

PROJECT REF: - BS 2022

DATE: - JUN 2022

TENDER ISSUE – T2

**HEVERCOURT RESIDENTIAL HOME, GOODWOOD CRESCENT,
GRAVESEND, KENT, DA12 5EY**

REFURBISHMENT WORKS

**MECHANICAL ENGINEERING SERVICES
SPECIFICATION PARTS A, B, C AND D**

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PROJECT REVISION SHEET

<u>Revision No.</u>	<u>Date</u>	<u>Details</u>	<u>Changes</u>	<u>Author</u>	<u>Approved</u>
T1	Jul 2022	Tender Issue		CB	CB
T2	August 2022		Pumps schedule updated HWS regulating valves added	MN	MN

PART A

GENERAL CONDITIONS AND PRELIMINARIES

Refer to General Conditions of Contract included in the Main Contract Document.

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<u>PART B</u>	<i>B / Issue A – Revision 5 – 2014</i>	
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<u>PART B</u> <u>GENERAL CLAUSES COMMON TO BUILDING SERVICES, PLANT AND EQUIPMENT</u> <u>INTRODUCTION</u> <u>Scope of Part B</u> Shall :- comprise integrated parts of the Specification covering the general requirements relating to the Works, as detailed in Parts C and D and on the accompanying drawings. be integrated together with Part A (where included) and read as a complete contract requirement. form a single entity, together with drawings. be complementary to each other (except in the case of Engineering Bills of Quantities) and include within the tender sum for the provision of all items shown or described in either or both. provide for any information contained in Part B which may not apply to all contracts to be ignored and only that relevant to the work being carried out to be acted upon. <u>Names of Parties</u> Shall :- in this part of the documentation provide for the Clause requirements for the specified work shall be the responsibility of the 'Engineering Contractor or Sub-Contractor' depending on whether the engineering installation is to form the Contract Work or Sub-Contract Work for the project, unless otherwise directed in Part D. <u>Definitions</u> Shall :- Comprise the following works and associated meanings :- 'Shall' is mandatory. 'Will' is informative. 'Should' is advisory 'Provide' means supply and fix or install.	01	01 02 03
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<u>Quality Assurance</u> Shall :- be in accordance with the BSI Buyers Guide to ensure that products that are manufactured, or stocked, under the following schemes are always given priority :- BSI KITEMARK Scheme BSI SAFETY MARK Scheme Firms of Assessed Capability Stockists of Assessed Capability include for the Client to be notified of any instance where these schemes could be, but are not, used. End of Element		04
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<u>STATUTORY REQUIREMENTS AND STANDARDS</u> <u>General</u> Include in the tender for all costs to complete the works in accordance with the Statutory Requirements and Standards current at the time of tender. Subject to negotiations and later instruction comply with subsequent issues during the Contract. The requirements of the Statutory Requirements and Standards are detailed throughout the documentation and particular items specific to Part B follow below. <u>Statutory Instruments, Regulations and By-Laws</u> The Building Services Contractor shall :- complete the works to and in accordance with the relevant :- Health and Safety at Work Etc. Act. Statutory Instruments associated with Construction and Installation Work The Building Act 1984 and the Building Regulations 2000 and subsequent amendments (including all approved amendments and editions) Electricity at Work Regulations 1989 Electricity Supply Regulations 1988 (as amended 1992); IEE Wiring Regulations (BS 7671: 2008 Requirements for Electrical Installations); Gas, Water and Electricity Authority Requirements Notify all Authorities in accordance with their By-Laws. Crown buildings are to comply with Building Regulations but are exempt from approvals or inspections by the Local Authority.	02	01
		02

<u>British Standards</u>	03
Shall :-	
Apply to all sections of the work, as listed hereunder :-	
BRITISH STANDARDS	
BS EN55014-1 : 2006 Electromagnetic compatibility. Requirements for household appliances, portable tools and similar electrical apparatus.	
BS EN55014-2 : 1997 Electromagnetic compatibility, Requirements for household appliances, electrical tools and similar apparatus. Immunity, products family standard.	
BS EN60073 : 2002 Basic and safety principles for man-machine interface, marking and Identification coding, principle for indication devices and actuators.	
BS 5304 : 2005 Guidance on safe use of machinery	
BS5378 Safety signs and colours	
Part 2 : 1980 Specification for colorimetric and photometric properties of materials.	
BS 5499-5 : 2002 Graphical symbols and signs :- Safety signs, including Fire Safety Signs. Signs with specific Safety meanings. BS EN 14713 : 1999 Protection against corrosion of iron and steel in structures. BS 6150 : 2006 Code of Practice for painting of buildings	

BS 8313 : 1997	Code of Practice for the accommodation of building services in ducts End of Element		
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<u>Protection and Storage</u> Shall include :- adequate and safe storage for all material plant and equipment necessary in respect of own Works. purpose made racks for storage of conduits, pipes and similar materials to prevent bending and distortion. purpose made end caps to protect threads, nozzles etc. protection by means of paint, tallow or grease for bright and machined surfaces and cleaning and polishing immediately before handover. protection against frost, building works, or operations by others.	08
suitable racks and storage for plant, equipment and materials unable to be stored in huts or buildings. protection for electrical cables and seal cable ends using methods and materials recommended by cable manufacturers. for leaving plant and equipment in a condition ready for painting where specified as part of the work or by others. for painting parts liable to corrosion immediately after removal of temporary protection. replacement material, plant or equipment where deterioration or damage has occurred prior to handover. <u>Position of Plant and Equipment and Installation to Drawings</u> Shall :- be in accordance with drawings scheduled in the specification which show the layout arrangement and equipment but may not detail the whole work involved and are diagrammatic in certain particulars. notwithstanding the provision of the drawings take dimensions and particulars from site for the work specified. include for submission of installation drawings based on the latest available information for the engineers consideration at a reasonable time before work is commenced. give due consideration to all services detailed on co-ordination and zoning drawings where provided with the specification. provide for contractual distribution all information and drawings necessary to achieve complete co-ordination. give due regard to the needs of inspection, efficient maintenance and replacement.	09

<u>Positions of Outlet Points</u>	10
Shall :- where detailed integrated layout drawings have not been issued with the tender, shall allow for fixings outlet points up to 1 metre from the positions specified or shown on the drawings at no extra cost.	11
<u>Alternatives</u> shall :- where a particular manufacturer is specified in Part D, include for the manufacturer called for in the specification. where considered appropriate provide for equivalent standard alternatives to be offered for consideration detailed with cost and technical comparisons, including references to British Standard where appropriate, on the schedule of alternatives submitted with the Tender. conform to the same intent, design, the same details of co-ordination and shall be compatible with other elements of work (Services or other trades). The cost of such an exercise and/or any subsequent cost arising due to the same purpose directly or indirectly, or due to the changes induced to other equipment and/or work of other trades shall be borne by the Contractor and under no circumstances form any claim.	
<u>Clean and Tidy Working</u>	12
Shall :- in respect of own Works require the site to be kept clean, tidy, free from waste and superfluous material and take all necessary precautions to avoid damage to the building structure or its contents.	13
<u>Samples for Approval</u>	
Shall :- be submitted for the Engineer's consideration and comprise such samples of workmanship, materials and equipment intended for execution of the Works as the Engineer considers necessary. Samples will remain the possession of the Engineer until the contract completion or be embodied in the installation.	

Working in confined Spaces

Shall :-

be defined and detailed, and risk assessments/method statements carried out within the requirements of the CDM regulations, and incorporated into the Health and Safety Plans.

be governed by a 'Safe System of Work'

be undertaken in accordance with an appropriate 'Permit to Work' procedure where such procedure is in operation on the site.

where no 'Permit to Work' system is in operation, be undertaken only after fully investigation and resolution of the following matters has been completed and the Engineer informed in writing of the proposals :-

- (a) Assessment of the task to be undertaken
- (b) Identification of the hazards of the task
- (c) Decision on methods of working to avoid hazards
- (d) Implementation of a system of work to incorporate these methods
- (e) Monitoring of the operation of the system of work

before commencing work and before personnel enter the space, be demonstrated to be safe by testing that no toxic or asphyxiate gases are present and the adequate oxygen levels are present.

before commencing work, include assessment of the likelihood of the conditions remaining as found, the impact of any materials or equipment to be taken into the confined space or found there (deposits, sludge, residues etc) and the possibility of any hazardous gases or vapours being able to enter the space.

be restricted to trained personnel.

be undertaken after consideration of the following :-

- (a) the provision of safe means of access and egress;
- (b) the presence of personnel to keep watch outside;
- (c) the provision of effective communications between personnel inside and outside;

(d) the provision of suitable protective equipment, including harnesses if possible and selfrescuing breathing apparatus if appropriate; (e) the availability of gas detection equipment and staff trained in its use; (f) a means of effecting a rescue in the vent of an emergency. <u>Method Statements</u> Shall :- include for preparing detailed method statements and risk assessments prior to undertaking major work packages or work to existing services. prepare a detailed method statement for the overall project to address the problems of programming, completion to suit specific contractual requirements. address the following issues with regard to each activity :- i) Health and Safety ii) Method of working iii) Programme iv) Enabling Works v) Specialist attendance's/tools/materials vi) Work required by third parties eg. hospital engineer, microbiologist or pharmacist vii) Quality assurance viii) Contingency measures (i.e. failure of break-in or ability to bring existing service back on line in accordance with programme) ix) Permit to work system x) CDM regulations 2007 submit the method statements/risk assessments to the Engineer and site representative within a reasonable time prior to undertaking such work for comment, where applicable. Copies shall be forwarded to client's representative. Where requested, the method statements/risk assessments shall be prepared and submitted to the Principal Contractor when required for incorporation into the Health and Safety Plan. End of Element		18
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<u>GENERAL TECHNICAL</u>	04	01
<u>Connections to Existing Services</u> Shall :- include specified new connections into existing services and unless otherwise stated, the buildings being assumed to be in full commission. include for the work to be carried out in a manner that does not interfere with the routine working of the buildings and in accordance with the programme of works. include for isolating and reconnecting as required for the permanent and/or temporary connections and making good insulation and decoration affected by the Works not isolate any equipment or section of any existing service unless the time and date of isolation has been agreed, via the site procedure for isolation. the Contractor shall ascertain site procedure for isolations and shall note that on some sites and some systems isolations may only be carried out by site engineers. include for bringing to the attention of the Engineer before commencing work if the condition of the existing services are not considered satisfactory for connections to be made. include identification, draining down, refilling, venting and balancing of any disturbed piped services. include circuit identification and testing of any disturbed electrical services.		02
<u>Connections to Appliances</u> Shall :- include for technical co-ordination for connection to all plant and equipment specified and for disconnecting and reconnecting of existing item requiring moving.		

include sound attenuation equipment and materials to prevent transmission of sound through ducts, pipework and structures as specified in Parts C and D.		
<u>Guards</u>		08
Shall :-		
be provided to all moving parts of machinery in accordance with the requirements of the Health and Safety at Work Act.		
comply with BS 5304 and provide easy access for maintenance together with access to shaft ends for tachometer attachment.		09
<u>Plant Drives, Pulleys and Keys</u>		
Shall :-		
include flexible couplings for flange and vee belt drives for pulleys. Flange or pulley drives on motors, fans and pumps to be truly balanced and secured in position by shaft keys or patent or patent locks readily accessible for withdrawal or adjustment.		
<u>Design Interchangeability</u>		10
Shall :-		
ensure that items of plant to be interchangeable where this will not affect the efficiency or safe operation of the works involved.		
<u>Fixing Building Services, Plant, Etc to the Building Fabric</u>		11
Shall :-		
be carried out as specified in Element 06.02.		
<u>Plant Bases and Anti-Vibration Mountings</u>		12
Shall :-		
ensure that all concrete bases for plant and machinery have a minimum perimeter clearance of 150mm with each item of plant adequately fixed, supported and aligned, in accordance with the manufacture's recommendations.		
include provision of holding down bolts, for all items of plant, including anti-vibration materials and mounting for units having rotation or moving machinery. Anti-vibration material which is to be cast into plinths shall have a weatherproof membrane on both bearing surfaces and be handed to the Building Contractor before casting commences.		

<u>Lubrication</u> Shall :- comprise the supply and servicing of plant and machinery with lubricants to the manufacture's recommendations before attempting to operate, ensuring lubricant levels are correct and providing a list of the manufacture's recommended lubricants. include the supply lubricant dispensers for each pattern of nipple and cup fitted. where necessary for purposes of servicing, include extension pipes with lubricant nipples.		13
<u>Bonding and Earthing</u> Shall :- include all necessary materials and make connections as specified in Part D to ensure that all installations and equipment are efficiently and continuously bonded to an earthing system at all times in accordance with IEE Wiring Regulations (BS 7671 Requirements for Electrical Installations).		14
<u>Spare Parts</u> Shall :- comprise the spare parts listed in the Schedule of Spares included in Part D, and show the costs as a separate item within the Tender. include for ordering the spares at the same time as orders are placed for the plant and equipment and raise for consideration any spare items which should be added to the Schedule of Spares. comply with the plant specification and be interchangeable with the corresponding parts on the plant. be numbered and described for identification and prepared for storage by protective enclosures and/or greasing or painting. produce delivery notes and ensure that these are signed by the clients representative for all spares and tools handed over. Posting or delivery to site of any items without obtaining evidence that they have been received by the Clients representative may result in further spares being required at no additional cost to the contract.		15

<u>Colours of Indicator Lights, Push Buttons, Annunciators and Digital Readouts</u> Shall :- conform with the conventions of BS EN 60073 or as specified in Part D. End of Element		16
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<u>TESTING, COMMISSIONING, CLIENT INSTRUCTION AND HANDOVER</u> <u>General</u> Shall :- as the Commissioning and Testing is an important and lengthy task to be undertaken prior to handover of a completed project, include for the preparation by the Main Contractor and his Sub Contractor of a Commissioning Programme as part of the Contract Programme, in conjunction with other contractual parties and with agreement of the Engineer, to describe the commissioning/demonstration and instruction Procedures, dates and personnel involved. The Programme to be agreed and distributed at least six weeks before commissioning is due to commence. include for all arrangements to enable the Engineer or his representative or nominated insurance company to witness test, or test and inspect at site or at the manufacture's premises. include for the appointment of an approved engineer, from the Contractor's own staff or an independent commissioning company, (known as the Commissioning Engineer) who is fully conversant with the operation of the Works and competent to supervise the whole of these procedures, which shall be carried out by persons fully trained in the operation of specialist installations and equipment. allow for the Engineer and his representatives to witness the proceedings, confirm the recorded results and determine whether the specified requirements have been met. allow for the Engineer to receive adequate written notice of the date and place of each (or series of) test, inspection, commissioning or demonstration procedure. include for demonstrating to the Engineer that the test instruments and equipment used are accurate when compared with a recognised standard. include for provision of all labour, materials (including fuel and energy – see Part D) and apparatus required for carrying out the testing, commissioning and instructing the Client's nominated staff. provide for commissioning and testing to be carried out with all trades evacuated, <u>other</u> than those associated with the Commissioning and Testing Procedures. ensure that the Testing and Commissioning period does not encroach on the Main Contract period.	05	01
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<u>Testing</u> Shall :- include the provision of a separate set of drawings and/or report sheets to be used to accurately record the following test and inspection information :- (a) Plant, section and installation under test (b) Manufacturer's reference number where applicable (c) Date, time, duration of test (and weather conditions if appropriate) (d) Test results with itemised readings including records of all other checks and tests. include for the testing of all equipment, material and services installations as detailed elsewhere in the specification and if the first inspection or test fails, repeat the procedure within a reasonable time, adhering to the time cycles and other requirements as specified for		02
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the first test. require the completion of all tests before any paint, cladding or similar materials are applied or before services are concealed. The Engineer will :- give twenty four hours written notice of his intention to be represented at the test. if he decides after inspection or testing, that such plant or any part thereof is defective, or not conforming with the specification, reject such defective parts by written notice within a reasonable time indicating the area of dispute. if he considers the tests are being unduly delayed, arrange for instructions to carry out the tests within 10 days. <u>Commissioning</u> Shall :- following satisfactory completion of the foregoing tests and when the installation is in a safe and satisfactory condition, set it to work and proceed to regulate and adjust as necessary to the design requirements. In general terms include the following procedures in accordance with information in specification Parts C and D :- (a) setting to work all systems as specified and ensuring that the performance requirements have been achieved. (b) balancing and regulating all systems to meet specified performance requirements. (c) making final adjustments and before practical completion, demonstrate by commissioning procedures detailed else where in this specification, that the provisions of the contract have been met in total by completing the previous testing and setting to work procedures and by showing that the completely integrated installation will function in accordance with the specified performance requirements. include records of all test results on the sheet provided, completing all commissioning documents and at all stages ensure that the Engineer has certified the documents and/or arranged for instructions for any remedial work.		03
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<u>Commissioning Procedures</u> Shall :- ensure that the following requirement shall be observed when commissioning the engineering works :- 1. Progressive static testing will be witnessed by the Site Engineer(s) when the work is presented as ready for testing. This will include Insulation Resistance Tests, Earth Continuity Tests, Water, Gas Pipeline and Air ducting Tests. 2. Pre-commissioning examination and testing should ensure that each system or item of equipment is complete, in a safe condition and all notices displayed. Completion for operational purposes implies the bulk of the snagging of work has been offered to the Site Engineer(s) and remedial work completed. All fans, pumps etc., will have been checked for operation and all polarity testing, phase sequence testing, loop impedance testing etc. carried out. 3. The Engineer, Site Engineer, Commissioning Adviser and other members of the contractual team to discuss the Commissioning Programme (previously prepared) take	04
account of any problems arising, availability of related services, agree access required for controls and agree documentation to be used etc. and adjust programme as necessary to a clear understanding of the position. 4. Demonstration of agreed systems and equipment to the programme will be witnessed on behalf of the Employer/client by the commissioning Adviser/Site Engineer/Engineer and results examined and adjust for final acceptance. 5. Instructions to the users staff to be completed by handover. 6. Any outstanding final acceptance testing such as for refrigeration and generators are to be listed and dates agreed in the defects liability period when reasonable demands for consumer requirements are available. <u>Instruction Period</u> Shall :- include, on completion of an installation (or part of) as the programme dictates, the provision by the Engineer of the names of the Client's staff to be involved, in the operation and maintenance, before planning, preparing and formally recording arrangements for the instruction period. include instructing the Client's staff in the safe operation and maintenance of all systems and items of equipment and where necessary running, maintaining and supervising in each case under normal working conditions, for an adequate and a reasonable period of time based on manufacture's recommendations, or alternatively at the manufacturer's works.	05

<u>Handover procedures</u> Shall :- unless otherwise stated in Part D include for obtaining and/or preparing the following mechanical or electrical documents to be available not less than one month before Practical Completion of any part of the Contract. include for incorporating the following documents into one or more volumes of durable finish service manuals, with format and contents agreed with the Engineer. Three sets to be provided on completion. 1. Index of Contents 2. Description of Design Intent & Operational Policy 3. Commissioning Documents and Reports 4. Manufacture's Operation /Service & Maintenance Manuals 5. Manufacturer's Spares List & Ordering Procedure 6. Operational and Maintenance Routines, Procedures for Fault Finding 7. Line Diagrams of Plant Control Systems and Description of Control Operation incorporating all set points 8. Schematic Layouts locating Valves, Switches etc. to Incorporate all Equipment Identification Numbering 9. Schedule of Installed Equipment with Specific Commissioned Duties 10. Descriptive Working Drawings for each main item of plant/equipment, showing safety features etc 11. Emergency Call-Out-Service-Personnel and Telephone Contacts 12. Copies of all charts posted elsewhere in building 13. List of all tools, keys and special requirements for handing over 14. Guarantees, Test Certificate & Reports 15. Insurance and Inspecting Authority Certificates & Reports* 16. List of Record Drawings (drawings separately available) 17. Health and Safety plan relevant to the fixed operational installation (not construction) in compliance with CDM regulations.	06
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* To include documents required under the Pressure Systems Regulations ensure that the operation and maintenance information is specifically relevant to the installed Works, compiled in a logical and instructive manner to ensure a full understanding by the user, of manufacturer's recommendations together with those in connection with Health & Safety and the Prevention of Legionnaires Disease.

Diagrams and scheme layout to indicate the individual control features and to be crossreferenced with identification numbers on the installed plant.

Record Drawings

Shall :-

Modify the installation drawings as necessary to record the "as installed" changes which may have occurred and thus form the basis of the final "As Fitted" drawings.

Unless otherwise stated in Part 'D', include for obtaining/preparing the record drawings which are to be available not less than one month before practical completion of any part of the Contract.

Indicate to a suitable scale agreed by the Engineer (which shall be in any case not less than the tender or installation drawings) the layout, identity, size and position of all services installed together with valves, control items, plant conduit routes, lighting fitting, switches, sockets outlets, distribution boards etc. The drawing shall show the results of all commissioning tests i.e. air flow rates as measured at grilles, measured flow rates through calibrated valves, pumps or orifice plates, controls settings media temperatures etc. The size, type and length of each ELV, LV and HV cable (to the nearest metre) shall also be given together with the measured earth fault loop impedance where applicable. All fuse or breaker current rating shall be shown as well as all trip settings.

Inter connections between items of equipment, including those provided by others and terminal numbering and cable core identification of all alarm and control circuits Shall be given. The drawings shall be amplified with schedules and /or diagrammatic presentation.

Particular attention shall be paid to the location and depth of buried services including those carried out by Gas, Water or Electrical Authorities etc. Similarly the drawings shall include all Sub letting and specialist works i.e. medical gases and ventilation ductwork etc. together with a schematic diagram of the application of automatic controls and instruments etc. The diagrams and drawing shall whenever possible have the valves etc marked to coincide with marking of valves labels etc, called for in the relevant sections of this specification.

<u>Valve charts and schematic diagrams</u> Shall :- produce, as defined in Part D, a chart indicating valve references and identifying valve service and function. Produce for each system, a schematic diagram indicating plant and its references, pipework/ductwork, commissioning settings, control components and their references, normal operating temperatures and pressures, filter dirty settings and other operational conditions. Each diagram and valve chart shall be laminated and framed and permanently mounted in the relevant space in a clearly visible position. End of Element		08
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<u>LABELLING AND FIXING</u>	06	
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Labelling

01

EQUIPMENT	COLOUR & SIZE OF LABEL	COLOUR & SIZE OF LETTERING	TITLE	FIXING REQUIREMENT	LABEL MATERIAL
VALVES	WHITE 80mm x 25mm	BLACK 4mm high	As specified in Part D	Brass ring fitted around spindle	Brass or ivory
CONTROL PANELS	WHITE to suit nomenclature 80mm x 25mm	BLACK 6mm high	As specified in Part D	Brass round head screws	Ivory Perspex or laminate
THREE PHASE EQUIPMENT	BLACK ON YELLOW 100mm x 80mm	BLACK ON YELLOW 10mm high	DANGER 415 Volts	Brass round head screws	Ivory Perspex or laminate
SWITCHGEAR & DISTRIBUTION BOARDS	WHITE 100mm x 80mm	BLACK 6mm high	Circuits and apparatus controlled cable size	Brass round head screws	Ivory Perspex or laminate
DISTRIBUTION BOARDS CIRCUIT CHARTS	-	-	As specified in Part D	Non-flammable transparent pocket sliding into metal channels on inside of cover	Type-written chart indicating outlets controlled circuit No fuse and cable size
BUSBARS	Phase colours	-	-	At all access points	PVC Sleeving
ESSENTIAL SUPPLIES EQUIPMENT	WHITE	RED	As specified in Part D	As specified in Parts C and D	As specified in Parts C and D
GENERAL EQUIPMENT	WHITE	BLACK	As specified in Part C and D	As specified in Parts C and D	Ivory, Perspex or laminate

All dimensions shown are minimum sizes

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Fixing Building Plant to the Building Fabric

EQUIPMENT TO BE FIXED	MATERIAL	ENVIRONMENT	FIXING
Heavyweight equipment or equipment subject to vibration, shock or heavy handling	Normal strength brickwork, masonry and concrete	Dry	Expansion bolts or self drill anchors
		Damp and/or corrosive	Galvanised or cadmium plated expansion bolts
	Normal Strength brickwork, masonry and concrete	Dry	Expansion bolts
		Damp and/or or corrosive	Galvanised or cadmium plated expansion bolts
	Poor brickwork, ,masonry or concrete in which it is difficult to drill neat fixing holes	Dry	Cement-in sockets or bolts
		Wet and/or corrosive	Galvanised or cadmium plated expansion bolts with proprietary caulking anchors
	Any material of low strength per unit area	Any condition	MS brackets and/or plates to spread the load. All brackets to be painted red lead primer and two finishing coats. Bolts to be galvanised, cadmium plated or normal to suit the conditions.
Any fixing and/or clips	Structural steelwork	Any condition	Clamps, finish of clamps and bolts etc to suit the conditions. All brackets to be painted red lead primer and two finishing coats.

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EQUIPMENT TO BE FIXED	MATERIAL	ENVIRONMENT	FIXING
Lightweight equipment subject to movement excessive vibration, shock or heavy handling	Good brickwork, masonry and concrete	Clean, dry	Fibre or plastic plugs, steel woodscrews
		Clean, damp	Plastic plugs, brass woodscrews
		Clean, dry, high temperature	White bronze plugs, steel woodscrews
		Corrosive, any temperature	Propriety white bronze plugs, cadmium plated steel woodscrews
	Brickwork and masonry with ragged or irregular holes	Any condition	Propriety plugs compound and woodscrews to suit environment i.e. Dry – Steel Damp – Brass Corrosive – Cadmium Plated Steel
	Good timber blockboard and plywood exceeding 12.5mm thick	Dry	Steel woodscrews
		Damp	Brass woodscrews
	Sheet and cellular material of high strength per unit area e.g. sheet metal, sheet aluminium, hollow concrete blocks, hollow clay blocks, plywood less than 12.5mm thick chipboard	Any condition	Threaded brass/neoprene inserts, plated gravity toggles, plated toggles
	Sheet and cellular material of low strength per unit area e.g. building boards, plaster board, laminated plastic	Any condition	Plated gravity toggles, plated spring toggles
	End of Element End of Section B01		

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PART C

C01 – Common Services

C02 – Thermal Insulation

C82 – Colour Coding for Identification of Building Services

The above are not contained herein but are available for inspection at the Engineers Office.

<u>PART D</u>		
<u>PARTICULAR SPECIFICATION OF WORKS FOR MECHANICAL ENGINEERING SERVICES</u>		
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<u>PART D</u>		
<u>PARTICULAR SPECIFICATION OF WORKS FOR MECHANICAL ENGINEERING SERVICES</u>		
<u>PREAMBLE</u>	01	

<u>Nature of Works</u> The work covered by this Specification is for the supply, installation, testing and commissioning of the Mechanical Engineering Services for the extension and refurbishment of Hevercourt Residential Home, Goodwood Crescent, Gravesend, Kent, DA12 5EY. Hevercourt Residential Home consists of a ground, first and second floor. Only the ground floor is being extended and refurbished as part of the contract works. The areas of the residential home that are not being refurbished shall be in operation throughout the contract. The Mechanical and Electrical Contractors shall, before submitting their tender, carefully examine all drawings and specifications and should inform the Professional Team of any discrepancy. In every respect, in the installation of the actual works, the Mechanical and Electrical Contractors shall be deemed to have included for materials to comply with the designated regulations in the Specification and, where not specifically detailed, he should use those materials which are the best of their kind. The workmanship must at all times be executed to a high standard and comply with the recognised working methods within the industry. The Professional Team reserves the right to reject any work which is not satisfactory, and all such defects must be rectified and the cost borne by the Contractor.	01
<u>Related Documents</u> Each of the following documents must be read in conjunction with Part D. Part A - Standard General Conditions and Preliminaries Part B - General Technical Clauses relating to the Engineering Services Part C C01 – Common Services C02 – Thermal Insulation C82 – Colour Coding for Identification of Building Services Tender Documents Where the details given in this Part D of the Specification are at variance with details given in Part A, B or C of this Specification, then Part D details shall apply. In all other respects, the requirements of Parts A, B and C of this Specification shall apply. No financial or other claim by the Contractor in respect of ignorance of the specific requirements of Part C of this specification, or any other part, shall be considered by the Employer. Part C is not appended but can be viewed by appointment at the Engineer's Office.	02
<u>Schedule of Contract Drawings</u> The following drawings will form part of the Contract Documents associated with the Mechanical Engineering Services Contract :- MBS 2022/1 Proposed Domestic and Drainage Services Layout Page 1 of 2 MBS 2022/2 Proposed Domestic and Drainage Services Layout Page 2 of 2 MBS 2022/3 Proposed Heating and Ventilation Services Layout Page 1 of 2	03

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MBS 2022/5 Proposed Boiler Room Layout and Schematic		
<u>Quality Assurance</u>		
All tendering parties, Contractors, Sub-Contractors, Supplies and Manufacturers of equipment or materials to be provided/installed, shall operate quality assurance procedures conforming to ISO 9001 EN 29000.		
Should any parties mentioned above not be certified to ISO 9001 they shall be required to demonstrate that they have quality assurance procedures in line with ISO 9001 requirements or are actively proceeding towards certification to this standard.		
Quality procedures will be applied throughout the Contract period on all matters.		
<u>CDM</u>		05
CDM Regulations will apply to this Contract and the Contractor shall fully comply with the regulations and shall supply all such information as required.		

DESCRIPTION OF THE WORKS

The Contractor shall include for the supply, installation, testing and commissioning of the complete mechanical installation items as follows:-

- a] Install new cold water down service pipe connecting into existing at roof level and routed as shown on the drawings.
- b] Strip out of existing central plant and replacement with new, including lining of existing chimney. NOTE: not a straight forward strip-out and replace. Building to remain in use throughout therefore phasing of works required, detailed here-in and on drawings.
- c] New LTHW distribution to serve all new extension areas plus a few existing areas, largely comprising underfloor heating but with some new radiators. NOTE: notching of new timbers required in multiple areas to accommodate these pipes.
- d] Modifications to existing heating services in isolated areas to accommodate: small local new build spaces comprising a new underfloor heating manifold; relocation of existing radiators with replacement with new and associated pipework modifications; new radiators to be fed from local existing LTHW pipework. NOTE: Contractor shall undertake survey of local pipework runs to determine most suitable place to extend from, and discussion with Engineer prior to undertaking works.
- e] New domestic services distribution to serve all new extension areas plus a few existing areas including for hot water secondary return throughout and TMV valves fitted to hot water outlets. NOTE: notching of new timbers required in multiple areas to accommodate these pipes.
- f] Modifications to existing domestic services in isolated areas to accommodate small local new build spaces ensuites. NOTE: Contractor shall undertake survey of local pipework runs to determine most suitable place to extend from, and discussion with Engineer prior to undertaking works.
- g] Installation of multiple unitary extract fans mostly with downstream ducting to outside running in ceiling voids or roof voids. A few units are through the wall type. Where downstream ducts rise vertically through a cold roof void condense trap with drain and dry trap to nearest stack to be fitted.
- h] Relocation of 1No. existing DX split system.
- i] New above ground domestic waste services to serve extension areas, and modification of existing sanitary pipework in some areas to accommodate revised layout. j] Insulation of all new pipework and ductwork (where running in cold void).

k] Pressure testing/chlorination/flushing of pipework. l] Provision of O&M information for all installed plant, and As Installed drawings. m] Commissioning of all plant & client demonstration. <u>WORKING DRAWINGS AND DETAIL CO-ORDINATION</u> <u>The drawings issued with this Specification for Tender and Contract purposes are not binding as to detail and are intended to be representative only of the work to be carried out by the Contractor.</u> It shall be noted that the tender drawings <u>do not</u> include the co-ordination drawings referred to in Part B, Clause 03 (1A) of this specification. The entire responsibility for the detail coordination of the works shall remain with the Contractor and other specialist Sub-Contractors employed by the Contractor. The Contractor shall make due monetary allowance at tender stage for all works necessary to complete the installations to the satisfaction of the Engineer including any offsets, diversions or other adjustments necessary to circumvent any obstruction caused by building elements, either architectural or structural, or by other engineering services, new or existing. Copies of the Architectural or other engineering services drawings are available for inspection by the Contractor by appointment at the offices of the Engineer prior to submission of the tender and no financial claim will be considered by the Employer for any additional works resulting from the Contractor's inability to make sufficient monetary allowance at Tender Stage for co-ordination factors which result in deviation from the tender drawings. All existing physical restrictions and limitations shall be determined by the Contractor prior to tender. The drawings issued for tender and contract purposes shall <u>not</u> be used by the Contractor for installation purposes. The Contractor shall prepare Working Drawings for the installation of the engineering services systems. These shall be prepared on the basis of all current Architectural details issued through the Contract together with all information available for other engineering services systems. The Contractor shall, in conjunction with other contract parties ensure that all Architectural and engineering elements are properly co-ordinated. Such detail co-ordination shall remain the entire responsibility of the Contractor and no financial, or other claim for subsequent alteration of any building or engineering element attributable to inadequate coordination will be considered by the Employer. All working drawings shall be prepared at an early stage in good time prior to the commencement of the installation works and the period required shall be identified on the Contractor's programme. All working drawings shall be prepared to a scale of 1 : 50 for all areas other than plant areas and shall include sections as necessary to indicate, particularly, cross overs within ceiling voids of mechanical and electrical engineering services elements. Plant areas shall be prepared to a scale of not less than 1:20 and shall include at least four sections and/or elevations. Encasement of the installation works and the period required shall be identified on the Contractor's programme. Engineering works shall not commence until such time as the working drawings are complete. All working drawings shall be submitted to the Employer/Engineer for information purposes only at least 3 weeks prior to the programmed commencement date. The Employer/Engineer reserves the right to comment upon the Working Drawings submitted by the Contractor and any such comments shall be incorporated into the Working Drawings. Such comment by the Employer/Engineer shall not relieve the Contractor of responsibility to ensure the proper coordination of the engineering services and other elements. It shall be entirely understood that any comment made by the Employer/Engineer or the Architect <u>does not constitute "approval"</u> of the content or accuracy of the working drawings and that the Employer, Engineer or Architect accept no implicit responsibility in making such	03
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comments with regard to the content and accuracy of the drawings submitted by the Contractor.

'AS FITTED' DRAWINGS AND SERVICE MANUALS

04

The attention of the Contractor is drawn particularly to the requirement to prepare and supply 'As Fitted' record drawings and Service Manuals for the completed installations all generally in accordance with the details given in Part 'B' of this Specification.

The drawings shall be the Contractors working drawings as detailed above specifically amended as required to show the works accurately, as installed by the Contractor, including all variations of works occasioned during the Contract.

The Contractor shall note that the Contract will not be recommended for Practical Completion and/or handover to the Employer until such time as the 'As Fitted' record drawings are completed and approved, together with the service manuals also as detailed in Part 'B' of this Specification.

The Contractor shall note where appropriate that service manuals and drawings are to be prepared at the conclusion of each Phase of the Contract sufficient for the works within this Phase of the Contract to be properly and safely maintained by the Employer. Similarly, data is to be provided to the Employer at the conclusion of each following Phase for the purposes of essential maintenance procedures.

At the conclusion of the Contract, the Contractor shall provide three copies of the final service manuals for the Contract together with copy negatives of the 'As Fitted' drawings in accordance with the details given in Part B of this Specification.

A sum of £2,500 in addition to the normal retention monies shall be retained by the Employer until such time as the 'As Fitted' Drawings and Service Manuals have been provided by the Contractor.

In addition to the requirement of Part B of this Specification the Contractor shall fully include within the tender sum for providing the 'As Fitted' drawings in a digitised form in the DWG or DXF format for use in computer aided design software. This shall also apply to specialist manufacturers drawings.

BUILDERS WORK

The Contractor shall be responsible for all builderswork associated with the provision of new mechanical services..

Builderswork shall comprise of all customary works and attendance relative to the installation of the new equipment in the plantroom and shall include the following :-

a] Holes

The cutting of all holes required through floors, ceilings and walls irrespective of the type of construction. These shall in all cases where practicable be drilled through to minimise damage to the building fabric and noise. PVC sleeves are required where cables pass through walls/slabs.

b] Making Good

Make good all walls, floors and ceilings that have been disturbed.

c] Notching of Timbers

Pipework distribution will require notching of timbers where running in flat roof areas.

d] Painting

All new pipework, pipe brackets and other fittings where exposed to view shall be painted to the specification of the Architect.

- e) When required ceilings shall be removed to allow the installation of new pipework or ductwork which shall be reinstated on completion.

- f) Where pipes are removed they are to be ground flat with the surface and plugged and sealed. Any flooring damaged in this process is to be patch repaired.

05

- g) The removal and reinstatement of radiator guards, casings, covers etc., to enable the works to proceed.

HOISTING, UNLOADING, SCAFFOLDING AND CRANEAGE

The Contractor shall allow within his tender full provision of the craneage and lifting of equipment into position and for unloadings. No assistance will be provided by others in this respect.

In addition, the Contractor shall allow full provision for scaffolding or ladders required to execute the Works and for temporary protection to pavements and road ways during craneage of new and redundant materials.

CARE AND CLEANLINESS

The Contractor shall ensure that full care and consideration is provided, particularly when operating in occupied areas, to ensure that inconvenience is minimal and damage does not occur to fixtures and fittings.

In particular adequate dust sheets are to be provided and laid over floor coverings and furniture when hole cutting, painting and similar operations are in progress. Wherever possible, dust generation is to be contained within the immediate area of operation by the provision of suitable screening.

06

07

<u>FIXINGS & SUPPORTING ELEMENTS</u>	08	01
The Contractor shall supply and install all fixing devices necessary to secure the engineering services installations. These shall be strictly in accordance with the schedule given in Part B, 06 of this Specification. All fixings shall be rated in accordance with the manufacturer's recommendations. The Contractor shall allow in the tender sum for all costs with regard to the above.	09	
<u>EQUIPMENT PERFORMANCE AND SYSTEM RESISTANCES</u>	10	
<u>HEATING INSTALLATION</u>		
<u>Central Plant</u>		
The existing boilers, HWS vessel and associated plant shall be stripped out, and new boiler room plant to serve both existing building and new extension areas installed. The Contractor shall note however that as the building is to remain in use throughout the works, it will be necessary to phase the strip-out/installation to help maintain services without resorting to the use of temporary containerised boiler plant. Also there is a requirement to line the chimney which will naturally require existing plant to be switched off for the duration. The general strategy is as follows: - New boiler and HWS plant shall be installed, along with pumps, distribution pipework, and associated plant such as the pressurisation unit and expansion vessels, whilst the existing boiler plant and associated plant is operating. - Brief interruptions to service shall be allowed for to enable isolation valves and 'T' fittings to be introduced into the existing services. This will enable actual connection of the new services and then a very quick change-over at a later date. - To enable the chimney liner to be installed, and outside of the heating season (so when only HWS services are to maintained) one of the 3No. new boiler modules being installed shall be put into operation with a temporary dedicated flue terminating at low level. Depending on when in the works programme this is undertaken, this temporary		

flue will either terminate through the wall at the rear of the plantroom, or if the rear extension has already been built, the temporary flue shall terminate through the roof of the plantroom. This is acceptable because a single boiler module falls below the threshold set in BS 6644 allowing that flue to terminate at low level. - This single boiler module shall be generating potable hot water within the new HWS calorifier, though there is scope to connect it to the existing HWS vessel if that is beneficial to phasing strategy. - Whilst the new liner is being installed within the chimney, all existing boiler plant may be stripped out as none of it will be connected back into the chimney. - Once the chimney liner is fitted, a flue header serving the new boiler plant shall be installed. However, this new header will initially be connected to the other 2No. boiler modules allowing the commissioning process to be undertaken on those without any interruption to the hot water service. A short interruption to service shall then be allowed for to enable the connection to the flue header of the 3rd boiler module and removal of the temporary flue. - Strip out of all remaining existing plant. This description is intended to give an overview of some of the likely issues when replacing the central plant. It is only indicative at this stage and shall be developed further once a Contractor is appointed and a programme of works fully developed. There is also the option of using the existing boiler and HWS plant to temporarily serve new LTHW and potable HWS circuits though introduction of new boiler and HWS plant at the earliest opportunity would be preferred.		
<u>Distribution Pipework</u> All new LTHW services shall be installed in rigid copper pipework and fittings complying with the specification shown below. Plastic pipework <u>shall not</u> be acceptable for use in the new LTHW service due to the water temperatures. General strategy with pipework distribution is to wherever possible keep a significant distance between hot pipes and cold to minimise the risk of heat migration. Where different services drop within boxing, cold pipes to run in segregated boxing.		02
<u>LTHW Circulation Pumps</u> Secondary side LTHW system to consist of separate pumped circuits: - F&R circuit at constant temperature to serve existing heating system (circa 80 deg flow) - F&R circuit at constant temperature to serve most of the new areas provided with underfloor heating (circa. 50 deg flow with a blending valve on the return pipework).		03
<u>Underfloor Heating</u> Contractor to employ an underfloor heating specialist to design those systems and specify all equipment. Design drawings provided by NPB are indicative only to show manifold positions and which areas are to be served.		04
<u>Radiators</u> All new radiators to be steel panel within LST casings, as specified in the plant schedules. All radiators to be fitted with accessible TMV and also lock shield valve.		05
<u>RPZ Valve</u> The cold water fill circuit serving the new plantroom installation shall be fitted with a RPZ valve upstream of the pressurisation unit. The Contractor shall include for submitting of all paperwork to South-East, some of which is required prior to installing that RPZ valve.	11	
<u>HOT & COLD WATER SERVICES</u>		

<u>Pipe in Voids</u> Any pipework LTHW and potable water pipework located in boxing, floor voids, roof voids, or indeed any voids, shall be insulated. For rigid pipes i.e. copper insulation shall be phenolic foam split sleeve type. For plastic pipework insulation shall be fibreglass blanket type, which will have a greater thickness compared to the phenolic foam equivalent. It is imperative that any boxing around the pipes allows for this increased insulation thickness. Any rising and low level LTHW pipework exposed but serving the LST radiator shall be insulated and boxed in within the space the radiator serves, to remove the risk of scalding. General strategy with pipework distribution is to wherever possible keep a significant distance between hot pipes and cold to minimise the risk of heat migration. Where different services drop within boxing, cold pipes to run in segregated boxing.		05
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<u>LTHW & POTABLE WATER PIPEWORK VALVES AND DRAIN COCKS</u> <u>General</u> All valves and metering fittings shall be manufactured by Crane Valves Ltd unless otherwise indicated. <u>LTHW Heating</u> Isolating valves installed on LTHW heating systems, size 50mm and below shall be brass ball type Fig. No. D191 with screwed bodies and shall have the lever removed where lockshield valves are required. Drain cocks shall be Fig. D340 gland cocks complete with loose keys and shall be installed at <u>all</u> low points in the systems. Regulating valves shall be Fig. D921, with bronze body, DZR copper alloy internals and a handwheel graduated 1-8. All metering stations shall be installed strictly in accordance with the Manufacturer's instructions. <u>Domestic Hot and Cold Water Services</u> Isolating valves installed on the domestic hot and cold water supply systems size 50mm and below shall be copper alloy type Fig No. D171C with compression ended bodies. Drain cocks shall be Fig. D340 gland cocks and shall be installed at <u>all</u> low points in the systems. Isolating stopcocks shall be provided to <u>individual</u> hot and cold water draw-offs to sanitary and other fittings <u>unless otherwise shown on the drawings</u> (i.e. in instances where it is permissible to serve a range of fittings from a single stopcock). Generally, these shall be manufactured by Crane, type D171C complete with steel lever with plastic grip and <u>compression ends</u>. Extension stems shall be fitted where the services are insulated. <u>HWS Return Regulating Valves</u> Thermostatic regulating valves shall be supplied and installed on the domestic hot water services distribution systems for the purposes of isolation and regulation of the main and sub-circuit secondary loops. The valves shall be provided on all branch return circuits from sub-mains to ensure that the secondary flow can be effectively balanced within the whole of the system to facilitate adequate circulation to all parts of the system. Oventrop Aquastrom T Plus shall be provided to achieve regulation on all return branches.	13	01 02 03
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<u>TMV3 Valves</u>	04
New blending valve shall be supplied and installed to serve the wash hand basins and showers throughout the new installation. These shall be TMV 3 in the location as indicated on the drawings and scheduled herein.	05
<u>Sterilisation</u>	
All hot and cold water services shall be sterilized on completion.	
<u>THERMAL INSULATION</u>	14
<u>General</u>	01
The Contractor shall include for the supply, delivery and installation of all materials required for the thermal insulation of mechanical services supplied under this Contract where specified to be insulated.	
Thermal insulation shall be strictly in accordance with the requirements of Part C of this Specification and as follows :-	
<u>Scope</u>	02
The Contractor shall include for the thermal insulation of the following:-	
a] <u>All</u> LTHW heating pipework and fittings except for final low level pipework tails to radiators (though as mentioned, low level tails to LST radiators where exposed to be insulated).	

b] All hot (flow and recirculation) & cold water service pipework and fittings other than final connections to draw offs where exposed to view.

c] All refrigerant pipework gas and liquid lines.

d] All valves on the LTHW heating service 50mm and above to be provided with removable Velcro muff jackets.

Insulation thickness is based on BS 5422: 2009, Table 15 for heating and Table 10 for cold water services (at 10°C) water temperature and Table 17, for domestic hot water services.

Low Pressure Hot Water Heating Pipework (75oC-100oC)

Pipework Size	Phenolic Foam Thickness	Mineral Wool Thickness
15mm	20mm	50mm
20mm	25mm	50mm
25mm to 32mm	25mm	55mm
40mm	30mm	55mm
50mm	30mm	60mm

Mains and Cold Water Service Pipework

Pipework Size	Phenolic Foam Thickness	Mineral Wool Thickness
15mm to 20mm	10mm	20mm
25mm to 50mm	15mm	20mm

Refrigerant pipework

All refrigeration lines (suction and discharge) shall be thermally insulated with 'Armaflex' Class '0' of 20mm thickness, installed strictly to manufacturer's recommendations. Furthermore external pipework runs to the condenser shall be wrapped in PIB, or an equivalent material, to prevent damage by birds.

Extract Ductwork

Where extract ducts from unitary extract fans run vertically within an unheated void, ductwork shall be fitted insulated and also fitted with a condense trap.

Insulation shall be mineral wool of 20mm thickness.

MECHANICAL VENTILATION SYSTEMS

General

The Contractor shall supply, install, test, commission and set into operation multiple unitary extract fans, set to operate on an intermittent basis, to serve ensembles and WCs.

Each plant item is specified in the plant schedules, along with the control method/equipment required.

The through the wall fan units shall use the manufacturer's wall mounting kit, which typically is telescopic to suit different wall thicknesses. The Contractor shall confirm all the wall kits available for the various fans specified are suitable for the wall construction in question prior to ordering.

GAS WORKS

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<u>Gas Meter</u>	01
The works shall include for extending the existing 65mm gas service serving the boiler room to serve the new boilers, with individual branches to each, as indicated on the drawings. A new solenoid valves, emergency control valve shall also be installed.	
As part of the boiler room works there is a degree of phasing required to ensure that the existing building can be provided with heating and hot water with the minimum interruption to services.	
<u>Gas Pipework & Fittings</u>	02
The Contractor shall install a new gas pipe from the relocated meter position through the wall and into the boiler room.	
Gas pipework shall be in black medium weight steel screwed joints and malleable iron fittings to BS 143 and 1256 for 50mm pipe sizes. Vertical bends to be made with equal tees and open ends plugged off. Gas pipework shall be installed with a fall of 1 in 240. Screwed joints shall be made with an approved gas jointing compound. Hemp shall not be used. The installation may only be carried out by individuals competent to do so and shall be Gas Safe registered.	
All new gas pipework shall be painted "yellow ochre" to match existing and existing retained pipework within the plantroom area shall also be painted for uniformity of appearance.	
<u>Gas Solenoid Valve</u>	03
A gas solenoid valves, as shown on the drawing and specified within the schedules, shall be installed on the gas pipework where it enters the boiler room. An ECV (emergency control valve) shall also be installed after the solenoid valve and in an accessible position.	
<u>Gas Safety System</u>	04
The control panel shall control the gas safety circuit, with hard wired connections to the gas solenoid valve, a safety knock-off button, and a thermal link above each boiler module.	
<u>DX SPLIT COMFORT COOLING SYSTEM</u>	17
<u>General</u>	01

An existing DX split type comfort cooling plant installation shall be carefully isolated, drained and stored safely to be installed in the Medical Room, as shown on the drawings. The external condenser shall remain in its current location. All pipework and insulation shall be in accordance with this specification, and the condense drain shall be by a trapped tundish into the waste system (HepvO type dry trap is permissible), connecting into the existing drainage beneath the sink unit. <u>Refrigerant Pipework</u> The Contractor shall design, supply, install, test and commission all interconnecting refrigerant pipework between the external condenser and the indoor unit. Both suction and discharge lines shall be insulated and vapour sealed. <u>In no circumstances are the lengths of pipework installed to exceed the maximum permissible lengths recommended by the Manufacturer.</u> All pipework is to be carried out in refrigerant quality soft/medium drawn copper tubing BS 2871 Part 2, 1972 and compete with the appropriate headers and joints. Pipe work shall be carried out by an approved (Certificate approval must be submitted prior to installation commencement) Refrigeration Engineer and in accordance with BS 4434, 1989 specification and the equipment manufacturers installation instructions. The longest possible lengths of copper pipe shall be installed to minimise joints. Appropriate refrigeration installation tools shall be used. Dry nitrogen must be used for purging. All pipework (suction and liquid lines) shall be insulated with slip-on close cell elastomeric pipe insulation (as manufactured by Armaflex or equal and approved) with a fire performance class O, having a wall thickness or not less than 19mm. Insulation must be protected when exposed to atmosphere by special paint or covered by an enclosure.		02
All joints (after refrigerant pressure and leak testing) to be properly glued as to provide a complete seal to prevent any condensation and clearly marked (yellow tape) for ease of identification. After installation of pipework and prior to sealing of insulation joints and starting of equipment, pipework should be pressure tested at 28 kg/cm² (430 psi) held for 24 hours and checked for leaks vacuum/dehydrated to (-752 Hg) and held at that setting for 12 hours (minimum). Refrigerant charge weight must be calculated to the actual installed length of pipework and in accordance with the manufacturer's recommendations. The charge weight must be indelibly marked on the equipment at the charge point at the time of commissioning. The charging should be carried out with an appropriate charging station and under the supervision of the manufacturer. Pipework is to be properly and tidily fixed and supported at a minimum of 1 metre centres and be run on galvanised trays or wall mounted. <u>SANITARY PLUMBING INSTALLATION</u> <u>Scope</u> The Contractor shall supply, install and put in operation a new above ground sanitary pipework services to serve all proposed outlets. Generally these services shall connect into new below ground drainage installed by others, though there are areas where existing above ground drainage shall be modified to serve new outlet positions.	18	01

<u>Quality of Work</u>	02
Materials and workmanship are to be of the highest quality and the entire installation shall be carried out in accordance with this Specification, The Building Regulations, BS EN 752 Parts 14, BS EN 12056 Parts 1–3:2000 and to the entire satisfaction of the Local Authority and the Engineer.	
<u>Pipework Generally</u>	03
All pipes are to be installed in a neat and workmanlike manner.	
Pipes are to be in UPVC or MUPVC as detailed on the drawings and specified herein.	
Generally, all main system pipework including all main vertical soil vent pipes, waste vent pipes and all suspended horizontal large diameter pipework shall be in UPVC. All branch soil, waste and ventilating pipework shall be in UPVC or MUPVC.	
<u>PVC Pipes and Fittings</u>	04
All PVC pipes and fittings shall be as manufactured by Caradon Terrain Ltd., using the 100 series UPVC soil system to BS 4514 and the 200 series MUPVC waste system to BS 5255.	
All PVC pipework and fittings shall be grey in colour where concealed and white in colour where exposed to view in rooms. The Contractor shall ascertain that all pipe fittings are available in both colours prior to his tender submission.	
<u>Pipework Erection</u>	05
All pipes shall be fixed vertically true with the aid of plumb-bob or similar accurate device. All horizontal pipes carrying soil or waste discharges shall be fixed at the following gradients unless shown otherwise on the drawings :-	
100mm dia : 92½° 75mm dia : 92½° 50mm dia : 91½° 38mm dia : 91½° 32mm dia : 91½°	
Pipes shall be free of burrs, rust, scale and other defects and shall be thoroughly cleaned prior to erection.	

Pipework which is unduly marked by tools, flattened, pitted or otherwise distorted or damaged will be rejected by the Engineer. Open ends left during the progress of the work shall be blanked off with purpose made metal plastic plugs or caps. Pipework shall be run to follow the contours of the building and shall be graded in accordance with this Specification. The Contractor shall allow in his tender for bending pipework around all projections and recesses and for all sets due to varying thickness of walls, floors and other structural works or services, whether such changes in direction are indicated on the drawings or not. Joints shall not be made in the thickness of any wall, floor or ceiling unless totally unavoidable. <u>Pipework Supports</u> All pipework shall be adequately supported on hangers or brackets. Vertical PVC pipes to be fixed by means of screw to wall holderbats. Suspended horizontal pipes to be fixed by means of MS ring clips either clamped or loose on the pipe to control thermal movement. Horizontal PVC wastes to be fixed by means of screw to wall pipe clips. Unless shown otherwise all pipework to be fixed at centres as recommended by the manufacturer. Suspended horizontal pipes to be fixed by means of MS ring clips either clamped or loose on the pipe to control thermal movement. Unless indicated otherwise elsewhere in this specification, all pipework shall be fixed at centres as recommended by the manufacturer.		06
<u>Pipework Jointing</u> Joints to cast iron pipes shall be by means of a suitable coupling selected from the Timesaver range carried out strictly in accordance with the manufacturer's recommendations. The Contractor shall allow for all costs associated with the procurement and installation of the necessary pipework and fittings. No alternatives will be acceptable in this regard.		07
<u>Access Doors and Rodding Eyes</u> Access shall be provided where shown on the drawings and in other positions as directed or necessary for cleansing and testing the system. All soil vent and waste vent pipes shall be provided with a large square access door at the foot immediately before entry to drain located at 1000mm above finished floor level. Access shall be provided at each floor level by means of an inspection door cast on the branch pipe and at other principal branches, as indicated on the drawings. These shall be so positioned as to remain accessible and not obstructed by other services or structure. Horizontal pipework shall be provided with access at principal junctions and bends and where indicated on the drawings. PVC cleaning eyes of circular pattern shall be fixed on PVC waste branches where indicated on the drawings.		08
<u>Termination of Stacks</u> 1No. existing stack to be extended vertically to terminate above roof level.		09

<u>Sleeves and Masking Plates</u>	10
Where pipes pass through walls and floors, tubular metal pipe sleeves shall be fitted. The internal diameter of the sleeve shall in no case exceed the outside diameter of the pipe enclosed by more than 22mm. In the case of wall sleeves, these shall finish flush with the	
finished wall face. For floors the sleeves shall have a 15mm. protrusion above the finished floor level to prevent water penetration. The annular space formed between the sleeve and the pipe shall be packed after erection with a suitable fire resistant and insulating material. Where pipework is exposed in rooms and passes through walls, floors or ceilings, chrome plated copper masking plates shall be fitted. On no account shall pipes be built solid into the structure.	11 12
<u>Trap Ventilation</u>	
Trap ventilation pipes (anti-syphon pipes) are to be provided where shown on the drawings. The vent pipe shall connect to the top of the branch waste pipe at a point not nearer than 75mm or greater than 300 mm to the crown of the trap and in such a manner as to be above the hydraulic gradient set up in the waste pipe when the fitting is discharged. Each vent pipe is to be carried up to a point above the level of the overflow of the fitting or in the event of the fitting having no overflow; the flood level shall be the governing height, before being run horizontally. In the event of this not being possible on ranges of fittings with surface mounted pipework then the vent pipe shall be run as high as possible and rise vertically to above flood level prior to connecting to the main vent pipe.	
<u>Sanitary Fitting Connections</u>	
drawings. All traps shall be 75mm deep	
<u>Drawing Ref.</u>	<u>Fitting</u>
WC	Water Closet
WB	Wash Basin
SK	Sink
The Contractor shall allow for all associated	
ment with integral traps shall be trapped by means of a and type as generally indicated herein and on the seal :-	
<u>Connection</u>	
100 PVC push-fit pan connector (of an approved type) and 100 PVC soil pipe.	
35 Chrome plated copper bottle trap, PVC waste pipe and anti-syphon pipe (where required).	
40 PVC tubular trap (where concealed) or 42 chrome plated copper tubular trap (where exposed) and 40 PVC	
waste pipe and 32 PVC anti-syphon pipe (where required). ated overflow pipework.	

<u>Installation of Sanitary Fittings and Associated Equipment</u>	13
The Contractor shall allow for the installation, testing and commissioning of all waste outlets, traps and supply fittings. Contractor shall prepare all necessary supports, bed and fix all taps, waste outlets and overflows with white "Dow Corning" silicone sealant and supply and install all necessary composition washers, packing pieces, screws, bolts etc., as required and necessary to provide a complete and fully functional installation upon completion. All sanitary fittings and associated equipment shall be sealed to walls, floors, etc., using "Dow Corning" a white silicone sealant as manufactured by Dow Chemicals Ltd. The Contractor shall also allow for making the final supply connections to taps, supply fittings etc.	14
<u>Fire Sleeves</u>	14
PVC pipework 40mm dia and greater passing through fire compartment floors and walls shall be fitted with an intumescent fire sleeve. These shall be type Firebreak 2 as manufactured by Caradon Terrain Ltd., of a type and size to suit the application and installed strictly in	14
accordance with the manufacturer's instructions.	15
<u>Testing and Commissioning</u>	15
The Contractor shall provide all necessary labour and equipment and shall include for testing the works to the requirements of the Engineer and Local Authority. To facilitate the general building programme, tests shall be made of sections as the work proceeds. Such testing, however, will not absolve the Contractor from his liability for any subsequent or final testing. Any defects that become apparent during tests of any part or parts of the installation, shall be rectified at the Contractor's expense and the part or parts re-tested to the satisfaction of the Architect and the Local Authority. All soil, waste, vent and rainwater pipes shall be tested by air to a pressure of 50mm water gauge. The gauge to remain steady for a period of five minutes. Where applicable, such tests to be applied before ducts or casings are built. All work shall receive a final test prior to handover. Access plugs, caps and doors to be removed, greased, refitted and made sound prior to the final test. The Contractor shall keep a record of the tests carried out on the drainage installation throughout the contract, recording date of test, by whom tested and the result. One copy of the record shall be sent to the Engineer on completion of the contract.	15

<u>PAINTING</u>	19	
The Contractor shall allow for the painting of services elements all generally in accordance with the requirements of Part B of this Specification. In addition all new exposed pipework shall be painted in colours to be agreed by the Client. Painting shall not extend to plant and other components which have a manufacturer's finish such as galvanised components and radiators which are supplied with stove enamelled or similar finishes. All other components shall be suitably primed with two coats of lead free inhibiting primer onto thoroughly wire brushed and cleaned surfaces. All supporting steelwork within plant rooms and all uninsulated pipework in all situations shall be finally painted with two further coats of an oil based paint (one primer, one gloss) of a British Standard colour, details to be advised by the Employer.	20	
<u>LABELLING & NOTICES</u>	21	
The Contractor shall allow for labelling <u>all</u> new mechanical and electrical plant and equipment supplied and installed under the Contract and also in accordance with the requirements of Part "B" of this Specification.		
<u>TESTING & COMMISSIONING</u>		
The Contractor shall allow for the comprehensive testing and commissioning of all new mechanical and electrical installations all in accordance with the details given in Part "B" of this Specification. The Contractor shall appoint a Specialist Commissioning Sub-contractor to carry out these works on his behalf. The name of the Specialist shall be provided to the Employer in a letter accompanying the tender return. These activities shall be integrated into the overall commissioning programme by the Contractor.		
<u>AIR VENTING</u>	22	
The Contractor shall allow for full provision for the venting of air from the distribution systems at all high points. All such high points shall be provided with automatic air vents installed on air bottles of the same diameter as the pipe to which it is fixed. All automatic air vents shall be manufactured by Spirotop or equivalent and shall incorporate a facility for isolation. Wherever possible, the pipework installations shall be installed such that they are self-venting.		
<u>WIRING REQUIREMENTS</u>	23	
<u>General</u>		
All parts of the electrical installation must comply with the current IEE regulations.		01

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CONTROLS

24

01

General

The Contractor shall supply, install, commission and put into operation a controls installation to serve the boiler room, including for control of the boilers, circulation pumps and gas safety system. The system shall also be equipped with external temperature sensor and plant fail link to the pressurisation unit as well as fire alarm interface.

It shall be the responsibility of the contractor to provide the controls specialist with the details of all equipment wiring diagrams to enable the controls specialist to prepare their wiring diagrams. All control system field and power wiring shall be supplied, installed, tested and connected by the control specialist in accordance with their external wiring and panel wiring diagrams. These shall be issued by the contractor for comment as working drawings.

The contractor shall be responsible for all hardware and software engineering and commissioning of the controls system within the limits of the controls description of operation as contained within this Specification.

The contractor shall carry out a thorough demonstration of the completed systems operation to the Purchaser's representatives and engineer.

The electrical installation to be included by the controls specialist shall include all power and control wiring with containment and mechanical connection including the power supply cable termination to the new control panel.

The controls specialist shall also isolate and make electrically safe all powered and wired plant and equipment scheduled for removal.

The tender price must be based on the control requirements, as described in this specification. The Contractor shall provide details of their proposed controls specialist within the tender submission letter. Suitable references and project works list may be requested by the Engineer.

The majority of the main mechanical plant will be controlled from the mechanical control panel located in the boiler room. The control panel will house a Trend DDC controller and will have a fascia mounted Trend IQVIEW4 keypad for interrogation of the system.

This system is not a BMS.

Boiler Room Gas Safety Control

The gas solenoid valve on the incoming gas supply to the boiler room shall be electrically fed through a thermal link above the boiler, with an emergency knock off button at the entrance to the boiler room.

Fire Panel Interface

Interface with fire alarm system.

Plant Initiation

All plant initiated by programmable timer with at least 3 adjustable time zones for each day of the week.

Outside High Temperature Hold Off

The heating pumps shall not operate if the external temperature is above a threshold value (15 deg C though adjustable). A lamp on the control panel fascia will confirm this condition.

General Pump Interlocks

All pumps will be disabled if there is pressurisation unit fault.

General Pump Control

The heating primary and secondary pumps change over from duty to standby in the event of a water flow failure, as sensed by a differential pressure switch located across the associated pump set. The lead duty pump will change on a weekly basis to ensure even running.

In the event of a pump failure a warning light will show on the control panel fascia.

The heating primary and secondary pumps shall be inverter controlled and the controls shall be commissioned to ensure that each pressure differential switch has sufficient scale or range to prevent nuisance alarms at low duties.

Boiler Interlocks

The boiler will be disabled if there is pressurisation unit fault or a no flow across the primary shunt pump.

HWS Calorifier

The temperature sensor within the calorifier shall feed stored potable water temperature back to the controls which shall operate the boiler plant and HWS primary circulation pump as required to maintain that potable water at 60 deg C (adjustable).

Secondary VT LTHW Circuits

There are 2No. secondary LTHW circuits:

- Flow and return to the existing heating system mainly comprising radiators. Max flow temperature approximately 82 deg C though weather compensated. This is to reduce heat emissions from the existing pipework.
- Flow and return to most of the new areas comprising underfloor heating. Constant flow temperature approximately 50 deg C (adjustable) controlled via 3 port motorised blending valve.

Pressurisation Unit

The electrical power supply for the pressurisation unit shall be derived from the control panel. Operation of the boilers and pump secondary and tertiary pump sets is disabled in the event of a pressure fault being detected. An alarm is raised at the Trend DDC controller and a warning lamp illuminated on the panel fascia.

Note:- the boiler shunt pump and secondary circulation pump shall be run on for a period of time upon a pressurisation unit fault in order to dissipate heat from the boilers to try to prevent a boiler high limit fault occurring. This period of time shall be adjustable from 5-15 minutes.

Remote Alarm Signal

The contractor shall allow in their tender pricing for a dial out facility to enable the control panel to contact a pre-determined mobile phone to issue a text in the event of plant failure.

The Client shall provide a SIM card to enable this service to function.

Alarming

The Trend IQVIEW keypad will sound an audible alarm and flash its display upon an alarm. A common alarm signal is generated at a pair of terminals within the control panel.

APPENDIX “A”

PLANT SCHEDULES

Hevercourt Residential Home, Gravesend

BS 2022

Plant Ref	Plant Item/Location	No. of	Manufacturer & Model	Details
BWP1	Cat 5 pump set, ground floor cupboard	1	Arrow Valves BTMIDI-3A	Wall mounted Cat 5 pump set serving external taps.
TMV3	Grd floor - various locations	Thermostatic mixing valve to limit HWS temperatures	Rada Meynell 15/3. 1/2” ports.	TMV3 preset at 43 deg C HWS delivery temperature.
EF1	WC	1	Nuaire NA 100T	100mm fan with integral adjustable overrun timer operated via light switch. Supplied with manufacturer’s wall kit.
EF2 – EF5	Ensuities for Bedroom 18-21	4	Nuaire NA 100T	100mm fan with integral adjustable overrun timer operated via light switch. Supplied with manufacturer’s ductwork and roof terminal kit.
EF6 – EF8	Staff WC, 2No. Accessible WCs	3	Nuaire Cyfan	Integral adjustable overrun timer operated via light switch. Ducted to outside and terminate above flat roof. Length of ductwork above corridor ceiling void to be fire rated, though as per drawing this strategy to be ratified with Fire Consultant.
EF9 - EF12	Ensuities for Bedrooms 14-17	4	Nuaire Cyfan	Integral adjustable overrun timer operated via light switch. Ducted to outside and terminate above flat roof.
EF13	Staff WC	1	Nuaire NA 100T	100mm fan with integral adjustable overrun timer operated via light switch. Supplied with manufacturer’s wall kit.
EF14	Accessible WC	1	Nuaire NA 100T	100mm fan with integral adjustable overrun timer operated via light switch. Supplied with manufacturer’s ductwork and roof terminal kit.

EF15	Hairdressing	1	Nuaire NA 150T	150mm fan with integral adjustable overrun timer operated via light switch. Supplied with manufacturer's ductwork and roof terminal kit.
EF16 – 28	Ensuites for Bedrooms 1-13	13	Nuaire NA 100T	100mm fan with integral adjustable overrun timer operated via light switch. Supplied with manufacturer's ductwork and roof

				terminal kit.
B1 – B3	Boiler/ Plantroom	3	Remeha Quinta Ace 115	Wall mounted. 1No. boiler to be installed first, with flue routed through the wall or plantroom roof on a temporary basis, to maintain HWS service to buildings, whilst rest of existing plant stripped out and chimney liner installed. Primary side to operate at 10K dT, 82/71 deg C F/R.
P1 – P3	Shunt pump/ Plantroom	3	Grundfos Magna 140/120 F	Single head shunt pump. Primary side to operate on 10K dT, so each shunt pump duty 2.26l/s @ approx.. 92 kPa.
DS1	Dirt Separator/ Plantroom	1	Adey Magnaclean Commercial 3"	Stainless steel magnetic strainer with drain point. Flanged connections.
P4	HWS Primary Pump/ Plantroom	1	Wilo Stratos Maxo-D 32/0.5,5-8 PN16	Twin head pump on duty/standby set-up
P5	Secondary LTHW Pump to New Heating Service/ Plantroom	1	Wilo Stratos Maxo-D 30/0.5-10 PN10-R7	Twin head pump on duty/standby set-up. <u>NOTE</u> : this pump to be allowed for in Contractor's tender return pricing, but to be confirmed once underfloor heating specialist sub-contractor appointed to confirm delivered pressure requirements.
P6	Secondary LTHW Pump to Existing Heating Service/ Plantroom	1	Wilo Stratos Maxo-D 65/0.5-12 PN6/10	<u>NOTE</u> : this pump to be allowed for in Contractor's tender return pricing, but works include for measuring flow rate/pressure drop of existing pump to confirm this is an appropriate selection. Twin head pump.
P7	HWS circulation pump for existing HWS service	1	Wilo Pico Z 25/1-4	Single head pump unit, suitable for use with potable water.
P8	HWS circulation pump for new HWS service	1	Wilo Pico Z 25/1-4	Single head pump unit, suitable for use with potable water.

EV2	Expansion Vessels for LTHW/ Plant Room	1	Flamco Flexcon 800/1.5	800 ltr vessel. 1.5 bar charge pressure. Selected to keep heating system working pressure to around 2 bar. Seeking to minimise additional pressure on existing pipework.
PU1	Pressurisation Unit/ Plant Room	1	Flamco Flexfiller 125D	Twin pump wall mounted. Max delivery pressure 3 bar.
FLT1	Filter for RPZ valve/ Plant Room	1	Honeywell F76S 3/4"	3/4" connections, located upstream of the valve.
RPZ1	Reduced Pressure Zone Valve/ Plant Room	1	Honeywell BA295 3/4"	RPZ valve with 3/4" connections
CAL1	HWS calorifier/ Plant Room	1	ACV HRs 800	Tank-in-tank calorifier with 125 ltr primary capacity and 675 ltr potable HWS capacity.
GSV1	Gas solenoid valve/ Plant Room	1	Banico ZEV65. 2.5" BSP connections.	Solenoid valve, line size orifice, linked to controls.

LST Radiators

All Radiators Stelrad LST iPlus K2 units.

Plant Ref	Location	No. of	Radiator Dimensions (lxh)	
R9	Staff WC	1	400x450	
R10	Store	1	400x450	
Plant Ref	Location	No. of	Case Dimensions (lxh)	Radiator Dimensions (lxh)
R1	Main entrance	1	2050x800	1800x600
R2	Sluice	1	650x800	400x600
R3	Access WC/Shower Room	1	1050x800	800x600
R4	Meeting Room	1	650x650	450x400
R5	Accessible WC	1	650x650	450x400
R6	Accessible WC	1	650x650	450x400
R7	Quiet Room	1	1850x800	1600x600
R8	Lounge	1	1850x800	1600x600

Non-LST Radiators

Both radiators Stelrad Softline, K1 units.

APPENDIX “B”

SUMMARY OF TENDER

MECHANICAL ENGINEERING SERVICES SUMMARY OF TENDER

<u>ITEM</u>	£
a] Strip out of existing boiler room plant.	£
b] Installation of new boiler room plant, including for lining of chimney. NOTE: these works £ to be phased to allow for provision of services throughout, with an indicative phasing described in this spec. Final phasing to be determined later, but Contractor to include for this in their pricing. NOTE: Contractor to ensure they have included for all South East Water paperwork relating to RPZ valve installation, some of which must be submitted <u>prior</u> to installation of valve.	
c] Installation of new domestic water services installation, including new cold water down £ service from roof void. Includes TMV3 valves, HWS secondary return pipework, etc. Also includes for some areas that are being reconfigured so local pipework modifications required. NOTE: Contractor to include for some local investigation works to confirm local pipe run positions and where to connect.	
d] Installation of new LTHW services, including for multiple underfloor heating systems, as £ well as modification to existing LTHW to accommodate replacement radiators in different positions to existing. NOTE: Contractor to include for some local investigation works to confirm local pipe run positions and where to connect.	
e] New above ground drainage services.	£
f] Installation of unitary extract fan units. Vertical duct runs in cold voids to be fitted with £ condense traps pipes to nearest drain fitted with dry trap.	
g] Careful removal, storing and reinstallation of existing fan coil unit.	£
h] Pressure testing, chlorination, flushing through, etc.	£
i] Insulation of pipework and extract ducts (where run in cold voids).	£
j] Commissioning, balancing, setting up, etc. of all mechanical plant.	£
k] Provision of Working Drawings, Maintenance Manuals and Record Drawings etc	£
l] Any other items not included in the above :- i] £ ii] £	

GRAND TOTAL **£**
Value Added Tax

The Tender shall include for any Value Added Tax payable to any part of the works. This amount shall be identified as a separate total item.

Signed

For and on behalf of

Date

Note :- The Contractor shall provide a fully quantified Schedule of Rates equating to the tender sum within 30 days from receipt of order.

