contractor shall indemnify himself against claims for damage to public or private roadways, drives, footpaths, sewers, gas, water and electricity mains, etc.

No claim arising from or caused by lack of protection or proper care and maintenance will be accepted.

3.23 Redundant Materials and Safety

The Contractor shall regularly collect, store centrally and then remove from the site all surplus materials prior to completion of the works.

The site shall be kept safe and tidy at all times in accordance with the Health and Safety at Work Act and all other safety requirements relevant to the site and works.

3.24 Materials

The Contractor shall provide all materials required for the completion of the works. All materials shall be new unless specified otherwise.

All of the materials and workmanship shall be of first class quality and shall comply with the applicable British Standard.

Where any workmanship or material is unsatisfactory, then this shall be rectified at no cost to the Employer.

Existing plant or materials rendered redundant during the course of the works shall not be re-used unless instructions are given in writing from the Client's Representative/Project Manager.

All redundant materials and scrap shall become the property of the Employer and shall be offered to the Employer via the Client's Representative/Project Manager before being removed from site.

The Contractor shall supply any samples of materials and workmanship that may be called for by the Client's Representative/Project Manager who shall be at liberty to retain such samples for the duration of the Contract.

The Contractor shall be responsible for the adequate packing, storage and protection from damage of all materials required for the installation. He shall replace any materials damaged or lost in transit to site, whilst being off-loaded or handled, stored or distributed on site. He shall ensure that all materials, fixed or unfixed, are protected against damage and shall replace any such damaged materials, up to the date of handing over to the Employer, free of charge

If tenderers wish to put forward materials of an alternative type or

make for consideration, they may do so.

No guarantee is given that any alternatives will receive consideration and the Contractor shall confirm that the alternative equipment is of the same standard and capable of performance at least as good as that specified, and its use will not vary construction details, hole sizes, access or electrical requirements. If alternative equipment is offered, full details of make, type, performance, builderswork requirements, plant space requirements, electrical requirements, shall be given together with a statement of the increase or reduction in price that is offered.

The Contractor shall identify any items subject to long term delivery and state the action necessary to complete the works as programmed.

3.25 Photographs and Publicity

The Contractor shall not take any photographs of the works without the permission of the Client's Representative/Project Manager.

The Contractor shall ensure that no information regarding the works or Employer is divulged to any third party for either publication, broadcasting or other purpose without the prior approval of the Client's Representative/Project Manager.

3.26 Inspection of the Works

No work is to be covered or concealed or insulation applied to any section of the works without the prior written approval of the Client's Representative/Project Manager.

The Contractor shall give all necessary assistance to enable the Client's Representative/Project Manager to examine any of the Works.

The Contractor shall give due notice (14 days minimum) to the Client's Representative/Project Manager when works which are to be covered or buried are ready for examination and the Client's representative shall carry out such examination and/or measuring without undue delay.

The Contractor shall give every facility to the Client's Representative/Project Manager to examine any variations for which payment is based on a schedule of rates.

3.27 Planning

The Contractor shall provide a detailed programme listing of all installation drawings, calculations, details, etc., as required by the Principal Contractor immediately following appointment. This shall include submission and required approval dates for drawings, calculations and schedules together with issue commencement and completion dates of the equipment to be installed.

The Contractor shall identify items which are on the critical path and give the dates by which they need to be ordered.

The Contractor shall ensure the co-ordination of the programme with all programmers for items of work forming part of the project but which are not part of the Works. Include for the preparation and issue of all builders works, working installation drawings, calculations and schedules in accordance with the programme.

The Contractor shall progress and monitor all negotiations with any Statutory Authority to ensure that all underground works are completed in accordance with the overall programme.

3.28 Setting Out and Builders Work Drawings

The Contractor shall provide comprehensive detailed drawings of any builderswork that may be required for the installation and operation of plant and equipment.

Before starting the manufacture of any ductwork, pipework, trunking etc the Contractor shall check that the shop drawings co-ordinate with all other drawings and verify the physical dimensions on site.

The Contractor shall set out all holes and chases necessary for the installation of plant and equipment. He shall provide details of all foundation bolts, nuts, washers, packing pieces, brackets, supports etc. He shall provide the CA with details of all fixing arrangements for approval.

The Contractor is to take particular note of any Structural down-stand beams below or within the Floor slabs and is to arrange for suitable pipework holes/slots to be provided through the beam webs where the pipes cannot pass under or between the beams and the ceiling.

The Contractor is to liaise and discuss with the Structural Engineer all holes/slots required through the beams and Floor slabs at an early stage in the works (priority issue) and seek the Structural Engineer's approval.

If it is necessary to cut holes through walls, they must be no larger than necessary to allow the pipes or cables etc to pass through with the appropriate sleeve.

Drill all holes for fixing the works.

3.29 Installation Drawings

The Contractor shall prepare and submit to the Client's Representative/Project Manager detailed installation drawings based on the Tender drawings, Architect's drawings, Structural Engineer's drawings and all other service installation drawings.

They shall take into account any modifications either to the building or the installation which may have taken place, incorporating details

of the actual items of plant and equipment to be installed.

All installation drawings shall be produced in Autocad LT or release 14 format, providing details of all services and equipment described in the Specification and shown on the Tender Drawings. These installation drawings must clearly illustrate the following:

a) The precise routing of all mechanical systems pipework, ductwork, and associated Specialist wiring systems.

b) The co-ordination of all services, in particular where different services are to be installed in close proximity. These drawings should show that the specified services can be suitably accommodated in the spaces provided and as such will be co-ordinated with all building and structural elements.

The Client's Representative/Project Manager may comment on documents and drawings issued for approval. The Client's Representative/Project Manager approval is strictly limited and it does not relieve the Contractor from his responsibilities under the Contract. The Client's Representative/Project Manager requires at least 14 days for comment and/or approval. The Contractor is to consider all comments and contact the Client's Representative/Project Manager at once if you disagree or require clarification on any item.

The Contractor shall take full responsibility for the exact position of the items forming part of the Works relative to structural items, fitments, other elements, and any other services. The Client's Representative/Project Manager's approval to the installation drawings does not absolve the Contractor from such responsibility.

The Client's Representative/Project Manager must give structural approval for all plant and builders work requirements, but this approval does not relieve the Contractor of his responsibility in complying with the Specification.

3.30 Inspection, Testing and Commissioning

The Contractor shall carry out all inspections, tests and commissioning in accordance with the requirements of the appropriate BSRIA recommendations, CIBSE commissioning codes, IEE Regulations, Fire Officers and any other Certifying Bodies.

All LPHW heating flow rates, HWS flow rates and temperatures, space and water temperatures, Supply and Extract ventilation rates, are to be measured and recorded in accordance with relevant CIBSE & BSRIA Guidelines.
The Contractor shall inform the Client's Representative/Project Manager when all major plant items are ready for inspection at the manufacturer's premises, allowing 14 days notice.

3.31 As Installed Drawings

The Contractor shall maintain on the Site a complete set of up-to-

date prints marked up with As Installed details, during the execution of the Contract Works. These prints must be made available at any time for viewing/inspection by the Client's Representative/Project Manager. From these marked up prints the Contractor must prepare final 'As Fitted' AutoCad record drawings so that they are legible when reduced to A3 size.

These will consist of two paper copies and Autocad LT format drawings on disk(s).

3.32 Operating and Maintenance Manuals

The whole and or any part of the Contract Works will only be included in a Certificate of Practical Completion when the Client's Representative/Project Manager has been issued with two copies of all manuals and operating and maintenance instructions in stiff back ring binders.

The Contractor shall prepare the following manuals in accordance with the general requirements of BSRIA Application Guide 1/87.1 to the detail level Class D

Main Manual

A manual detailing the whole of the mechanical services installation which shall include the following information as appropriate for the installations included:

a) Contents List

b) General descriptions of the installation, equipment used and method of the installation.

c) Handbooks, maintenance instructions, drawings and spare parts list for all components, plant and equipment used in the Contract Works.

d) Schedule of routine maintenance complete with oil and grease points and recommended lubricants.

e) Schedule of test readings and set points for all controls.

f) Schedule of periodic and preventative maintenance for specialised equipment.

g) Wiring diagrams of plant.

h) Service manuals for all specialised plant giving all details, as listed above.

i) Schedules of equipment and motors, related to the As installed drawings, listing names of manufacturer, serial number of plant and electrical details.

j) Outline design data of plant.

k) Test and performance data of plant.

l) Test certificates.

m) List of recommended spares and tools.

n) Set of As Installed drawings reduced to A3 size, folded to A4 and bound in the manual.

Flat Manuals

The contractor shall provide a simplified operating and maintenance manual for each of the 14 flats

Each manual shall contain the following:-

a) Contents List

b) General descriptions of the installation, equipment used and method of the installation.

c) Handbooks, maintenance instructions, drawings and spare parts list for all components, plant and equipment used in the Contract Works.

d) Schedule of routine maintenance complete with oil and grease points and recommended lubricants.

e) Schedule of test readings and set points for all controls.

f) Schedule of periodic and preventative maintenance for specialised equipment.

g) Wiring diagrams of plant.

h) Service manuals for all specialised plant giving all details, as listed above.

i) Schedules of equipment and motors, related to the As installed drawings, listing names of manufacturer, serial number of plant and electrical details.

j) Outline design data of plant.

k) Test and performance data of plant.

l) Test certificates.

m) List of recommended spares and tools.

n) Set of As Installed drawings reduced to A3 size, folded to A4 and bound in the manual.

3.33 Redundant Materials and Safety

Collect regularly, centrally store and then remove from the Site all surplus materials prior to completion of the Works. Maintain the Site safe and tidy at all times in accordance with the Health and Safety at Work Act and observe all other safety requirements relevant to the Site and Works. Ensure adequate fire precautions are taken throughout the Contract period.

3.34 Faulty Work or Materials

Carry out the Works to the satisfaction of the Client's Representative/Project Manager who has the right to reject any material or workmanship which is, in his opinion, unsatisfactory. The Contractor is to replace such material or rectify such bad workmanship forthwith at no cost to the Employer.

3.35 Compliance with Specification

Install the Works to conform to the best principles of modern practice.

The work must be carried out by fully competent tradesmen of the appropriate grades.

Not withstanding any inspection carried out by or acceptance given by the Client's Representative/Project Manager, ensure that the Works are installed in accordance with the design and Specification.

3.36 Thermal Insulation

General

Include within your tender for the insulation of the following:-

- External services
- LTHW pipe work above ceilings, in boxings, in floor voids, risers etc. and in Plant Rooms
- CWS and HWS circulation pipe work above ceilings, in boxings, etc., and in Plant Rooms.

3.37 Schedule of Specialist Equipment as Client's Requirements.

Certain equipment items relevant to the Mechanical Services provisions are to form part of the Main Contract installation and also supply of specific units by the Client/Main Contractor.
Items include Sanitary Ware, Taps, Shower units, Kitchen Fitments, Hobs/Ovens. The list is not exhaustive and the Mechanical Services Design/Install Contractor is to liaise with the Client/Main Contractor and Architect early during the installation Stage of the works to define all elements in this connection. The final list will cover only

'Specialist' items/appliances. All other general installation items e.g. Gas Boilers, Heat Interface Units, pumps, controls, etc., are to be provided and installed by the Mechanical Contractor to ensure complete and comprehensive Services Installations as set out under Clauses 4, 5, and 6 of this Specification. Where items are noted to be 'as equal approved' the final item(s) selected are to be agreed with the Project Manager/Client prior to purchase/installation.
The Client/Main Contractor supply items will be handed over to the Mechanical Contractor for fixing, connecting, and commissioning.
The Contractor is to identify all Services requirements for the specialist Kitchen or other items and include for these within the tender costings. The Contractor is to check and verify all final relevant Mechanical and other items being supplied by others with the Main Contractor and the Client's Representative/Project Manager to establish any changes or additions/omissions prior to finalising their detailed designs.

3.38 Design intent Mechanical Scheme drawings to be read in conjunction with this Specification.

See also notes 1 & 2 below.

Drawing No.	**Title**
GBC-1564-MECH-M-100	Ground Floor – Details of Heating & Water Services
GBC-1564-MECH-M-101	First Floor – Details of Heating Services to Flats 1-4
GBC-1564-MECH-M-102	Second Floor – Details of Heating Services to Flats 5-8
GBC-1564-MECH-M-103	Third Floor – Details of Heating Services to Flats 9-12
GBC-1564-MECH-M-104	Fourth Floor – Details of Heating Services to Flats 13 & 14
GBC-1564-MECH-M-201	First Floor – Details of Domestic Water Services to Flats 1-4
GBC-1564-MECH-M-202	Second Floor – Details of Domestic Water Services to Flats 5-8
GBC-1564-MECH-M-203	Third Floor – Details of Domestic Water Services to Flats 9-12
GBC-1564-MECH-M-204	Fourth Floor – Details of Domestic Water Services to Flats 13 & 14
GBC-1564-MECH-M-301	Schematic Detail of Heating &

	Boosted Cold Water Services
GBC-1564-MECH-M-302	Ground Floor – Boiler Plant room and Sections
GBC-1564-MECH-M-303	Phase 1 & Possible Phase 2 – DWS & Heating Schematic

NOTE:-

1. The above drawings provide detailed design information relating to the Mechanical Services
2. The above drawings are to be read in conjunction with all relevant Architect's and Structural Engineer's Drawings.
3. The drawings are to be read in conjunction with this specification

SECTION 4: MECHANICAL SERVICES WORKS

4.1 SCOPE OF WORKS.

The Mechanical Engineering Services as described in this Specification shall comply with all relevant statements for heating, Domestic Water Services, and Ventilation as outlined in Cundall Sustainable Energy Statement Ref.1014719-RPT-001 dated 24.01.2017.

The Mechanical Services briefly comprise, as relevant for each work item, the supply, delivery, off-loading positioning, installation, testing, commissioning, and proving in operation of the following:-

- Disconnection and making safe of all existing heating and domestic Gas and water services and primary incoming supplies to allow demolition of the existing property.

- New heating services to all areas.

- New domestic boosted hot and cold water services to all Flats, Bin Store & Residences parking.

- Incoming Gas services extended from a new incoming supply to suit the new building to feed Gas Fired Heating/HWS Boiler Plant.

- New Incoming mains Cold Water service with supplies extended to suit the new Building.

- Provision of underground heating Flow & Return pipework into the Ground Floor Plantroom for possible connection of the building to a future District Heating System.

- Above ground waste, Foul, Soil, and Rainwater drainage.

NOTE.1:
All materials, equipment, fittings, and accessories used for the Mechanical Services installation shall be suitable for such use and comply with all relevant British, or equivalent, Standards of Construction/Manufacture and operation.

NOTE.2: The Main Building Contractor will be providing certain Sanitary Ware and other 'built-in' equipment and associated taps/fittings required to complete the installations. The Contractor is to liaise with the Main Contractor in this connection to identify all items being supplied and fixed ensure that the proposed equipment is suitable and compatible with the proposed installations and with relevant Standards and Building Regulations. All pipework arrangements to Sanitary Ware and other Client provided equipment is to be suitably installed to allow all necessary connections to be made in accordance with the equipment Manufacturer's recommendations.

The Scope of Works shall include the following services as outlined in the following clauses.

4.2 DEMOLITION OF EXISTING BUILDING.

1. The Contractor is to liaise with the local Gas and Mains Cold Water services providers to disconnect and make safe the existing primary supplies into the building to allow safe demolition.

2. The Contractor is to strip-out any Mechanical Services that may be identified by the Contract Manager which needs to be saved following which the demolition works will commence.

4.3 HEATING AND HOT WATER SERVICES

4.3.1 FLAT "HEAT INTERFACE UNITS"

1. Heating to the Flats will be via LPHW systems feeding radiators all as detailed on the tender issue design drawings. The Radiators are to be fitted with approved Thermostatic Radiator Valves / Hand wheel and lock shield valves as scheduled

2. A Heat Interface Unit (HIU) of size and output scheduled on the tender issue design drawings is to be installed into each Flat.

   Each HIU is to be equipped with the following
   - Heating plate heat exchanger
   - HWS plate heat exchanger
   - Accurate temperature monitoring for hot water and heating supply managed by an integral electronic controller, temperature sensors, mixing valve and circulating pump.
   - Hot water pre-heat function
   - Heat meter complete with M Bus data link wired back to the Ground Floor Plant room
   - Expansion vessel
   - Hot Water priority control
   - Secondary circuit heating circuit pump
   - Summer / Winter mode
   - LED information Matrix

4.3.2 PRIMARY GAS-FIRED HEATING BOILER PLANT.

1. The Contractor shall supply and install within the ground floor plant room, two MHG Wallcon 115 wall mounted natural Gas-fired condensing boilers each rated at 105Kw when operating at 80℃ - 60℃ flow and return. The boilers are to be installed complete with integral boiler circulating pumps, a cascade frame and prefabricated gas, heating flow and return headers

2. Each boiler shall be complete with:-

   Long lasting stainless steel heat exchanger
   Low NOx emissions
   Modulating gas burner
   Functional LCD display with navigation button technology
   Facility to communicate with other devices via integrated BUS
   Frost protection
   Chimney sweep function
   Remote access with OZW672 web server

3. Products of combustion from each boiler are to be ducted away via twin wall concentric fresh air inlet/flues direct to outside generally as indicated on the tender issue design drawings

4. The boilers are to be commissioned by the manufacturers

4.3.3 **PRIMARY HEATING BUFFER VESSEL.**

1 A single 750 litre heating buffer vessel is to installed within the ground floor plant room complete with thermal insulating jacked. The vessel shall be as supplied by MHG Heating Ltd and shall be installed complete with

Temperature sensor to be located 1/3 of the way up from the base of the vessel
AAV on the top of the vessel
Drain cock at the base of the vessel
80mm primary flow and return connections located top and bottom of the vessel
80mm secondary flow and return connections located top and bottom of the vessel

4.3.4 COMBINED DIRT AND AIR SEPARATOR

1 A BOSS combined dirt and air separator is to be installed within the ground floor plant room on the secondary heating flow from the buffer vessel to the flat HIU's. The separator is to be installed complete with an AAV, pressure gauges & drain cock.

4.3.5 SECONDARY HEATING CIRCUIT PUMP

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1 A Grundfos Magna3D twin head cast iron pump of model ref indicated on the tender issue design drawings, is to be installed within the ground floor plant room and arranged to provide a constant temperature heating circuit from the buffer vessel to the flat HIU's

2 The pump shall have a cast iron casing and a PES30%GF resin impellers.

3 The pumps shall include the following
- Auto function
- Proportional pressure control
- Constant pressure control
- Constant temperature control
- Constant curve control
- Ma or Min curve duty
- Automatic night setback
- Integral motor protection
- User interface with TFT display
- Control panel with self explanatory push buttons

4 The pump is to be commissioned by the manufacturers

4.3.6 HEATING PRESSURIZATION UNIT AND EXPANSION VESSEL

1 A heating pressurization unit is to be supplied and installed within the ground floor plant room.

2 The unit shall be as manufactured by "Mikrofill Systems Ltd and shall be as model Mikrofill3 complete with a 250 litre expansion vessel.

3 The unit shall incorporate the following features
- Integral fluid risk category 4 backflow prevention
- Comprehensive electronic pressurisation manager
- Fill volume indicator
- Large LED screen display

4.3.7 PROVISION FOR FUTURE DISTRICT HEATING SERVICES

1 The primary heating service from the Boilers to the buffer vessel shall be configured to allow alternative feed connections from a possible future District Heating system.

2 The principle shall be that the primary heating circuit from the Gas-fired boilers, and the boilers, are to remain for possible standby use should the District Heating system fail when in operation.

3 To facilitate the use of a possible future district heating circuit a flanged "stool piece" section of pipe is to be installed within the secondary heating return (from the flat HIU's to the buffer vessel) complete with isolating valve on either side of the stool piece to enable easy installation of a motorised 3-port control valve and new branch connection, generally as indicated on the tender issue design drawings

4 A section of "future district heating flow & return piping" together with integral leak detection cabling is to be installed between the southern boundary and the ground floor plant room, generally as indicated on the tender issue design drawings. The pipework is to be installed buried and terminated within an accessible pit at the site boundary and vertically within the ground floor plant room, generally as indicated on the tender issue design drawings

5 The buried pipework is to be supplied and installed by Durotan Ltd using pre-insulated steel tube and fittings

6 The pipework is to be capable of operating temperatures up to 152℃ and a maximum pressure of 25Bar

7 The completed pipe work is to be purged with Nitrogen and then charged with Nitrogen to a pressure of 3Bar

8 The pipe Insulation thickness is to be 'Plus Plus' grade and leak detection wires are to be fitted within the insulation (by Manufacturer) for connection to a surveillance system in accordance with BS EN 14419. The wires are to be terminated in a suitable galvanised adaptable box within the Plant Room and labelled.

4.3.8 INCOMING MAINS WATER SERVICE

1. The Contractor is to extend a mains water service from the authority's incoming main to the cold water booster / storage tank set.

2. A mains water service is also to be extended from the authority's incoming main to two wash down points, one in the Bin Store one in the Residents parking garage.

3. The wash down units shall be as manufactured by "Arrow Valves Ltd model ref MIDI-3A AB 230V and installed complete with a wall mounted hose reel and pipe.

4. All mains water pipe work installed external to the ground floor plant room is to be traced heated using Raychem FS-A-2X advanced pipe freeze protection cable

5. All mains water pipe work is to be thermally insulated as detailed within section 5 of this specification

4.3.9 COLD WATER BOOSTER SET & BOOSTED COLD WATER SERVICES

1 A packaged "Scuba Tank" cold water booster set is to be supplied and installed within the ground floor plant room

2 The set shall be as manufactured by "Dutypoint Ltd and shall comprise

- Variable speed duty and stand-by stainless steel submersible pumps each capable of providing 3.4l/s at 3.5Bar
- GRP insulated Bylaw 30 cold water storage tank with an actual capacity of 2250litres
- High flow inlet solenoid valve
- Low water level pump protection device
- Digital system status display
- Fused isolation switch
- Common alarm volt free contact.

3. The booster set shall be commissioned by the manufacturers.

4. A common boosted cold water service is extended from the above booster set to the store cupboard within each of the flats.

5. An inline 35mm water meter is to be installed within each flat with data extended / wired back to the ground floor plant room. Downstream of the mete the boosted cold water main splits with a valved connection to the HIU and a valved branch extended to serve all sanitary ware, washing and dishwasher machines. All as indicated on the tender issue design drawings.

6. A pressure reducing valve is to be provided as required to suit any connected outlets that are not suitable for mains pressure.

7. All boosted cold water services are to be installed using copper tubing and crimped fittings

8. A ¼ turn ball valve with lever is to be installed on all final connections to sanitary ware, washing machines & dishwashers.

9. A Dutypoint 65mm electromagnetic water conditioner is to be supplied and installed into the common boosted cold water distribution main complete with associated control panel

9. The Main Contractor will be providing taps, showers, and Sanitary Ware free of charge to the Mechanical Contractor who shall fix and connect the units.

4.3.10 GAS SERVICES

1. The Contractor is to extend a new gas service from the authority's incoming supply and meter to the new boiler plant.
2. The supply to the boilers shall incorporate an energised open fire solenoid valve which shall close in the event of a fire condition

4.3.11 FLAT HEATING & HOT WATER SERVICES

1 Heating and hot water services are to be provided to each flat via a Heat Interface Unit, (HIU) as previously detailed.

2 All heating service shall be installed using copper tube and crimped fittings.

3 Each unit shall be located within a store cupboard within each flat and served be a constant temperature heating circuit extended from the ground floor plant room to each of the 14 flats.

4 Each of the HIU's is to contain two plate heat exchangers, one to provide heating and one to provide hot water services to each flat.

5 Heating to the Flats will be via a LPHW heating circuit extended from the HIU to steel panel radiators all as detailed on the tender issue design drawings. The Radiators are to be of sizes and outputs scheduled and installed complete with Thermostatic Radiator Valves / Hand wheel and lock shield valves as scheduled on the tender issue dosing drawings. The radiator lock shield valves shall incorporate a double regulating valve with each being set to suit the radiator output

6 Heating to all bathrooms shall be provided by dual fuel towel rails each complete with an electric immersion heater for use during summer months. The towel rail sizes and outputs are as scheduled on the tender issue dosing drawings and a suitable switched mains electricity supply is to be provided for each of the towel rails.

7 Hot water services are to be extended from the HIU to all sanitary ware.

8 To comply with Building Regulations Part "G" a thermostatic mixing valve (TMV) is to be incorporated into the hot water services to each baths to ensure that the temperature of the hot water to the bath does not exceed 48℃.

9 A ¼ turn ball valve with lever is to be installed on all final connections to sanitary ware, washing machines & dishwashers.

10 The Main Contractor will be providing taps, showers, and Sanitary Ware free of charge to the Mechanical Contractor who shall fix and connect the units.4

11 All hot water distribution services are to be trace heated using Raychem HWAT-M self regulating trace heating cable. Hot water services are to be thermally insulated using 30mm thick insulation

4.3.12 AUTOMATIC CONTROLS

1. The contractor shall employ a Control Specialist, to supply and install a fully automatic control system to serve the various plants as detailed within this specification.

2 In general the controls specialist shall carry out the electrical installation works to all mechanical plant items either from the control panel or from local isolators provided by the electrical contractor.

3 The control system shall generally be manufactured by Trend, shall have a keypad on the control panel door for interrogation of the system and be fully commissioned by a fully competent Trend control systems engineer.

4 The control system shall generally be manufactured by Trend, shall have a keypad on the control panel door for interrogation of the system and be fully commissioned by a fully competent Trend control systems engineer.

5 A control panel shall be provided to house all the required power motor starters and MCB's as required by the plant items. The control panel shall be manufactured in two sections. One section will house all power wiring and components for the plant items while the second section shall house all the required Trend controllers and interface modules.

6 A door interlocked mains isolator shall be provided within the power section of the control panel, sufficiently rated for the electrical loading required. The isolator shall be sited within the control panel to allow the electrical contractor sufficient space to terminate the incoming mains supply cable assuming top panel entry.

7 The control circuit shall be 24Vac throughout the control panel. A dedicated control circuit transformer shall be provided and shall be rated to allow for 25% spare capacity for future use. Primary and secondary circuit MCB's shall protect the transformer.

8 Control switches and indication lamps shall be fascia mounted on the power section door and shall be clearly identified with engraved traffolytte labels.

9 Wiring within the control panel shall be run in ventilated purpose made cable trunking sized to allow for 25% spare capacity. All wiring terminations shall be made with crimp connectors and shall be identified using colour coded and numbered cable ferrules. Where possible all cable numbers should match the outgoing terminal numbers. Suitably

rated terminals shall be numbered and arranged for top panel entry. Spare terminals shall be provided in the power section and the control section of the control panel.

4.3.12.1 Heating Plant

1. The heating to the building will be provided by two gas fired fully condensing boilers, a pressurisation unit with expansion vessels and primary heating pumps into a buffer vessel
2. The heating to the building will be provided by two gas fired fully condensing boilers, a pressurisation unit with expansion vessels and primary heating pumps into a buffer vessel
3. A Constant temperature circuit shall be extended from the heating buffer vessel to serve a Heat Interface Unit in each of the flats.
4. Provision shall be made to interface with the general building fire alarm system, so that the control panel and the boiler module will shut down in the event of a fire alarm condition.
5. A Mikrofill pressurisation unit together with a 250 litre expansion vessel will provide the fill and expansion of the heating system. The Boilers will be interlocked with the primary pumps and the pressurisation unit such that the pumps will not be allowed to operate unless the system is at its required pressure.
6. The Boilers will not be allowed to operate unless either of the two primary heating pumps is running. A pressurisation fault condition shall also stop the Constant temperature pumps from operating.
7. A temperature sensor located within the heating buffer vessel will modulate the heating output from the two gas fired boilers in order to maintain the design flow temperature of the heating circuit to the HIU's. The outside temperature sensor will also provide frost protection. With an outside temperature of 2℃ or below the heating pum ps will run. A boiler return temperature sensor will start the boilers if the return temperature falls below 15C. The outside frost condition will automatically override any pre set plant operating time schedules.
8. The constant temperature pumps will be a twin head set with built in inverters to modulate the pump speed to maintain a constant circuit pressure. The pumps will automatically change over in the event of the lead pump fault. The Trend controls will also change over the lead pump daily.
9. The Trend control system will provide on/off time schedules and temperature control for the heating system. The plant will be switched in a staged sequence on initial start up to prevent overloading the electrical supply to the building.

4.3.12.2 Gas Services

1. A gas solenoid valve shall be provided in the main gas supply pipe and will be supplied from the control panel. The gas valve will close if a fire alarm condition is present.
2. A Safety circuit shall be provided and shall include thermal links above each boiler and emergency stop push buttons located at the exit of the boiler room. The operation of the safety circuit shall shut the control panel

down and close the gas solenoid valve. An indication lamp on the control panel door shall indicate that the safety circuit has operated and shall be repeated to the Trend controller.

4.3.12.3 Cold Water

1. A Dutypoint water booster set will be provided complete with its own control panel to operate its pumps according to the system pressure. The mains supply for this unit will be supplied from the control panel. If the unit goes into a fault condition then an alarm will be sent to the control panel for visual indication of the fault and to the Trend controller.

4.3.12.4 Future District Heating

1. The control panel shall include sufficient space to add at a future date the controls associated with a possible district heating scheme.
2. The plant associated with the future district heating scheme comprises:_

- A medium to low pressure plate heat exchanger
- A 3-port diverter valve to be installed into the HIU heating return main to the buffer vessel
- Temperature sensor in the existing heating return main from the HIU units
- A temperature sensor to be installed into the MPHW heating flow and return mains
- A temperature sensor to be installed into the flow and return main connections to the plate heat exchanger

4.3.12.5 Projected control points

The following list is an estimation of the likely points required. It shall be the responsibility of the controls specialist to finalise the points required.

DESCRIPTION	DO	DI	AI	AO	COMMENTS
Boiler flow temperature			1		
Boiler return temperature			1		
Boiler enable	2				
Safety circuit operated		1			
Fire alarm shutdown		1			
Pressurization unit fault		1			
CT flow temperature			1		
Outside air temperature			1		
Primary heating pump 1 enable	1				
Primary heating pump 2 enable	1				
Constant temperature pump 1 enable	1				
Constant temperature pump 2 enable	1				
Cold water booster set fault		1			
Future PHE enable	1				
Future 3-port diverter control				1	

The following is a list of equipment associated with the controls:

DESCRIPTION	Qty
Boiler Electro thermal link	2
Emergency stop push button	1
Boiler flow and return temperature sensors	2
Outside air temperature sensor	1
Trace heating thermostats	1
Trace heating cable	1
Trace heating pipe temperature sensor	1
Trend Controller	1
Trend Analogue Input module	4
Trend Digital Input module	1
Trend Digital Output module	1
Trend Analogue Output module	3
Trend Keypad	1
Heating temperature sensors	5
Heating temperature sensors - Future	4

4.4 LANDLORDS HEATING AND DOMESTIC WATER SERVICES

1 No Heating or Hot Water services are required in the Landlords areas of the building.

2 The Cold water services for the Landlord areas are confined to the provision of a wash down unit to be located in both the Bin Store & Residents parking garage all as indicated on the tender issue design drawings. The wash down units shall be as manufactured by “Arrow Valves Ltd model ref MIDI-3A AB 230V and installed complete with a wall mounted hose reel and hose pipe.

4.5 CO-ORDINATION WITH VENTILATION SYSTEMS.

The Contractor is to liaise with Coastal Ventilation and co-ordinate all pipework, routing, etc., services with the Ventilation ductwork and equipment routes and locations throughout.

4.6 ABOVE GROUND WASTE WATER DRAINAGE.

1. The Contractor is to design and provide all complete waste water drainage systems within the building from W.C.’s, Sinks, Bath’s, Showers, water-connected equipment e.g. Dishwashers, etc. All connections and pipework, fittings, etc., to comply with all relevant

British Standards, CIBSE Guides and the Building Regulations Part H. All pipework take-offs from equipment to be trapped. All pipework to be approved, solvent weld type PVCu.

2. The designed nominal diameter of all waste pipes shall not be reduced in the direction of flow.
3. The design of gravity drainage systems shall generally comply with The Building Regulations (*typically Approved Documents G & H*), the relevant parts of BS EN 752, BS EN 12056.
4. Ventilated PVCu SVP Risers to be provided. It is the Contractor's responsibility to design and position all SVP's to suit the final detailed design of the building and waste water Services in liaison with the Architect. Where required the SVP's to be boxed in with 15mm (min.) thick mdf on treated softwood battens with paint finish where visible in Rooms.
5. SVP's to connect to drainage pipework connection stubs from pipework connections running below the Ground Floor slab to Foul water manholes as indicated on the Architect's drawings.
6. The Contractor is to design and install a Rainwater drainage system for the Building including Roof guttering and down-pipes, etc. Refer to the Architect's drawings for principles of R.W. Guttering for the building. Rainwater down-pipes to be extended underground to discharge into purpose provided Soakaways or Manholes as indicated on the Architect's drawings.

4.7 SPECIAL EQUIPMENT AND APPLIANCES.

1. The Contractor is to install and connect Kitchen equipment and appliances in the Flats as indicated on the Architect's drawings to ensure a complete and final installation. The Contractor is to liaise with the Main Building Contractor at commencement of the site works to verify all final equipment and appliances and related services requirements and include for their complete installation.

4.8 EARTHING AND BONDING

1. The Contractor shall liaise with the Electrical Contractor to organise, supply, and install an Earthing and bonding system for the complete Mechanical Services installation generally in accordance with the requirements of BS 7671:2008 (Amendment : 2011) and BS 7430:1998.
2. All exposed and extraneous metalwork attached to or within touching distance shall be bonded to the earth system in accordance with BS 7671:2008 (Amendment 1: 2011).
3. All sections of metal support trays shall be bonded together and to earth. Cable trunking bonds shall be made using proprietary Earth links.
4. Separate green/yellow SCLSOH earth cables are to be run through all conduit and trunking as a supplementary earth and connect to all trunking sections, conduit boxes, equipment items, etc.

4.9 ELECTROMAGNETIC COMPATIBILITY (EMC).

1. Electro-Magnetic Compatibility for all systems and equipment is to be considered.

2. The Contractor is required to provide full details of the specified Equipment manufacturers EMC testing procedures and details which are to Comply with the following criteria

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Equipment	Emissions Standard	Immunity Standard
Internal lighting (normal & emergency)	EN55015:2006+A1	EN61547:1996
Fire Alarm	EN61000-6-3:2007	EN50130-4:1995
Other equipment	EN61000-6-3:2007	EN61000-6-1:2007

Additional Requirements:

Equipment also specified (in addition to the above table) is to meet the following standards regarding disturbances to mains power supplies:

Equipment	Standard
All mains powered equipment drawing up to 16A/phase	EN61000-3-2:2006
All mains powered equipment drawing up to 16A/phase	EN61000-3-3:1995
All mains powered equipment drawing greater than 16A/phase up to 75A/phase	EN61000-3-11:2000
All mains powered equipment drawing greater than 16A/phase up to 75A/phase	EN61000-3-12:2005

The manufacturers design construction, and testing is to also take into Consideration BSEN 50121 Parts 1 – 5

EMC Technical documentation is to be provided to demonstrate compliance with the EMC Regulations as:

- EC Declarations of Conformity for individual apparatus.
- Test reports to meet requirements of BSEN 50130-4, etc.
- Installation guides/instructions for EMC.

The Contractor shall obtain statements, certificates and other evidence of EMC compliance from the equipment and associated products manufacturers indicating compliance with the respective EMC Standards.

The statements, certificates and other evidence of EMC compliance from the equipment and associated products manufacturers shall be bound within the Operating & Maintenance Document. Copies of the statements, certificates and other evidence of EMC compliance shall be passed to the project manager as required during the works.

4.10 DETAILED INSTALLATION DRAWINGS.

The Contractor is to be responsible for providing full co-ordinated AutCAD prepared detailed Installation drawings, as detailed under Section 3.0, indicating the mechanical services.

The installation drawings are to include typical cross sections of any pinch points

Copies of the installation drawings are to be issued electronically for approval prior to works being undertaken

The drawings are to be at a scale not less than1/50

4.18 COMMISSIONING & COMPLETION.

As part of the finishing works the Contractor shall carry out the following works

- Flush out the entire heating services and chemically dose the system with an inhibitor
- Chlorinate the entire domestic hot and cold water services
- Provide a gas schematic of the installed services
  Boiler manufacturer to commission the new gas fired boilers including their controls
- Manufacturer to commission the cold water booster equipment.

At the completion and prior to hand over the Contractor shall demonstrate the completed services to the Client's Representative/Project Manager and shall provide an Operating and Maintenance Manual which shall contain the following information.

1. As installed drawings of all services
2. Commissioning results of the services
3. Chlorination certificate
4. Manufacturers Operating and maintenance instructions for all plant and equipment installed
5. Contact details of the Gas & Water authorities
6. Manufacturers commissioning certificates
7. Copies of all pipe work pressure testing

At hand over the Contractor is to further demonstrate the entire installed services to the Client's Representative/Project Manager.
After a period of 1 month following hand over or occupation the Contractor shall return to site and carry out further demonstrations as requested by the client

4.19 BUILDERSWORK IN CONNECTION WITH MECHANICAL SERVICES.

The Mechanical Contractor is to provide a list, with quantities, sizes details, etc., of items which require Builder's provision/attendance to successfully execute the Mechanical Services installation through to completion. The Mechanical Contractor is to liaise with the Main Building Design Contractor on site and mark-up all holes needed through walls/Structures, etc.

4.20 SUGGESTED EQUIPMENT FOR CONSIDERATION.

A Schedule of equipment for the Mechanical Services is included in Section 6

SECTION 5: PIPEWORK STANDARDS & INSTALLATION

The Contractor is to note that the following Specifications are standard and those relevant to this specific installation are to apply.

All connections and pipe work, fittings, etc., are to comply with all relevant British Standards, CIBSE Guides & the Building Regulations Part H.

All pipe work take-offs from equipment will be trapped. Care shall be taken to ensure that dirt and rubbish are prevented from entering open ends of pipe work during storage and progress of the works. Open ends shall be blanked off with purpose-made plugs or caps. Plugs of wood, paper or any similar fibrous materials shall not be used. If any stoppage in the circulation occurs as a result of non-compliance with this requirement, the contractor shall rectify the matter at his own expense. Reducers shall be eccentric to permit line drainage or venting, as applicable, unless otherwise specified.

Cold pulled bends using an approved bending machine will be permitted on copper pipe work provided there is no distortion, undue thinning of the wall, joviality or any damage to the metallic structure of the metal Pipework shall be run as neatly as possible, setting around obstructions, follow the lines of the building fabric whether horizontally or vertically and shall be arranged to make the best and most economical use of the available space.

All valves and cocks shall be suitably installed in positions easily accessible for operation, maintenance and replacement purposes.

Piping in ducts and ceiling voids shall be suitably spaced and so arranged as to permit subsequent access to any pipe for maintenance and removal without disturbance of the remaining pipes.

Pipes shall not be solidly built into walls or plasterwork and joints shall not be positioned within the thickness of walls, floors or in any other inaccessible positions.

Pipes subject to expansion shall be run so that they are not fixed hard onto walls or tight in brackets

A minimum clearance of 100mm shall be provided between all piping insulation and the finished floor and ceiling levels.

Pipe work, which is to be insulated, shall be fixed so as to allow each pipe to be insulated around its full circumference with a clear space of 20mm minimum between the insulation and walls or other surfaces (excepting floors and ceilings) or the insulation of an adjacent pipe.Minimum clearances between pipe work, electrical conduit and wiring, when these services are run in parallel, shall be 150mm.

Where pipes pass through walls, floors and ceilings they shall be enclosed by sleeves of similar metal to the pipe concerned and such sleeves shall be of a size to permit free movement of the pipe with a minimum clearance of 3mm. Subject to special provision where such sleeves have to allow for expansion the sleeves shall be set concentric with the pipe and the weight of the pipe shall not be borne by the sleeve.

Pipe sleeves through designated fire stop partitions, walls or floors, shall be caulked with mineral wool or other suitable and approved material. Such fire stopping shall meet with the local Fire Authority approval.

Sleeves shall fit the full width of the building fabric as finished and shall terminate with the finished face of the fabric. Vertical sleeves shall incorporate a lug to prevent displacement after fitting and shall be fixed or grouted in the floor as necessary. Split sleeves shall not be used without the approval of the Contract Administrator.

Where pipes pass through bathroom, toilet or kitchens floors which are subject to washing down, each sleeve shall project 15mm above finished floor level and the packing shall be sealed watertight with a suitable and approved waterproof sealing compound.

Expansion and Contraction

All piping shall be arranged so that expansion and contraction can be readily taken up by bends and/or changes in pipe direction.

Branch connections to mains shall be made in such a manner as to avoid undue stress being exerted on them due to expansion and branches shall be pre-stressed by cold drawing them during erection. Insulated pipe work within floor voids, routed through notches cut into joists, shall have the insulation carried through the notches. If this is unacceptable due to structural constraints, pipe work shall be wrapped with a fibrous rubbing strip where they pass through the notch to avoid noise generated by movement of expanding or contracting pipe work.

Pipe work supports:

All pipe work shall be supported in such a manner as to permit free movement due to expansion and contraction, except where anchored.
Pipe work supports shall be arranged as near as possible to joints and changes in direction, each support shall take its due proportion of pipe weight.

Supports shall be provided adjacent to all valves and equipment installed in the pipelines to prevent undue strain on adjoining pipe work and to allow the equipment to be removed for maintenance purposes, leaving the pipe work adequately supported at the free end.

Pipe supports for mild steel and copper (shown in parenthesis) shall be arranged at intervals not greater than those shown in the following table:

Pipe Diameter	Intervals - Horizontal Runs	Intervals – Vertical Runs
15 to 20(22) mm	1200mm	1800mm
25(28) mm	1500mm	2400mm
32(35) to 50(54) mm	1800mm	3000mm
65(67) mm and above	2400mm	3600mm

Pipe Supports for UPVC and ABS pipe work shall be arranged at intervals not greater than those shown in the following table.

Pipe Diameter	Intervals - Horizontal Runs	Intervals – Vertical Runs
15 to 20mm	800mm	1200mm
25mm	900mm	1300mm
32	1000mm	1500mm
40	1100mm	1600mm

Where two or more pipes are supported on a common bracket, the spacing shall be as for that of the smaller pipe.

Vertical pipes shall be supported at the base to withstand the total weight of the riser. Branches from risers shall not be used as a means of support for the riser. The supports for horizontal pipe work shall be fixed to allow for correct grading of the pipes and to allow for positive venting and draining.

All pipes shall be supported independently and so fixed that they may be removed or replaced without disturbing other pipe runs and/or insulation.

Brackets for copper tube shall be hot stamped or cast brass, brackets for chromium plated tube shall be chrome on cast brass or gunmetal, brackets for mild steel tube shall be of mild steel or malleable iron as approved, brackets for galvanized mild steel tube shall be galvanized iron or steel.

<u>Venting and draining:</u>

Drainage and air venting facilities shall be provided at all low and high points of all water system piping and equipment to permit the complete emptying of systems and the release of entrained air.

Automatic air vents shall be provided at all high points of water services piping in plant rooms, vertical ducts, ceiling voids and as shown on the drawings. Elsewhere manual air vents shall be fitted to all water system high points.

Painting and identification:

All plant and equipment (unless suitably finished by the manufacturer) in plant rooms, all un-galvanized ferrous pipe work, supporting steelwork brackets, brackets and steel flanges shall be painted.

All the above surfaces shall be thoroughly de-scaled and cleaned by wire brushing and then painted with one coat of best quality chromatic priming paint. Where the surfaces are to remain un-insulated, the priming paint coat shall be followed with one undercoat and one gloss topcoat of a heat resisting paint of colour to be approved by the Contract Administrator.

All un-galvanized ferrous pipe work, immediately after installation, shall be prime painted as described above.

All cut edges of mild steel ductwork shall be painted with a coat of best quality galvanizing paint.

Colour coding of all piped services and/or pipe insulation shall be carried out in accordance with the requirements of BS 1710. Where pipes are within distribution service ducts, roof voids, ceiling voids, etc. code banding and direction arrows shall be located in all places of access. On all circulating circuits the words ‘flow’ and ‘return’ shall be placed adjacent to the appropriate direction arrows. All valves shall be provided with laminated plastic discs secured to valves with split rings each engraved with a reference number. The Contractor shall allow for a minimum of five 8mm high characters on each disc. The designations of valves shall be agreed with the Contract Administrator.

A diagrammatic valve chart shall be provided in each plant room showing and listing the valve reference numbers, their location and function. The valve chart shall be manufactured from dual colour melamine sheet suitably engraved. All valve reference numbers shall be shown on the ‘As Fitted’ drawings. All items of plant, including boilers, pumps, calorifier, pressure sets, storage tanks, air handling units, etc. shall be labelled with laminated plastic plates. Where two items of plant are identical they shall be numbered no. 1 and no.2.

Within the gas meter compartment a gas line diagram wall mounted behind glass in a frame shall be provided, all in accordance with the requirements of the Gas safety Regulations.

Temperature / altitude gauges and test points:

Provide and install temperature (T) gauges, combined pressure and temperature (P/T) gauges and test points (TP) as indicated below and as shown on the drawings

(T) On all F&R final connections to boilers and Hot Water Calorifier & branch connections to new low loss header

(P/T) On the suction and discharge side of all circulating pumps

(TP) On all ports of motorised control valves

All (T) and (P/T) gauges shall be complete with brass pockets. Gauge ranges shall be selected to suit the working pressures and temperatures of the installed systems with units measured in 'BAR' and '℃', respectively

dosing pots:

A heating system chemical dosing pot is to be included within the plant room for hating System.

Valves, cocks and ancillary items NOTE: Contractor is to provide as relevant to this project.

Provide and install the following items where required / necessary in order to commissioning the complete mechanical installation. All fittings shall comply with the requirements of the Water Supply Regulations and be listed in the WRAS Water Fittings and Materials Directory.

Pressure Reducing Valves– Direct Acting:

Pressure Reducing Valves shall be installed to reduce water pressures to a specified level during flow and non-flow conditions if required to suit the specific equipment/service. No pressure creep shall be permitted under non-flow conditions.

Isolating Valves (IV):

15-50mm bore	OVENTROP 10791 or HATTERSLEY fig. no. 100EXT quarter turn ball valve with extended lever shaft.
15mm bore Low Flow	OVENTROP 10611 or HATTERSLEY fig. no. 1473 DR globe valve.to 0.035 l/s)
65mm bore and above	OVENTROP 10482 or HATTERSLEY fig. no. 970 fully lugged Butterfly Valve.

Lock shield Valves (LSV)

15-50mm bore	OVENTROP 10792 or HATTERSLEY fig. no. 100LS quarter turn ball valve.

Commissioning Sets (CS):

15-54mm bore	OVENTROP 10608 (complete single set unit comprising of DRV and Metering Station) or HATTERSLEY fig. No. 2432 comprising DRV as below plus fig. 1000 bronze metering station with threaded connections.

Note: Please confirm flow rates for use of Low Flow or Medium Flow Commissioning Sets.

65mm bore and above	OVENTROP 10628 cast iron commissioning set

Double-Regulating Valves (DRV):

15-50mm bore	OVENTROP 10601 or HATTERSLEY fig. no. 1432 oblique pattern double regulation globe valve with bronze body and DZR stem.
65mm bore and above	OVENTROP 10626 or HATTERSLEY fig. no. M733DR cast iron oblique.

LTHW pattern DR globe valve:

65mm bore and above on	OVENTROP 10465 or HATTERSLEY fig. no. 954G semi-lugged double domestic hot & cold water regulating butterfly valve.

Stop Cocks (SC):

15-50mm bore	To BS 1010
65 and above –	HATTERSLEY fig. no. M598 to BS 5163 with bronze below ground seat.
65 and above –	HATTERSLEY fig. no. M598 to BS5163 with bronze below ground ferrous pipe seat.
65 and above –	HATTERSLEY fig. no. 35 to BS 5154 with bronze above ground copper pipe body and stem.

Gas Cocks (GC):

15-50mm bore	OVENTROP 30164 or HATTERSLEY fig. no. 100 quarter turn ball valve with yellow ‘GAS’ sleeved lever.

Single and Double Check Valve (CV) & (DCV):

15-50mm bore	OVENTROP 44011 (Single check) or OVENTROP 44001 (Double check) or YORKSHIRE fig. no. 4423 double check valve with screwed female connections

Safety Valves (SV):

15-50mm bore	NABIC fig. no. 500 spring loaded type safety valves as manufactured by National Vulcan Engineering Insurance Group Ltd.

Strainers (STR)

Up to 40mm bore	OVENTROP 11200 or SPIRAX-SARCO 'Y' type with malleable iron body, 0.8mm perforated brass screen and screwed ends.
40mm bore and above	OVENTROP 11200 or SPIRAX-SARCO 'Y' type with cast iron body, 1.2mm stainless steel screen and flanged ends.

Drain Cocks (DC):

Within plant rooms and on Major items of plant	OVENTROP 10320 or HATTERSLEY fig. no. 81HU gland cock.
Where exposed to view	OVENTROP 10335 or HATTERSLEY fig. no. 371 lock shield pattern with serrated hose connection to BS 2878.
Service Valves:	15 & 22mm bore OVENTROP 10793 or BALL-O-FIX valves to be fitted to all connections to sinks, basins, WC cisterns, showers and other miscellaneous sanitary fittings. Valves shall have chromium plated finish and have screw slot adjusters.

Thermostatic radiator Valves (TRV)

15mm bore	OVENTROP AV6 Uniset Pro (compression connection) with matching Combi 4 lock shield valve

Air Vent (AV):

HATTERSLEY fig. no. 425 key operated bronze air vent.

Automatic Air Vent (AAV):

OVENTROP 10883 or CHARLES WINN B/SS aluminium bronze body, stainless steel spindle, brass ball, valve and seat nickel alloy with integral isolating valve. Outlet to have 8mm copper discharge pipe run to terminate 400mm above FFL.

Pressure Regulating Valve (PRV):

NABIC fig. no. 800 pressure relief valve

Temperature & Pressure Relief Valve (T&PRV):

FLAMCO UK 'Prescor' thermal relief valve

Expansion Valve (EV):

FLAMCO UK 'Prescor' expansion relief valve

Tundishes:

FLAMCO UK visible tundish of DZR.

Temperature Gauge (T):

NABIC fig. no. 345 or equal and approved

Pressure Gauge (P):

NABIC fig. no. 210 or equal and approved

Combined Pressure and Temperature (PT):

FLAMCO UK thermo pressure gauge

Automatic By-pass Valve:

DANFOSS-RANDALL model AVDA 15- 25 or 32 - 50mm regulator complete with impulse tubes

08.00 **THERMAL INSULATION**

Pipe work:

All piped services with the exception of the gas services, boiler and flue drain/condense lines, shall be thermally insulated as follows:

Insulation shall be of the pre-formed Rockwool rigid section type with minimum declared thermal conductivity of 0.04 W/m℃ and thickness as detailed below

LTHW Heating and Hot Water Pipe work –

Pipe Size	ckness
15	25
20 (22)	32
25 (28)	32
32 (35)	32
40 (42)	32
50 (54)	32
65 (67)	40
80	40
100	40

Cold Water Pipe work (Copper)-

Pipe Size	ckness
15	25
22	32
28	32
35	32
42	40
54	40
67	40

All thermally insulated pipe work shall be finished with reinforced aluminium foil sheeting.

All refrigerant pipe work shall be insulated with HT/ARMAFLEX – UV resistant pre-formed foam thermal insulation with built-in vapour barrier, or other equal and approved. All joints and seams shall have HT/ARMAFLEX HT 625 adhesive applied to form a complete bond between joints and seams. All external refrigerant pipe work is to be painted two coats of UV resistant paint

Thermal insulation and adhesive shall be applied in strict accordance with the manufacturer's instructions.

All valves within the boiler plant room shall be fitted with insulating jackets.

All thermal insulation on mains cold water pipe work shall incorporate a vapour barrier.

Pipe work exposed to view and final pipe tails to sanitary ware, where exposed to view, shall not be insulated.

Thermal insulation throughout shall have identification bands

stuck to surface at 1000mm intervals to describe the service covered

SECTION 6:

1. SCHEDULE OF SUGGESTED EQUIPMENT & SYSTEMS.

To be read in conjunction with Section 4 the Mechanical Specification and Section 3 of this Specification, the Architects design drawings, and Performance Specifications.

NOTE: The Mechanical Contractor is to base his tender on the plant and equipment and plant identified on the tender issue design drawings and schedule below.

ITEM	MANUFACTURER	TYPE
Main Gas-Fired Boilers	MHG Wallcon 115 – Rated output 105Kw when operating at 80/60℃	Wall Mounted Units. Condensing. Balanced Flue.
Cold Water Main Booster System	Dutypoint Scubatank 2250 with duty standby pumps	Scubatank 2250.
Boiler System Pressurization set.	Mikrofill3 unit complete with 250l exp vessel	Mikrofill3
Heating system Pumps	Grundfos Ltd.	Run & Standby pumps
Heat Interface Units	MHG Teleheat Heat Interface Units	As scheduled on tender drawings
Plantroom External Weatherproof Supply/extract High/Low mounted) Fresh- Air Grilles.	-	To be as detailed by Architect. Min 450mm sqr top and bottom
Heated Towel Rails	Stelrad Aqua Classic dual fuel rails	White rails of sizes and outputs scheduled on tender drawings
Radiators	Stelrad Compact.	As scheduled on tender drawings
Heating and HWS Plantroom Control Panel and associated Controls/Detectors, etc.	Edwards Modular Controls Ltd. Brighton or equal	.
Main Primary Gas-cock and Fire KO Valves and mains Water Isolating Valves	By Control specialist	Contractors Choice
Local Heat & Water Meters	Heat Meters UK & Water Meters UK Ltd. Tel. 01524 555929	Maxac – water meter
Garage & Bin Store mains water wash down unit	Arrow Valves Ltd	Break tank and pump MIDI-3A-AB 230v

Internal Waste / Drainage equipment	Contractor's choice.	As Marley or equal uPVC system to suit SVP locations as indicated on Architect's drawings.
External Rainwater equipment	Contractor's Choice.	Contractor to liaise with the Architect to agree type/quality/sizes of down-pipes and locations to suit ground level discharge positions, etc.
Heating Buffer vessel	MHG 750 Litre	750 L
Combined dirt & air separator	Boss 50mm combined unit	50mm
Electromagnetic water conditioner	Dutypoint	EC65