Sureserve
Energy Services
Public Buildings

BLOCK E
COLEG CAMBRIA
WREXHAM

BUILDING SERVICES
SCOPE OF WORKS

June 2025

Issue and Revision Record

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1 General Scope of Works

1.1 Preamble

The Scope of Works shall be read in conjunction with the Mechanical & Electrical Services design intent drawings the scope will encompass solar PV as detailed in document PR250113.

The Contractor shall be responsible for undertaking completely the equipment specification and co-ordination of the entire mechanical and electrical services installations including builders work in connection. This is a turn-key project, with the Contractor responsible for employing all specialists' and sub-contractors deemed necessary for the complete works as described herein.

The Contractor shall assess the access to the site and building and shall allow for any difficulties expected from any restrictions, including protection of all completed works during the construction phase.

Access into the site has deemed to be considered by the Contractor and full compliance with the scope of works must be observed.

In undertaking the specification and co-ordination of the entire mechanical and electrical services installations, the Contractor shall consider the proposed general arrangement drawings, ducts/voids available for the services, etc. before commencing his detailed design, builders work and construction drawings.

The Contractor shall maintain, in principle, the design intent of the building services systems ensuring that a thoroughly co-ordinated and complete installation is provided in accordance with the Scope of Works (including design parameters therein), the contract conditions and the design intent drawings.

The appointed contractor will assume the responsibility of principal designer and principal contractor, as such the appointed will take full responsibility for conformity with the health and safety and CDM regulations.

1.2 The Building and General Requirements

Block E Coleg Cambria is located in Wrexham, Wales.

Coleg Cambria is one of the UK's largest colleges, with over 7,000 full-time and 20,000 part-time students, and has international links covering four continents. Coleg Cambria was created following the merger of Deeside College and Yale College, Wrexham. Coleg Cambria began operating on 1 August 2013.

Heating and domestic hot water is provided to the building via central systems located within the plantroom at roof level.

This decarbonisation project is to reduce the carbon footprint of the College, by the use of highly efficient air source heat pumps including smart building controls and Solar PV.

The decarbonisation project works to be undertaken are to strip-out and remove the existing gas fired boilers and water heater (and associated services) as per the strip out drawings, and supply and install new heating and domestic hot water central plant and all ancillary equipment including; air source heat pumps, buffer vessel, hot water heat pumps,

circulation pumps, ventilation, pressurisation unit, expansion vessels, automatic controls, pipework, associated electrical services, fittings and fixtures.

1.3 Scope of Works

The scope of the works shall comprise the supply, installation and commissioning of the building services and shall include but not be limited to the following:

1. Complete full Riba stage 3 evaluation and develop to stage 4, Validation of existing systems and enabling works.
2. Removal of asbestos shall be by others (refer to asbestos report).
3. Strip-out works.
4. Supply, installation and commissioning of new air source heat pumps, circulation pumps, buffer vessel, valves, fittings, fixtures, automatic controls, low loss header, pipework and electrical supplies.
5. Supply, installation and commissioning of new hot water heat pumps including the associated local valves, fittings, fixtures, automatic controls and electrical supplies.
6. Design, supply, installation and commissioning of all new automatic controls system to monitor and control the operation of the air source heat pump system and boiler room plant, including control panel, sensors/switches, cabling, etc.
7. Condense and waste drainage installation works.
8. Thermal insulation to all pipework, buffer vessel, fixtures and fittings. Insulation jackets shall be supplied and installed to all new pumps, valves and fittings.
9. Water treatment dynamic flushing, chemical clean of the new pipework installed under this contract. Closed circuit filling and dosing of LTHW pipework. All in accordance with BSRIA guides; BG29/2012 (for cleaning and flushing) and BG50/2013 (dosing treatment).
10. Chlorination of domestic water services pipework installed under this contract.
11. Inhibitor dosing of heating services pipework under this contract.
12. Testing of water quality to demonstrate compliance with the manufacturer's requirements.
13. Design, supply and installation of all new electrical services to the new equipment; including galvanised conduit (cable containment), cable tray at high-level, isolators, supply cabling, switch gear etc.
14. Undertake all builders work associated with the project.
15. Preparation and issue of all detailed design, construction drawings for review and comment.
16. Complete co-ordination installation of all works.
17. Attendance at design, site and co-ordination meetings.
18. Pre-commissioning and commissioning witnessing the above services.

19. Full Record Drawings, Health and Safety file and Operating and Maintenance Manuals (one soft copy on USB flash drive) of all O & M Manuals and Record Drawings are required).

20. Liaise and co-ordinate with Statutory Authorities (building control), Planning & DNO as necessary.

21. Framed or laminated "As Installed" drawings (size A1) to be wall mounted in plantroom.

22. Full co-ordination of the services and co-ordination of the project works with the day to day operation of the building.

1.4 Obligations

Undertake responsibility for all works defined herein and shown on the layout drawings and in particular, the following:

- Undertake the design of the following specialist aspects (contractor design portion elements):
    - Temporary heating and hot water plant as required.
    - Fixings and supports
    - Builders work in connection
    - Automatic controls system including smart building controls
    - Acoustic analysis and treatment.
    - RIBA Stage 4 & 5 Mechanical & Public Health services design
    - RIBA Stage 4 & 5 Electrical services design

- Undertake the responsibility for resolving final spatial co-ordination.
- Co-ordinating the building services, with each other and with the building structure and fabric.
- Undertake the role of lead co-ordinator with all specialist contractors involved and agree principles of co-ordination with all parties concerned.
- Provide the following drawings as defined elsewhere:
    - Detailed design drawings
    - Detailed installation drawings
    - Builderswork in connection drawings
    - Wiring schematics
- Provide builders work details based on the installation, manufacturing and shop drawings.
- Negotiate with public and other authorities as necessary, obtaining final approvals of any appropriate authority.
- Fully re-evaluate and take full responsibility for all parts of the design and building elements that may be affected by acceptance of alternative plant selections.
- Supply, deliver to site, unload, store, protect and co-ordinate movement of all plant, equipment and materials required for the works including lifting and hoisting.
- Fix and install correctly all plant, equipment and materials and ensure that all associated works are correctly executed.
- Undertake the firestopping of all penetrations associated with the works.

- Install fire barriers where a fire rated partition is penetrated.
- Preparation of the operating and maintenance manuals and planned maintenance schedules.
- Undertake the testing and commissioning of the works.
- Providing a commissioning report in accordance with CIBSE Codes.

1.5 Design Responsibilities

The Contractor shall be responsible for the following aspects of the design.

Detailed design responsibilities shall include the activities listed below, in addition to those activities normally undertaken through the custom and practice of the industry. Design responsibilities shall include but not limited to:

- A fully comprehensive RIBA Stage 4 design including layout drawings, schematics, equipment schedules, etc. for all building services design associated with this contract.
- A fully comprehensive RIBA Stage 5 construction issue including layout drawings, schematics, equipment schedules, etc. for all building services design associated with this contract.
- Detail the final or supplementary builders work information based on manufacturer's information. Provide fully dimensioned drawings.
- Detailed design and locations of brackets and supports including ASHP base
- Calculating system water capacities and quantities of chemical additives.
- Design and selection of acoustic attenuation equipment to satisfy the particular performance requirements of the specification, planning conditions and the defined spatial allowances.
- Final selection of all anti-vibration mountings to suit the particular application of the mounts.
- Preparing detailed automatic controls and electrical wiring diagrams of all equipment supplied showing all interconnections between equipment to enable all necessary wiring to be undertaken.
- Capacity, location, routes and design of electrical wiring, controls and conduit systems. Including trunking, trays and basket ware used in lieu of multi-conduit installation.
- Detailed design of automatic controls systems insofar as it is required to meet with operational and spatial requirements of the specification. The installer shall be responsible for ensuring the full compatibility of the plant and equipment with the specified function and for the design and incorporation of all interfaces (including relays or other devices or modifications to hardware or software).
- Dimensioning of, and final installation details of, automatic control panels to suit the detailed requirement of the agreed supplier of the control equipment. The installer shall be responsible for ensuring that:
    - Control panel cable entry/exits are possible in the final location.
    - Safe operating and maintenance clearances are provided.
- Final locations of:

    - Test points
    - Control sensors
    - Detectors
    - Thermostats
    - Gauges
    - Isolation valves
    - Commissioning sets
- Sizing of cable terminations for all items of equipment. Appropriate for the rating of fuses installed in fused connection units for the rating of the connected equipment.
- Design of cable or cable containment terminations on to electrical equipment.
- Dimensioning of and final installation details of electrical switchgear including:
    - The cable entry details for the selected location
    - Provision of adequate safe operating and maintenance clearances
- Ensuring cable size selections as specified are not invalidated by the selection of alternative routes during installation or selection of alternative manufacturers.
- Detailed design, supply and installation of plant platforms.
- Demonstrate that all plant and equipment incorporated into the works can be safely and easily maintained in full compliance with:
    - Health & Safety legislation
    - CDM Requirements
    - British Standards
    - Health & Safety Technical Memoranda
- Ensure that adequate space is provided for future replacement of plant or parts and that all access panels/doors are unobstructed.
- Detailed design of the electrical services installations including earthing and bonding requirements in accordance with BS 7671 Eighteenth Edition IET Wiring Regulations.

1.6 Design & Installation Parameters

The Contractor shall be responsible for undertaking completely the detailed design and co-ordination of the entire building services installations on this decarbonisation project.

The contractor's design shall be in accordance with the requirements and recommendations of the following publications current at the time of tendering. Should the Contractor become aware of any changes to these requirements prior to practical completion they shall bring it to the attention of the Employer's Agent. The Contractor shall comply with recommendations, requirements and guidance in these publications insofar as they affect the design, installation and commissioning of the building services.

1. British Standards & British Standard Codes of Practice including Harmonised (EN) European Standards
2. Health & Safety at Work Act
3. Statutory Acts
4. Building Regulations
5. Construction (Design & Management) Regulations 2015
6. The Chartered Institution of Building Services Engineers Guides & Technical Notes, Technical Memoranda & Commissioning Codes

7. Building Services Research & Information Association Application Guides & Technical Notes
8. BS 7671 IET Wiring Regulations Eighteenth Edition
9. Electricity Council Engineering Recommendations
10. Water Design, Supply (Water Fittings) Regulations
11. Institution of Gas Engineers & Managers Publications
12. HVCA Installation Guide TR10
13. Institute of Plumbing Guide
14. Good Practice in the Selection of Construction Materials. Current Version Published by Ove Arup & Partners
15. HSE ACOP L8 and CIBSE TM13 for Mains Water & Domestic Water Services

1.7 Co-ordination & Survey

The Contractor shall, before commencement of any work or submission of any drawings for comment, fully co-ordinate his works with all other services and disciplines, such that when builders work, working and design drawings are submitted for comment, they are fully co-ordinated with all other services.

It shall be the Contractor's responsibility to liaise with the other agencies in the co-ordination and integration of the services with all other trades.

The Contractor shall include for all necessary survey work.

The Contractor shall, before commencement of any work, provide detailed fully dimensioned working drawings, detailing all; plant, pipework, pumps, equipment and control accessories required in his installation for the Client or his Representative to comment upon.

The Contractor shall attend project team and co-ordination meetings as required by the Client or the Employer's Agent.

1.8 General Notes

The Contractor shall be responsible for the co-ordination, design, supply, delivery, erection, connection, testing and commissioning of all materials and equipment to complete the installation.

The Contractor shall design, provide, install, set to work, test, commission and certify all works associated with the mechanical, public health and electrical services installations. Include for all builders works in connection, fire stopping, containment/wireways and attendances.

The Contractor shall provide and incorporate all necessary equipment, accessories and ancillaries for a complete working and fully operational system. If there are any areas of doubt, or if any other equipment or ancillary works are required to provide a complete working system, it is the responsibility of the Contractor to identify the works, equipment and components required and to provide the necessary items.

Provide electrical works certificate (inclusive of "design" sign-off).

The Contractor shall be responsible for obtaining all relevant Local Authority approvals prior, during and at completion of the works.

All plant and materials shall be selected in accordance with the following and installed in accordance with manufacturers' recommendations:

1. Manufactured in accordance with relevant British Standards specification and Codes of Practice. Plant and Materials manufactured by companies having an appropriate BS EN ISO 9001:2008 certification shall be used in preference where suitable.
2. Conform to design requirements and be suitable for the purpose for which they are intended.
3. In compliance with Statutory Requirements.
4. Have an anticipated life expectancy as outlined in CIBSE Guide M, providing recommended maintenance in accordance with the Operating and Maintenance manuals is carried-out.
5. Suitable for operation on the Electricity Design, supply.
6. Plant and materials shall be similar in quality to those derived in this document. The Contractor shall submit a full list of intended manufacturers/suppliers for consideration by the Employer's Agent.

The Employer's Agent shall reserve the right to reject equipment which is considered inferior or would not meet the anticipated life expectancy given in CIBSE Guide M.

All plant, equipment and materials shall be installed in such a manner that it can be freely and easily maintained and replaced without causing major disruption to the tenant, infringing the Health and Safety at work requirements and causing disruption to the overall site. In general, it shall not be necessary to enter one tenant's area in order to serve or maintain equipment relating to another tenant.

1.9 Validations

The Contractor shall be fully responsible for undertaking the following described mechanical services validations prior to the stripping-out works:

- Test and record operating temperatures on all primary and secondary heating circuits.
- Test and record flow rates on all primary and secondary heating circuits.
- Record operating system pressures on all primary and secondary heating circuits.
- Water sampling analysis of closed circuits (1 no. in plantroom and 2 no. outfield).
- Condition and performance validation on existing secondary VT and CT pumps. All findings shall be detailed within a report.
- AHU validation: Test and record flow rates, external static pressures, condition and performance of unit and each component and operation of controls.
- Fully comprehensive BMS validation.

1.10 Enabling Works

The following scope of enabling works shall be the Contractor's responsibility to prepare the plantroom and external ground area for the main installation works:

1. Obtain a copy of the Asbestos Survey Report from the Client. Removal of asbestos by others. Should this not be relevant and or adequate to the works a targeted R&D Survey will be required.
2. Create external compound area for a site cabin and welfare - to be Heras fenced.

1.11 Strip-Out of Existing Services

Contractor shall note the following existing systems and components shall be stripped-out within the existing plantroom at roof level.

The strip-out works of the boiler plant, hot water heater and associated services shall take place once the new air source heat pumps and hot water heat pumps have been commissioned and are fully operational.

All stripped out materials and equipment not retained for reuse must be safely disposed of from site:

1. Electrically isolate, decommission, disconnect, and strip-out the gas fired boilers, gas fired water heater, pressurisation unit, associated flues plantroom electrical (excl. lighting) and controls installation.
2. Mechanically isolate, decommission, purge, disconnect and strip-out the gas supply to the boilers and water heater.
3. Mechanically isolate, drain down, decommission, disconnect, and strip-out the boilers incl; flues, local flow and return pipework, open vent pipework, shunt pumps, valves and fittings
4. Mechanically isolate, drain down, decommission, disconnect, and strip-out the gas fired hot water heater incl: hot water pumps, pipework, valves and fittings.
5. Mechanically isolate, decommission, disconnect, and strip-out the primary circuit pumps and associated connecting pipework and fittings.
6. Undertake all builderswork associated with the project.

The Contractor shall strip-out all fixtures, fittings, supports and bracketry for a complete strip-out of these services.

2 Mechanical Services

2.1 Above Ground Drainage

Contractor shall note the following existing systems and components shall be stripped-out within the plantroom at roof level. All stripped out materials and equipment not retained for reuse must be safely disposed of from site:

2.1.1 Safety Discharge

The Contractor shall design, supply and install safety valves and safety valve discharge pipework drainage connections to each air source heat pump and hot water heat pumps. The discharge waste pipework will drop to terminate at low-level.

2.1.1 Overflow Discharge

The Contractor shall supply and install overflow discharge pipework drainage from the pressurisation unit within the plantroom at roof level. The discharge waste pipework will run to discharge over a gully.

2.2 Air Source Heat Pump & Heating Installation

The Contractor shall supply and install new floor standing air source heat pumps and all fixtures and fittings necessary for the complete installation. The air source heat pump support system must be in accordance with the manufacturers requirements.

The Contractor shall supply and install the air source heat pumps externally, to the rear of Block F, as indicated on the drawings.

The Contractor shall supply and install all pipework (material mild and heavy steel), pumps, buffer vessel, valves, fittings and fixtures to the air source heat pumps for a complete installation as generally indicated on the drawings.

The Contractor shall allow for the air source heat pump manufacturer to commission the air source heat pumps and integral controls.

The pipework is to be installed to provide a neat installation, with all plant and valves easily accessible for maintenance (in accordance with manufacturers requirements) and replacement.

The Contractor shall design, supply and install builders work necessary to create support systems, plinths and openings.

The Contractor shall supply and install all new low loss header within the plantroom at roof level and all primary and secondary pipework material (mild and heavy steel), primary pumps, valves, fittings and fixtures to the air source heat pumps, buffer vessel and existing secondary pumps for a complete installation as generally indicated on the drawings.

2.2.1 Weather Compensated Control

The Contractor shall review the existing BMS weather compensated curve and amend as necessary to suit the new operating temperatures of the ASHP system. The Contractor shall test the operation of the 3-port control valve to ensure the variable temperature heating system is operating at the correct temperature.

2.3 Buried Pipework

The Contractor shall appoint a district heating specialist to carry out all planning, civils, ground probing radar scans, excavations, waste management, pipework installation, backfill, ground reinstatement works, associated with the buried services installation.

Prior to carrying out any works, the Contractor shall carry out a ground scan/ground probing radar systems (GPR) to ascertain routes of buried services. All findings are to recorded on a as installed drawing.

The Contractor shall produce and issue a Traffic/Pedestrian Management Procedures document, together with fully comprehensive RAMS to demonstrate that work will be completed safely.

The buried pipework shall be installed using the Isoplus Insulation Series 2 pre-insulated product.

The ground reinstatement works shall include for landscaping to be reinstated as per the existing finish.

2.4 Hot Water Heat Pump Installation

2.4.1 Hot Water Heat Pumps

The Contractor shall supply and install within the plantroom at roof level 3 no. new hot water heat pumps complete with anti-stratification pumps and all fixtures and fittings necessary for the complete installation.

The Contractor shall supply and install copper pipework to match existing within the plantroom. The new hot water heat pumps shall connect to the existing mains cold water and hot water supplies within the existing plantroom at roof level, as generally indicted on the drawings for a complete installation.

The pipework in the plantroom is to be installed to provide a neat installation, with all plant and valves easily accessible for maintenance (in accordance with manufacturers requirements) and replacement.

2.4.1 Heating & Hot Water Service Pumps

The Contractor shall supply and install new all new circulation pumps as indicated on the drawings, including all fixtures and fittings necessary for the complete installation of the pumps.

The hot water service return and anti-stratification pumps shall be single head type and shall be supplied and installed.

2.4.1 Safety Valves

The Contractor shall design, supply and install new safety valves to the air source heat pumps, and hot water heat pumps in accordance with the manufacturer's recommendations.

The Contractor shall design, supply and install a safety valve to the pressurisation set within the plantroom in accordance with the manufacturer's recommendations.

The Contractor shall refer to BS6644 for the correct sizing and specification and will ensure that the discharge capabilities of all safety valves selected are equal to or greater than the output of the air source heat pump or system it is protecting.

2.4.1 Pressurisation Units & Expansion Vessels

The Contractor shall supply and install a new pressurisation unit and expansion vessels for the heating system. The pressurisation unit and expansion vessels are to be located within the plantroom at roof level.

The Contractor shall allow for the supply and install of all pipework, overflow, quick fill bypass, anti-gravity loop, safety valve, valves, fixtures, fittings and accessories for the complete installation/reconfiguration of the pressurisation set.

2.4.1 Plantroom Ventilation

The existing louvres shall be retained for plantroom ventilation.

2.5 Radiators

All radiators within Block E shall be replaced with new.

The Contractor shall issue a programme for comment, which shall clearly indicate the proposed dates (and periods) to switch off and drain the heating system within Block E.

Prior to system drain down, the Contractor shall liaise and obtain approval from the local authorities to discharge the water to drain.

The Contractor shall replace all existing radiators with new. The new radiators shall be sized so that they are suitable for operating temperatures of the air source heat pump system.

The Contractor shall calculate the heat output of the existing radiators, using correction factors based on the below criteria:

- LTHW Flow temperature: 83°C
- LTHW Return temperature: 71°C
- Offices: 21°C
- Teaching Rooms: 19°C
- Toilets: 20°C
- Circulation areas temperature: 19°C

The Contractor shall calculate the heat output of the new radiators, using correction factors based on the below criteria:

- LTHW Flow temperature: 70°C
- LTHW Return temperature: 40°C
- Offices: 21°C
- Teaching Rooms: 19°C
- Toilets: 20°C
- Circulation areas temperature: 19°C

New radiators shall be manufactured by Stelrad, their Classic Compact K3 range.

The Contractor shall supply and provide all temporary sheeting within the areas they are working in to ensure draining, removing and the installation of radiators does not damage the building fabric and finishes. All costs associated with damages, making good and decoration caused by these works shall be covered by the Contractor and not the Client.

2.6 Thermostatic Radiator Valves

All radiators shall be provided with pressure independent thermostatic radiator valves on the flow connection and a lock shield valve on the return.

The pressure independent thermostatic radiator valves (PI-TRVs) shall incorporate their own integral differential pressure controller (DPCV) ensuring a maximum flow limitation in both part- and full load.

Each valve is to be preset to suit the radiator heat output. The K setting of the valve can be adjusted by the following steps:

Remove the protective cap/thermostatic sensor.

Find the reference mark ‘R’.

Turn setting ring until the required presetting algins with the reference mark.

At settings ‘N’, the valve is fully open.

The lockshield valves shall be set to fully open and are there to provide future isolation for maintenance/radiator replacement.

The PI-TRVs shall be manufactured by Danfoss, their Pt40 range.

2.7 Electronic Thermostatic Radiator Valve Heads and smart building controls.

All PI-TRVs shall be provided with electronic TRV heads. The electronic TRV heads enable digital control that shall communicate with the BMS. The electronic TRV heads shall be manufactured by LowaWAN.

The contractor shall provide a full schedule of smart building controls, including but not limited to Occupancy sensors including temperature and data logging, smart lighting controls including PIR. Automatic door entry.

All measures will be linked to the BMS.

2.8 Central Air Handling Plant

A central air handling unit is located at roof level within the plantroom. The existing air handling unit incorporates a pre-heat coil and a re-heat coil.

The Contractor shall replace the existing pre-heat and re-heat coils with new. The new coils shall be sized so that they are suitable for operating temperatures of the air source heat pump system.

The Contractor shall calculate the heat output of the existing heating coils using the below operating temperatures:

- LTHW Flow temperature: 83°C
- LTHW Return temperature: 71°C

The Contractor shall calculate the heat output of the new radiators, using correction factors based on the below criteria:

- LTHW Flow temperature: 70°C
- LTHW Return temperature: 40°C

The Contractor shall appoint a coil specialist to ensure that the duties of the new coils, match the existing.

The Contractor shall carry out local pipework modifications and valve replacements so that the new coils operate on a 2 port pressure independent control valve (PICV). The Contractor shall modify the controls of the CT pump set to operate on pressure control.

2.9 Automatic Controls

The Contractor shall design, supply and install a complete automatic controls system that integrates the existing plant with new. The contractor is to carry out a comprehensive validation of the existing BMS system to ascertain if the existing central mechanical control panel can be retained for the new heating installation.

2.10 Insulation

The Contractor shall allow to supply and install hammerclad finished, foil faced rockwool thermal insulation to all new pipework, bends, flanges etc. within the plantroom at roof level.

Externally, the Contractor shall supply and install 50mm PIB thermal insulation.

The Contractor shall supply and install all valves and pipework fittings with removable Velcro strapped insulation jackets fabricated from silicone coated glass fibre cloth encapsulating 50mm insulation.

2.11 Pipework, Valves and Fittings

The Contractor shall supply and install all valves, strainers, flushing points, fixtures and fittings including deaerators and dirt separators as indicated on the drawings.

The Contractor shall supply and install all pipework tap in (binder) points for the fitting of gauges and sensors for the complete pipework and controls installation.

The pipework in the plantroom is to be installed to provide a neat installation, with all plant and valves easily accessible for maintenance and replacement.

The Contractor shall supply and install all pipeline equipment as generally indicated on the drawings.

2.12 Pipework, Fixings and Supports

The Contractor shall be deemed to have included within his Tender Sum the cost of all fixing and support requirements. The extents of which shall be designed by the Contractor.

2.13 Water Treatment

Prior to the Contractor carrying out the initial heating system drain down, a trade effluent licence from the relevant utility company shall be obtained.

Upon completion of the new heating installation, the new installation shall be thoroughly flushed and cleaned prior to it being 'opened up' to the existing heating distribution pipework system.

Flushing and cleaning of the existing and new heating systems shall in accordance with BSRIA BG29-2012 "Pre-commission Cleaning of Pipework Systems".

The water quality of the heating circuits shall be fully the responsibility of the installing Contractor and shall meet the requirements of the ASHP manufacturer set out in their literature.

Then when all the agent is removed and the system fully flushed through, a corrosion inhibitor will be added during commissioning to the heating system. The correct dosing levels will be attained, as per BSRIA 50/2013.

Following flushing, filling, venting and dosing. The water quality shall be sampled and sent for full bacterial and chemical analysis in accordance with BS 8552 and confirmed to be within the required parameters prior to opening the existing system to the new equipment.

All requirements of COSHH regulations will be complied with during the chemical cleaning and chemical treatment process.

A completion certificate will be issued when the above has been performed.

The O&M manual shall include a section setting out the water treatment requirements to maintain the ASHP warranty.

2.14 Valve & Fitting Tags / Labelling / Pipe Labelling

The Contractor shall design, supply and install circular tags with valve or fitting numbering tag to all valves and fittings fitted via ball link chain.

The Contractor shall design, supply and install labels to all plant, equipment and isolators within the plantroom.

The Contractor shall design, supply and install pipe labelling to identify hot and cold pipes, directions of flow and circuit references.

2.15 Builders work In Connection

The Contractor shall design, supply, install and undertake all builders works in connection necessary to complete the project. The scope of the builder's works is expected to include the following:

- Access – scaffolding to roof level to enable installation of new heating pipework
- Access – Heras fencing to external compound area
- Thorough clear out of rubbish and sweep and hoover of plantroom and plantroom floor
- Form a new steel support system for the floor standing air source heat pumps
- Form a new trench for the external heating pipework (with appropriate trench protection). Back fill and finish landscaping to match existing floor finishes
- Filling and making good redundant penetrations and openings in walls, floor and roof
- Removing all redundant brackets, threaded rods and support fixings
- Firestopping
- Core drilling

2.16 Plantroom Record Drawings

The Contractor shall supply and install A1 sized "As Installed" drawings to be laminated or framed and screwed to the plantroom wall. The drawings shall depict:

1. "As Installed" Schematic
2. Valve Numbering Chart (size, type, number)
3. Electrical Services Circuit Chart

3 Electrical Services

3.1 General

(To be completed on next issue)

3.2 Fire Alarm Installations

The existing fire alarm installation shall be retained and protected from damage. During the course of the works the Contractor shall ensure that dust covers or bags are fitted to devices in the site demise where dirty works are being undertaken in order to avoid false alarms.

The covers/bags shall be removed at the end of each working shift and confirmation made that the system is safe and fully functional so as to ensure no loss of cover to the building at the end of each working shift.

Where works require the loss of cover/service to the fire alarm systems then this shall be undertaken outside of normal working hours in order to reduce risk of loss to the client.

The Contractor shall ensure that where modifications/additions are made to the fire alarm installation then the systems installed shall be tested and commissioned in accordance with BS7671, BS5839 and the manufacturers recommendations and that new certificates for the works issued.

3.3 Testing and Commissioning

The Contractor shall ensure that all works are fully tested, commissioned and left in safe and in full working order upon completion of the works.

The testing and commissioning of the systems shall be undertaken in accordance with:

- British Standards
- Codes of Practice
- Manufacturers Recommendations

4 Operation & Maintenance Manuals

As soon as possible after the setting to work of the installations the Contractor shall issue complete Maintenance and Operating Instructions and 'As Built' Records for The Works.

- Provide O&M Manuals and Record Drawings for all works, to be issued in both PDF and DWG formats.
- Provide all certificates/commissioning sheets, prior to Practical Completion, inclusive of "design" sign-off.

An example of the contents to be included is available from the Client's Representative on request.

5 Commissioning & Certification

Prior to Practical Completion being considered, the following commissioning sheets and certificates shall be fully completed and issued to the Employer's Agent:

SYSTEM	COMMISSIONING SHEET/CERTIFICATE
Electrical Installation	• Electrical Installation Certificate
Automatic Controls Installation	• Automatic Controls Installation Certificate & Report
Heating System	• Flushing and Water Treatment Certificates (and laboratory results) • Recorded Flow Rates (at all commissioning sets) • Expansion Vessel Certificates (heating circuits) • Pump Service Commissioning Reports • Photo Evidence of Clean Strainers • Pipework Pressure Tests • Air Source Heat Pump Reports • Gas Safe Certificate (for strip out works)
Domestic Water	• Chlorination Certificate (hot water heat pumps only • Pump Service Commissioning Reports • Recorded Flow Rates (at all commissioning sets) • Pipework Pressure Tests