

# EDEN GEOTHERMAL HEAT NETWORK MEP DESIGN

Mechanical and Electrical Engineering Specification

**VOLUME 1 OF 4 – PRELIMINARIES**

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**EDEN GEOTHERMAL HEAT MAIN MEP DESIGN  
MECHANICAL AND ELECTRICAL SPECIFICATION**

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**PRELIMINARIES / GENERAL CONDITIONS**

**Audit sheet**

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**A10 PROJECT PARTICULARS**

**A10 PROJECT PARTICULARS**

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### A10 PROJECT PARTICULARS

#### 100 INTRODUCTION TO PRELIMINARIES / GENERAL CONDITIONS SECTION

This Preliminaries / General Conditions section of the specification describes the building engineering systems Installer's obligations in relation to the management of the Works, production of information, design responsibility and other matters not directly related to the technical content of the Works, insofar as they relate to the building engineering systems sub-contract(s). Nothing in this specification overrides any requirement of the main contract preliminaries; this specification should be read in conjunction with the main contract preliminaries. For the avoidance of doubt, it is confirmed that except for particular actions on behalf of the Contract Administrator, none of the matters herein are for Hoare Lea to perform, including when novated or otherwise acting for the Main Contractor.

Unless specifically stated otherwise, references to regulations, standards and all other referenced documents are to the edition (including amendments, replacements and normative references) current at the time of tender.

#### 200 DEFINITIONS

The following definitions apply throughout this specification. In addition, the definitions of different types of drawing and Building Information Models given in BSRIA BG6 – A Design Framework for Building Services, current edition, apply:

Installer:	The trade contractor appointed to undertake Mechanical, Electrical, Lift, Fire Protection or other building engineering system installation work in any single or combined sub-contract as defined by the main contract documentation.
Building Engineering Systems (Installation):	Each and every Installation from the following schedule: <ol style="list-style-type: none"> <li>1. Mechanical</li> <li>2. Electrical</li> <li>3. Fire Protection</li> <li>4. Voice and Data Cabling</li> <li>5. Commissioning</li> </ol>
Contract Administrator:	Throughout this specification the term "Contract Administrator" should be read as "Employer's Agent" and refers to the party named as such in the main contract preliminaries, or others acting on their behalf.
Client / Employer	The person or organisation named in the Main Contract as the Employer or their assignee
Submit:	Issue documentation in accordance with the contract (ie the specified number of copies, to the Contract Administrator and / or other members of the project team as required).
Works:	All building engineering systems shown on the drawings and described in the specification.
Drawings:	The tender drawings (or tender Building Information Model where applicable).
Elsewhere:	Detailed or specified in other clauses, sections, shown on the drawings, in the Building Information Model, or contained in the specification or main contract documentation.

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System:	All equipment, accessories, controls, supports and ancillary items, including supply, installation, connection, testing, commissioning and setting to work necessary for that section of the Works to function.
Competent person:	A person who, by reason of theoretical and practical training, or actual experience, or both, is competent to perform the task or function or assume the responsibility in question and is authorised to perform such a task or function.
Trench:	A covered horizontal service space in the floor or ground with access from above.
Cavity:	A space enclosed within the elements of a building, within which services are installed, eg the space between ceiling and floor above.
Concealed services:	<p>In relation to installation requirements, a pipe that is a Water Fitting must be located in compliance with the definitions and requirements of the WRAS Guide to The Water Supply (Water Fittings) Regulations.</p> <p>In relation to installation requirements, other pipework is “concealed” if it is behind a structural or finishes element, other than a single sheet of plasterboard, that would need to be removed or damaged in order to replace or repair the service and does not contain sufficient easily removable / openable access panels / hatches to obviate this need.</p> <p>In relation to inspection requirements, a service is “concealed” if it is located behind a structural or finishes element that does not contain sufficient easily removable / openable access panels / hatches to allow the service to be inspected along its entire length,</p>
Terminal units:	Units such as radiators, convectors, fan coil units, induction units, variable or constant air volume boxes and other like equipment.
Ancillaries:	All specified fittings, accessories, inserts, test points, bracketing, terminal equipment connected to and installed in the engineering services system.
Equal and accepted:	The Contract Administrator will be the sole arbiter of whether any alternative product to that specified is acceptable. The acceptance of an alternative by the Contractor Administrator does not imply acceptance of a derogation from the performance requirements for the item in question unless this has been brought to the Contract Administrator’s attention and specifically agreed in writing. The absence of a response from the Contract Administrator to a proposed alternative may not be used as the basis for an extension of time claim, and should be interpreted as a refusal of the alternative, if the decision becomes critical for programming purposes.
Lead Co-ordinator	A role undertaken either by the Main Contractor or by one Building Engineering Systems Installer to ensure co-ordination of design and installations.

### 210 Metric and Imperial Conversions

Some dimensions and units in metric have been converted from imperial units and approximated to the nearest practical dimension, ie 12” has been converted to 300mm. Metric sizes have been used for both metric and imperial components. Where only imperial components are available the imperial size has been converted to the metric equivalent size. Due allowance should be made for metric and imperial conversions.

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**A10 PROJECT PARTICULARS**

**END OF SECTION A10**

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**A11 DRAWINGS AND TECHNICAL SUBMISSIONS**

**A11 DRAWINGS AND TECHNICAL SUBMISSIONS**

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#### **A11 DRAWINGS AND TECHNICAL SUBMISSIONS**

#### **100 BUILDING INFORMATION MODELLING AND DRAWINGS OF INSTALLATIONS**

#### **110 GENERAL**

Produce and submit all drawings, without exception, in a CAD format agreed at tender. Make independent enquiries to ensure that the CAD system is compatible with those systems being used by the design team and provide file translation facilities to suit the design team's format. In the absence of such enquiries and a written agreement to the contrary, the tender will be deemed to allow for AutoCAD, latest version. Issue drawing files in both DWG and PDF format.

Use a drawing layering convention and drafting protocols that allow some items (including dimensions, furniture, general text, drawing borders) to be 'frozen' without affecting the visibility of other aspects eg the building structure. Agree the layering convention and drafting protocols with the Contract Administrator prior to commencing drawing production.

Prepare all drawings in accordance with BS 1553 *Specification for graphical symbols for general engineering*.

On all drawings show the same project name as that on the cover of this specification.

Reproduce all drawings in accordance with BS EN ISO 5457 *Technical drawing documentation. Sizes and layout of drawing sheets*.

Agree with the Contract Administrator a document numbering system prior to preparing any documents.

When drawings are revised, indicate the revisions that have been made since the previous issue by means of "revision clouds".

#### **120 SCHEDULE OF DRAWINGS FOR SUBMITTAL**

Within *two* weeks of appointment prepare and submit a schedule of all drawings that you propose to submit for comment in connection with the Works. For every drawing on the schedule indicate the following:

1. drawing number and revision letter/number
2. drawing title and building engineering system
3. scale
4. latest date required on site
5. date that final comments are required
6. date on which comments were received
7. date issued for comment
8. date of commencement of drawing production

Revise and submit the drawing schedule on a monthly basis, updating it to take into account all revisions that have taken place.

Include the necessary time in the programme for production of drawings for submission; examination; alterations and resubmission in the event of the initial submission not being accepted; and the final issue.

#### **130 DRAWINGS TO BE PROVIDED**

Provide the following drawings and cross-reference them to each other for ease of interpretation. Where applicable, definitions of the contents of each drawing type are to be as contained within BSRIA's Building Applications Guide BG 6 *A Design Framework for Building Services*, Appendix C.

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### **A11 DRAWINGS AND TECHNICAL SUBMISSIONS**

1. Detailed Schematics
2. Technical Design Drawings
3. Co-ordinated Working Drawings
4. co-ordinated reflected ceiling plans (not in BG 6)
5. Installation Drawings
6. shop / fabrication drawings (not in BG 6)
7. Manufacturer's Drawings
8. plant and equipment drawings (not in BG 6)
9. plant and equipment wiring diagrams (not in BG 6)
10. Builder's Work Information
11. Builder's Work Details
12. Record Drawings

### **140 PRODUCTION OF CO-ORDINATED DRAWINGS**

Ensure that all Co-ordinated Working Drawings, Installation Drawings, Builder's Work Information and Builder's Work Details for the project are co-ordinated and that their production is timely. Prepare drawings to a common drawing production programme agreed with the Main Contractor.

Attend drawing production meetings arranged and chaired by the Main Contractor or Lead Co-ordinator. The purpose of the meetings is to resolve the effective production of the Co-ordinated Working Drawings, Installation Drawings, Builder's Work Information and Builder's Work Details, for each and every discipline.

No additional payment will be made for abortive draughting by any individual Installer caused by lack of knowledge of the requirements of any of the other work packages. Any work package proceeding prior to the submission of and receipt of comments on the relevant co-ordinated drawings will do so at that Installer's own risk.

No additional payment will be made to rectify work rendered abortive as a consequence of an Installer's failure to install in accordance with a properly produced and commented-upon drawing, or as a consequence of an Installer proceeding without relevant detailed information of the other sub-contract packages, structure or architectural form.

Produce and present all drawings in printed form unless otherwise agreed in writing by the Contract Administrator.

Indicate on every Co-ordinated Working Drawing, Installation Drawing, Builder's Work Information Drawing and Builder's Work Detail all relevant details of all elements of structure, architectural form and other building engineering systems. Ensure that all drawings have independent layers of information in accordance with the following list and include the relevant aspects, in co-ordination, of the following:

1. structure and architectural form
2. mechanical Works
3. electrical Works
4. fire protection Works
5. voice and data cabling
6. external Works

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7. primary and secondary steelwork.
8. process work

Depict all the above in a readily identifiable manner.

### 200 LEAD CO-ORDINATOR'S ADDITIONAL RESPONSIBILITIES

While the overall responsibility for programming and co-ordinating the entire Works is the Main Contractor's, the Main Contractor may designate one Building Engineering Systems Installer to act as Lead Co-ordinator. Unless otherwise specified elsewhere, the role of Lead Co-ordinator will be undertaken by the mechanical Installer.

The Lead Co-ordinator's additional responsibilities are as follows:

1. Create and maintain the architectural and structural information for the background to the co-ordinated drawings and liaise with the Main Contractor to ensure the latest architectural and structural information is used at all times.
2. Establish the layering convention to be used by all building engineering systems Installers.
3. Agree with the Main Contractor and the other building engineering systems Installers a programme for the production of the individual Installers' installation drawings, and of the Co-ordinated Working Drawings, Installation Drawings, Builder's Work Information and Builder's Work Details.
4. Manage all building engineering system Installers' exchange of information with each other, and with the Main Contractor and other related work package contractors.
5. Produce the Co-ordinated Working Drawings showing all the building engineering systems installations along with architectural and structural information. Update the co-ordinated drawings as necessary to incorporate spatial design changes instigated by the Main Contractor or any of the building engineering systems Installers.
6. Production of Co-ordinated Builder's Work Information and Builder's Work Details showing the builder's work requirements of all the building engineering systems installations. Update these drawings as necessary to incorporate any changes to the Co-ordinated Working Drawings.
7. Check the co-ordination of all services on the co-ordinated drawings.
8. Should more than one technical documentation specialist be employed by different Installers, agree with the Contract Administrator a common style and format for the Record Drawings and operating and maintenance instruction manuals, and co-ordinate their production.

### 300 CO-ORDINATION

Each and every building engineering systems Installer is responsible for ensuring its installation is fully co-ordinated with the remainder of the project and that all information relating to each and every installation is correctly indicated on the Lead Co-ordinator's Co-ordinated Working Drawings. Likewise ensure that all builder's work requirements are correctly indicated on the Lead Co-ordinator's co-ordinated Builder's Work Information and Builder's Work Details. Incorporate any spatial changes instructed in relation to the Works.

Following issue of the final Co-ordinated Working Drawings by the Lead Co-ordinator, each Installer may issue their installation drawings, using the routes agreed and shown on the Co-ordinated Working Drawings.

Ensure that the Installation Drawings include all works to be carried out by sub-traders / suppliers and that their works are fully co-ordinated with each other and with all other installations.

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Take dimensions on site, check runs and levels, and mark on site actual locations of all builder's work holes required through walls, partitions, floors, etc, and also chases in walls, floors, etc, for conduits, pipes and the like, and offer them for inspection by the Contract Administrator prior to carrying out any work of making them. Establish a method of working with the Contract Administrator to ensure that such builder's work proceeds without hindrance to the overall project programme. Ensure that setting out of plant and equipment, pipes and ducts etc, permits it to fit into the space allocated and allows access for maintenance and replacement purposes.

Agree with all sub-traders / suppliers, and be responsible for, the positions of their work or materials including pipe runs in ducts, conduits and cables, etc, and the positions of holes, chases, recesses, fixings and the like, before work is put in hand, in order to ensure that they do not conflict with other work.

To ensure co-ordination between sub-traders / suppliers, arrange and attend any necessary meetings with the relevant sub-traders / suppliers in order to agree such priorities as are necessary and in order to monitor progress. Obtain the necessary data for, and prepare, Co-ordinated Working Drawings showing all the work involved in the building engineering systems installation together with its associated builder's work, and give all necessary instructions to overcome any potential conflicts.

Note that the responsibility for co-ordination of the Works is not limited to physical co-ordination, but also includes co-ordination of communications interfaces between systems supplied and installed by different specialists, including but not limited to IT systems, building management system, access control system, and automatic meter reading system. Arrange and attend any necessary meetings with the relevant sub-traders / suppliers to ensure any issues relating to communication interfaces between systems are resolved well before installation and commissioning. This includes communication interfaces between two systems that are within your sub-contract package, and communication interfaces between a system that is within your sub-contract package and another system that is in a different sub-contract package.

#### 400 INSTALLATION DRAWINGS

Each of the building engineering system Installers is to produce, in accordance with the agreed programme, independent Installation Drawings, Builders Work Information and Builder's Work Details. Each Installer is responsible for the accuracy of its own information and for the physical relationship of its own Works to those of other Installers.

When preparing drawings for the installation show all components required for a complete installation, properly located, dimensioned and co-ordinated.

Produce plans, elevations, sections, details and schematics. Make them of a minimum scale but sufficient to illustrate and describe the design, fabrication, installation and fixings for all assembly conditions, interfaces and co-ordination with the other works.

As a minimum produce drawings in accordance with the following:

- |  |      |
|--|------|
| 1. floor plans with co-ordinated services layout                   | 1:50 |
| 2. plant rooms, services ducts details, etc                        | 1:20 |
| 3. ductwork manufacturing details                                  | 1:50 |
| 4. co-ordinated sectional drawings / details                       | 1:20 |
| 5. diagrammatic arrangements, wiring diagrams, etc                 | NTS  |
| 6. Builders Work Drawings*   |      |
| 7. component details, hangers, supports, secondary steelwork, etc* |      |

(\*use a scale that allows the intent to be clearly illustrated)

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Base the Installation Drawings on the tender drawings taking into account any modifications that may have taken place, and correctly relate the details of the actual plant and equipment selected for incorporation into the Works, to all other items. Properly include in the Works the layouts, routes and details of the building services engineering systems shown on the tender drawings, and make allowance for the installation, operation and maintenance of the Works by all other trades and disciplines. Accurately show the specified or selected plant and equipment in its true proposed location.

Base the Installation Drawings upon the latest issue of information issued by the Contract Administrator during construction.

Submit Installation Drawings that clearly state that plant or equipment proposed complies in all respects with the specified requirements. Where alternatives or deviations from the specification are to be proposed for the Contract Administrator to consider, clearly detail each and every alternative or deviation proposed.

Submit details of plant and equipment in schedule form, accompanied by the supplier's certified working drawings where appropriate. Provide copies of the manufacturers' certified drawings for major items of plant, indicating physical dimensions, schematic arrangements of all components and fully detailed electrical wiring diagrams.

Where necessary for the proper co-ordination of the Works, make a survey of the site or building(s) or room(s) and existing installations as constructed, and prepare the Installation Drawings from the resulting site measurements. Where Record Drawings and / or a record BIM model of the existing installation are made available, do not rely on the accuracy of these and carry out a survey to verify the accuracy of the record information.

Show on the Installation Drawings all plant, equipment and cable tray / cable trunking / pipe / duct runs, etc. Include full details of all plant together with cable tray / cable trunking / pipe / duct sizes, wiring diagrams, schematic and inter-connection diagrams / drawings.

Show on wiring diagrams, (including internal diagrams for items of electrical equipment and diagrams of interconnection between items of equipment and components) references of all terminals and terminations with cable types clearly identified.

Ensure that circuit and layout diagrams for the electrical wiring of plant, etc, detail not only all circuitry within main control panels but also that within all external equipment (eg motor starters, thermostatic control devices), together with all interconnecting wiring from the main point of supply onwards and with all terminal markings. Indicate the required sizes and types of all cables on the layout diagrams together with the ratings of such items as fuses, switches and controllers.

Arrange circuit diagrams, where possible, so that the main sequence of events is from left to right and from top to bottom of the diagram. Comply, generally, with the IEC on-line database for diagram symbols. If abbreviations are employed for the designation of components, provide a schedule on the drawings that explains the meaning of the abbreviations.

Ensure that the circuit and layout diagrams for the electrical wiring of plant, etc, subsequently form part of the set of Record Drawings.

Individual circuit and layout drawings from the various component manufacturers are not acceptable in lieu of composite diagrams.

Where revisions take place to the building engineering systems installation, either under the authority of a Contract Administrator's Instruction, or by written agreement with the Contract Administrator, or as a consequence of revised architectural or structural drawings being issued, modify the Installation Drawings accordingly and re-issue for construction purposes. Issue revised drawings in accordance with and with regard to the agreed programme for construction.

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Particular Installation Drawings may (by the prior, specific and express written permission of the Contract Administrator), omit minor details such as conduit, provided that an agreed method statement rigorously covers the installation intent. This permission will not be unreasonably withheld but will not be given where either Employer operation or visual appearance is adversely affected, nor where such details are needed for informing other trades.

Ensure that the Installation Drawings include details of all local co-ordination around equipment, control panels, and individual plant, at access points and on architecturally finished surfaces. The intent is that all installations can be considered for spatial relationship, appearance and Employer operation.

Ensure that the Installation Drawings show sufficient detail to enable the erection staff to install the Works in accordance with the specification and show sufficient clearances for insulation, dismantling, maintenance, insertion of thermostats, thermometers, gauges and the like, painting, cleaning and commissioning. Show also on the drawings possible causes of obstruction or restriction, either structural or by other services, to enable alternative routes to be considered. Include electrical equipment and control items on the mechanical Installation Drawings

#### **500 BUILDER'S WORK INFORMATION AND BUILDER'S WORK DETAILS**

Prepare and issue Builder's Work Information and Builder's Work Details based on the Installation Drawings, in sufficient time to prevent abortive work. This information may modify or supplement any builder's work provision for the building engineering systems installation already made on the architect's and structural engineer's tender drawings.

Show clearly on the Builder's Work Information the requirements necessary to accommodate the installation of each and every building engineering system. In cases where preliminary builder's work and structural information has already been shown on the tender Drawings (eg the weight of items of equipment, sizes of access ways, etc), check that it is correct before incorporating it into Builder's Work Information.

Prepare all other necessary Builder's Work Information required for the execution of the Works, making due reference to the structural and architectural final dimensioned detail drawings as applicable. Fully dimension all such drawings.

Provide all Builder's Work Information in sufficient time to comply with the agreed programme requirements and meet all costs arising from failure to do so.

#### **600 TECHNICAL SUBMISSIONS**

For all plant and equipment proposed, submit all manufacturers' drawings and comprehensive technical information prior to the placing of orders and manufacture. Submit final details, including all technical aspects and calculations where applicable, in a clear, definable and easily read format with the specified technical details, notes and performance data clearly shown.

Include the following information as a minimum:

1. copies of manufacturers' certified drawings indicating physical dimensions, schematic arrangement of components and full electrical wiring diagrams
2. full description of controls systems describing the sequence of operation of all components under every operating condition likely to be experienced by the equipment
3. manufacturer's material and workmanship specifications including paint finish and RAL colour
4. full performance schedules, operating characteristic curves and charts for every individual item of equipment indicating all data necessary (eg fluid flow rates, pressures, operating temperatures, electrical currents, voltages, noise levels, etc) to properly describe in engineering terms, the performance of the equipment being offered, including the definitions of all engineering parameters at the interfacing points of connection



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5. manufacturer's installation, operating and maintenance instructions
6. waiver of intellectual property rights on application or arrangement of equipment or materials as required on site, in favour of the Employer, as defined in the main contract
7. manufacturer's letter confirming whether or not the proposed equipment (a) is on the UK Government's 'Energy Technology Product List' for Enhanced Capital Allowances purposes under the UK Government's climate change package of measures, (b) is on the UK Government's 'Water Technology Product List' for Enhanced Capital Allowances purposes and (c), is 'CE' marked or that it does not legally require a 'CE' mark

Ensure that all product information provided as part of technical submissions is in accordance with the Code for Construction Product Information (CCPI, [cpicode.org.uk](http://cpicode.org.uk)).

The submission of the above information does not remove the obligation for all equipment to comply with the specification. Any proposed deviations from the specification should be specifically drawn to the Contract Administrator's attention and their written agreement obtained before proceeding. The absence of a response from the Contract Administrator to a proposed deviation may not be used as the basis for an extension of time claim, and should be interpreted as a refusal to accept the proposed deviation, if the decision becomes critical for programming purposes.

#### 700 COMMENTS ON INSTALLER'S DRAWINGS / MODELS AND TECHNICAL SUBMISSIONS

Allow at least ten working days for comment by the Contract Administrator. Issue the drawings and technical submissions progressively, related to the construction programme, grouped according to building engineering system and in sequence with all other Installers' Installation / Co-ordinated Working Drawings, to facilitate reviewing.

Where drawings are issued out of sequence, are issued without supporting or referenced information, or are otherwise reliant on un-issued information, the Contract Administrator reserves the right to reject the drawing or comment only upon those elements unaffected by missing information.

The Contract Administrator's representative will, if requested, attend a series of meetings during the production of the Installation / Co-ordinated Working Drawings and Builder's Work Information to provide early comment upon presentation, detail, design queries and production programme.

Where details are replicated throughout a series of drawings and / or technical submissions, present and agree such details prior to draughting the entire scheme. Repeat or duplicate drawings need not, and should not, be submitted.

Submit drawings and technical submissions for comment in sufficient time prior to ordering equipment and to avoid delay to the Works.

Unless otherwise agreed in writing, do not commence any installation work until the relevant Installation and Co-ordinated Working Drawings have been issued and commented upon.

Take responsibility for any omission, errors or any discrepancies in the drawings and other particulars supplied directly or by suppliers, whether such drawings or particulars have been commented upon by the Contract Administrator or not, provided that such omission, errors or discrepancies are not due to inaccurate information of particulars furnished in writing to the Installer by the Contract Administrator.

Comments (or absence of comments) by the Contract Administrator on any drawing, model or technical submission do not mean that the Contract Administrator is responsible for the correctness of such, nor its suitability for purpose. These remain your responsibility.

Amend and re-issue as soon as possible all deliverables in response to the Contract Administrator's comments, and continue to do so until all comments have been addressed to the Contract Administrator's satisfaction. Any installation work carried out while comments remain outstanding is at your risk.

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Attend meetings associated with the submittal review procedure.

**800 REVISIONS AND VARIATIONS**

Where the scheme is subject to revision or instruction, show the full effect of such revision on the Installation Drawings, Co-ordinated Working Drawings, Builder's Work Information, Builder's Work Details, and Record Drawings. Where the scheme revision involves change to the architectural or structural details give immediate notice to the Contract Administrator.

Where drawings are revised and updated during construction, issue to the Contract Administrator for comment on the revision only.

A variation in cost will only be considered by the Contract Administrator if a significant departure from the intent of the tender drawings has been necessary and is demonstrated. This will not include normal detail development relating to inclusion of, nor development of, factors within your design responsibility.

Maintain on site a marked-up record of the progress of the Works on a set of Installation Drawings, detailing the extent of completed actual installations and all departures from the Installation Drawings. Update them weekly, securely store them and keep them available for inspection on site. Incorporate them in a file of draft Record Drawings at no longer than monthly intervals.

**END OF SECTION A11**



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**A12 THE SITE / EXISTING BUILDINGS**

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**A12 THE SITE / EXISTING BUILDINGS**

**100 INSTALLER SURVEY - TENDER**

Undertake a site survey prior to submitting the tender to verify all matters that could affect post-tender costs or Works. No allowance can or will be made post-tender for any omission of Works or cost arising from information available at the time of tender. Make arrangements through the Contract Administrator to visit the site in the first week after receipt of the invitation to tender.

**200 INSTALLER SURVEY - INSTALLATION DRAWINGS**

Undertake all site survey work prior to the preparation of Installation Drawings, Working Drawings, or Builder's Work Information to enable accurate preparation and dimensioning of them. Do not rely upon information contained in any tender drawings Refer to the main contract preliminaries for details of site access arrangements during construction.

**300 SPECIAL SURVEYS**

Arrange and provide for any specialist surveys to be undertaken, and forward the results of them to the Contract Administrator prior to submitting for comment the associated Installation Drawings.

**END OF SECTION A12**

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**A20 THE CONTRACT/ SUB CONTRACT**

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##### 100 INSTALLER'S DESIGN RESPONSIBILITY

The contract will be let on a design and build basis, therefore you are responsible for developing the concept design described in the tender documents into a fully detailed building engineering systems design that achieves the stated design intent. Ensure that your design is fully co-ordinated, taking into account the room, furniture and equipment layouts prepared by the architect and design information (including drawings) prepared by all members of the project design team including other engineering systems designers/installers. Attend design team meetings, to contribute towards design development and co-ordination, as and when requested to do so. All such design is subject to the comment of the Employer's Agent.

The tender information has been produced to a design scope agreed with the Client. Notwithstanding any specific installer design responsibilities referred to elsewhere in this section, unless explicitly identified and excluded by the installer at tender stage, the installer's design scope will be deemed to include any items not covered by the tender information.

Ensure that the design undertaken to meet the requirements of this clause is fully co-ordinated and compatible with the remainder of the project design.

Comments by the Contract Administrator do not affect your responsibility for the suitability and correctness of designs and other obligations within the contract documentation.

Your design obligations include, but are not limited to the following, as applicable to your scope of works:

1. Prepare fabrication drawings, Co-ordinated Working Drawings, Installation Drawings, Builder's Work Information, Builder's Work Details and Record Drawings.
2. Select drain and vent point locations and piping gradients in accordance with the current edition of BSRIA BG 29/2021 *Pre-commission cleaning of pipework systems*.
3. Design bracket and support arrangements and select appropriate locations for them, taking account of any known restrictions on types or location of fixing. Detail, supply and install all sleeves, inserts, frames, fixing anchors etc, and any other items required to be cast or built into the structure by others, including co-ordination of positions to such extent and accuracy to allow structural construction to proceed. Obtain approval from the structural engineer and / or Architect of proposed fixings etc.
4. Design all secondary support steelwork required to support the engineering systems within this Works package where not specifically detailed on the Structural Engineering drawings.
5. Prepare all electrical wiring diagrams of all equipment supplied by you showing all interconnections between equipment to enable the necessary wiring to be undertaken.
6. Select all equipment and components to meet the requirements and performance specified or scheduled, and be responsible for the design of the equipment and components selected.
7. Carry out the detailed design of the automatic controls insofar as it is required to meet the full physical and operational requirements of the specification. Ensure the full compatibility of the plant and equipment with the specified function. Where there are interfaces (including relays or other devices or modifications to hardware or software), be responsible for their design and the incorporation of them. Carry out all electrical design activities, as detailed herein, relating to the automatic controls system. Prepare detailed BMS points schedules, wiring schematics, control panel labelling details and equipment schedules.
8. Be responsible for the complete design, coordination, installation and testing of the converged network system by engaging a recognised specialist systems integrator to facilitate full

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#### A20 THE CONTRACT/ SUB CONTRACT

operation of the building engineering systems in accordance with the tender drawings, and the particular and performance requirements of the specification.

9. Dimension, and produce final installation details of, the automatic control panels to suit the detailed requirements of the controls equipment and the cable entry/exit arrangements such that:
  - a. cable entry is possible in the selected location, and
  - b. doors are not fouled by other plant, equipment, services or structural elements, and
  - c. safe operating and maintenance clearances are provided in all access positions when installed on site.
10. Select the fire alarm system(s) and voice alarm system(s), and their components and cabling requirements, to meet the requirements of the particular manufacturer and the requirements of the specification. Ensure that the design of the fire alarm system(s) and voice alarm system(s) comply with the edition of BS 5839 current at the time of Tender.
11. Design and obtain certification of the commercial and/or residential sprinkler system(s), its components and configuration, to meet the particular and the performance requirements of the specification, including submitting calculations and all other design information required by the certifying authority.
12. Design and select attenuators to satisfy the particular and performance requirements of the specification, including spatial allowances shown on the Tender drawings.
13. Design flue systems for the diesel generator(s), boiler(s) and other equipment to meet the requirements of the equipment manufacturer, the Building Control Body and the Environmental Health Officer, and ensure that the flue gas is discharged at the required velocity and altitude. Provide the Contract Administrator with a copy of the application for approval of the flue system under the Clean Air Act where applicable.
14. Design elements of the scheme to account for self-weight and other applied forces / loadings in reasonable use (eg the design of anchorage, encasement and foundations for buried tanks or buried piping).
15. Design systems to safely and reliably accommodate thermal expansion and contraction (including the provision of anchors, bellows, compensators, loops and bends.) Design systems to safely and reliably accommodate and control their movement due to hydraulic pressures and building movement.
16. Design acoustic treatment (including attenuators, silencers, absorption materials, baffles, mutes, cladding and jacketing) or modification of equipment, to comply with the noise levels specified, including when all building engineering services systems and plant are operating.
17. Select valve, damper and access locations.
18. Calculate system water capacities, the quantities of chemical additives required; and design and provide all the facilities required (whether temporary or permanent), for pre-commissioning flushing and cleaning of water systems, all in accordance with the current edition of *BSRIA BG29/2021 Pre-commission cleaning of pipework systems*.
19. Select all anti-vibration mountings to suit the particular application of the mounts.
20. Design pump inertia bases to meet the specified vibration isolation requirements.
21. Select exact locations of instruments, control sensors, detectors and thermostats.

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22. Carry out final sizing of sections of ductwork between terminal units and diffusers to achieve the specified noise criteria and duct velocities.
23. Carry out final detailing and confirmation of the location and sizes of duct connections to external louvres.
24. Calculate pump and fan duties to suit the piping and ducting layouts shown on the final Installation Drawings to ensure that the specified capacities are not invalidated by the selection of alternative pipe or duct routes, or items of plant and equipment selected for incorporation into the Works
25. Check the natural gas pipework pressure drop downstream of the meter, based on the final equipment selections and Co-ordinated Working Drawings, to ensure compliance with applicable regulations and guidance.
26. Select the capacity, location and design of electrical conduit, trunking, tray and cable ladder systems
27. Select proprietary platforms, access covers, gratings, ladders, walkways, balustrades, guardrails and all additional structural steelwork, associated with specific items of plant, where indicated in the tender documentation.
28. Carry out detailed design of fire-rated ductwork systems and ductwork fire protection systems, including obtaining all necessary statutory approvals.
29. Select, position and carry out final sizing of regulating devices (including regulating valves, balancing valves, flow measuring orifice plates, commissioning sets, balancing dampers, etc), to achieve the specified function and to suit the characteristics of items served and the final configuration of installed systems, in accordance with the recommendations of the manufacturers of the regulating devices.
30. Select, position and carry out final sizing of swing/flap check valves to achieve the minimum flow velocity necessary to hold the disc in a wide open and stable position, in accordance with the recommendations of the manufacturers of the check valves.
31. Select cable terminations on items of equipment provided by you to suit the cable sizes proposed by other Installers (including the electrical Installer, the automatic control system Installer, etc) or the specified cable sizes, as appropriate.
32. Ensure that the specified cable sizes are not invalidated by your selection of alternative cable routes.
33. Carry out detailed sizing, location and design of electrical conduit systems including capacity, locations, routes and fixing.
34. Verify spatial requirements, routes and anchor points for cable pulling.
35. Design earthing and bonding requirements for electrical engineering systems, mechanical engineering systems, architectural elements and structural elements that require earthing and bonding
36. Design cable and cable trunking terminations on to electrical equipment provided under the sub-contract; and dimension, and produce final installation details of, electrical switchgear, to ensure that:
  - a. cable entry is possible in the selected location, and
  - b. doors are not fouled by other plant, equipment, services or structural elements, and

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- c. safe operating and maintenance clearances are provided in all access positions when installed on site.
37. Ensure fuse sizes installed in plug tops are appropriate for the rating of connected equipment.
38. Size and detail the design of refrigerant pipework between items of equipment provided under the sub-contract Works.
39. Undertake the following vertical transportation sub-contract design obligations:
  - a. detailed design of all specialist and proprietary equipment associated with the vertical transportation installation to allow the installation to function in accordance with the performance requirements of the specification
  - b. determining final locations of all vertical transportation equipment within the motor rooms and shafts to ensure safe and efficient operation and to suit the detailed requirements of the vertical transportation installation
  - c. production of design loadings / reactions on support structure associated with the installation.
40. Size and design earthing and electromagnetic screening of electrical power systems and ensure compliance with the appropriate EMC directives.
41. Comply with all requirements set out within the current edition of BS 7671 *Requirements for Electrical Installations. The Wiring Regulations* and HSE publications.
42. Design all temporary Works, facilities and provisions required during construction, to meet the requirements of the Specification.
43. Undertake a lightning protection risk assessment in accordance with the relevant system specification and the edition of BS EN 62305 current at the time of tender, considering the relevant project-specific factors and determining the minimum level of protection required. Design and certify the lightning protection system, its components and configuration, to meet the particular and the performance requirements of the specification, tender drawings, lightning protection risk assessment, the requirements of client's insurance and the edition of BS EN 62305 current at the time of tender
44. Ensure that the design of the security system(s) components and cabling requirements meet the particular manufacturer's and the specification's requirements.
45. Design the gaseous fire suppression system(s), its components and configuration, to meet the requirements of the specification.
46. Design and determine the required extent of the trace heating system(s) in accordance with section Y24 of the specification.
47. Select plant, equipment and components from the UK Government's 'Energy Technology Product List' unless directed otherwise by the Contract Administrator.
48. Select plant, equipment and components from the UK Government's 'Water Technology List' unless directed otherwise by the Contract Administrator.
49. Ensure that details of making good, fire stopping and weatherproofing are effective.
50. Carry out stress calculations for steam and HTHW piping using the 'Caesar II' software.
51. Calculate system water capacities based on the installation drawings and actual equipment intended for installation, in order to properly determine the required capacity of expansion vessels, expansion cisterns, pressure vessels and thermal inertia [buffer] vessels, and carry out final selection of pressurization units.

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52. Design thrust blocks associated with underground pipework installations.
53. Carry out detailed design and sizing of underfloor heating pipework systems to achieve the specified heat outputs.
54. Calculate sub-circuit resistances based on the piping layouts shown on the final Installation Drawings and taking into account items of plant and equipment selected for incorporation into the Works; and select control valves based on the calculated sub-circuit resistances.
55. Design drainage systems to safely and efficiently dispose of condensate produced by plant and equipment, in accordance with the equipment manufacturers' recommendations and in compliance with applicable regulations and standards.
56. Carry out final detailed location and dimensioning of second fix equipment (including but not limited to: luminaires; electrical switches, control devices etc; grilles and diffusers) based on architectural information.
57. Carry out the detailed design of laboratory and medical gases and bulk cryogenic storage systems and associated monitoring and alarm systems (including oxygen depletion monitoring and alarm), in accordance with the information provided within the tender documents.
58. For new buildings, calculate the building emission rate (BER) for the actual building as constructed, and submit the calculation to the Building Control Body.
59. Select the pressure settings, flow capacities and diameters of all safety valves (except where they are incorporated within, or directly connected to, an appliance, and provided by the appliance manufacturer, and the appliance manufacturer has selected these parameters).
60. Develop the concept design into a fully co-ordinated, detailed building engineering systems design, taking into account the room, furniture and equipment layouts prepared by the architect and design information (including drawings) prepared by all members of the project design team.
61. Model the building engineering systems design in Revit or other approved BIM software. Issue the model for comment at intervals during the design development process and, as a minimum, at the following stages of development as defined in BSRIA BG 6: Building Engineering Systems Design Development Model, Building Engineering Systems Technical Design Model; Building Engineering Systems Production Information Model.
62. Ensure that your designer(s) attend(s) design team meetings.
63. Select materials and equipment fully in accordance with Hoare Lea's Building Engineering Systems performance specification(s).
64. Note that the Tender drawings show the design principles and overall interfaces within the building fabric and structure. Where sizes of piping, ducting, cables and equipment capacities are shown or specified, these are approximate sizes for Tender and guidance purposes only. Develop the design in accordance with the principles shown or detailed in the tender specifications, on drawings, room data sheets, furniture layouts, equipment layouts and architectural plans. Include in the tender all costs for developing the design into working solutions. No claims for additional costs will be considered for design development and detailed co-ordination of the building engineering systems.
65. Carry out all calculations of the building engineering systems design applicable for each individual system. Clearly demonstrate in the calculations the proficiency of your design, to meet the requirements of the specification. Submit copies of all calculations to the Contract Administrator for inspection and comment at a time to be agreed with the Contract Administrator at the contract outset.



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66. Carry out thermal analysis of the project's building fabric envelope, in co-operation with the project Architect.
67. Base all calculations on external dry bulb and wet bulb design temperatures that include the effects of climate change and heat island effect as outlined in the edition of Guide A published by the CIBSE current at the time of Tender. State, and reach agreement in writing with the Contract Administrator about, the basis of such effects, including the assumed emissions scenario and the future time period used, appropriate to the intended economic 'lifetime' of the building engineering systems installations.
68. Be responsible for the design and installation of fire protection system(s) to meet the requirements of the Building Control Body and Fire Officer. This includes provision for fire dampers, smoke dampers, fire alarm and detection systems, etc. Submit proposals to the Building Control Body and obtain formal approval therefrom.
69. Prepare a risk assessment of every individual building engineering system designed by you and submit them all in accordance with CDM Regulations and the project Principal Designer's and/or Principal Contractor's procedures as appropriate.
70. Co-ordinate all aspects of the engineering services design with the fire plan / fire strategy for the project.
71. Meet the specific performance criteria detailed in the specification and other tender documents.
72. Comply fully with the requirements of the accompanying building engineering systems specifications.
73. Design all installations to optimise the efficient use of energy and minimise running costs.
74. Design for easy maintenance of Building Engineering Systems plant and equipment and standardise equipment wherever possible. Select equipment so that the spare components and replacements they require (eg fluorescent lamps, air filters) are restricted to a limited number of sizes and types to avoid the need to stock numerous different spares.
75. Design all Building Engineering Systems to be easy to operate.
76. Design and install all components of the Building Engineering Systems to meet the requirements of the access plan / access strategy / access consultant for the project.
77. Design all building engineering systems to be compatible with all architectural finishes including suspended ceiling systems, partitioning systems and raised access floors. Integrate and co-ordinate all systems in terms of appearance and spatial allocation and correlate them with the aesthetics of the complete building.
78. Select "state-of-the-art" system components designed to reflect the architectural and aesthetic qualities of the building. Select and locate the equipment to complement the building and interior designs.
79. Select only equipment and systems that comply with the appropriate European Electromagnetic Compatibility (EMC) Directive. Where equipment or systems deviate from this standard, declare this within the tender, stating their generic standard and the Emission and Immunity Standards.
80. Carry out the design in accordance with all relevant guidance published by the CIBSE, BSRIA, BRE, IGEM and IET.
81. Assist and collaborate with others in liaison with Statutory Authorities with respect to Building Regulations approvals and compliance. Prepare supporting documentation.

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82. Undertake overheating and natural ventilation analysis to demonstrate compliance with Part F and Part L of the Building Regulations including any separately specified criteria, and finalise natural ventilation provisions in conjunction with the architect.
83. Carry out the design to ensure that the target BREEAM / Code for Sustainable Homes (CSH) rating specified in section B3 is achieved.
84. Incorporate low and zero carbon / renewable energy systems in the design and design such systems to ensure that the requirements of the local authority and the Employer in terms of energy contribution / carbon emissions reductions are met.
85. Produce a CIBSE TM54 dynamic thermal model shall including fully coupled component-based plant simulation with detailed representation for the air and waterside networks. Further engagement with the client on the anticipated occupancy profiles, plant schedules and operational characteristics is expected.

#### 200 INSURANCE

Under the terms and conditions of the main contract, the Main Contractor is required to secure certain policies of insurance, the benefits of which extend to sub-contractors either partly or in whole. Examine these policies and obtain such supplementary cover as is necessary.

Insure and indemnify the Main Contractor against such obligations in respect of the sub-contract as those for which the Main Contractor is liable. Produce insurance policies on demand.

#### 300 DEFECTS LIABILITY

Liability for making good defects in the Works extends for a period of 12 months from the date of issue of the certificate of Practical Completion for the Works.

If it is necessary to replace or renew any portion of the Works as part of liability for defects, the defects liability period in respect of that portion of the Works shall be deemed to commence from the date of such replacement or renewal.

The Contract Administrator may require that new tests be carried out to demonstrate that the plant is continuing to work satisfactorily if the replacement or renewal may affect the efficiency of the Works or any portions thereof.

In the remedying of defects in the Works take all necessary precautions to minimise the risk of damage to the buildings, the decorations, the fittings and the equipment.

In the event of such damage occurring bear the cost of replacement or making good, subject to the proviso of being granted the benefit of any settlement in respect of such damage accepted by the insurers under the insurance policies taken out in accordance with the requirements of the contract.

Agree with the Contract Administrator a programme for the carrying out and the completion of any work not finally finished at the time of the Works being offered for acceptance and that does not prejudice the issue of a Practical Completion certificate. The rectification of defects may be required to be executed out of normal hours and no additional costs will be accepted for complying with this requirement.

Prior to Practical Completion submit a method statement for the comment of the Contract Administrator outlining how the defects that arise during the defects liability period will be rectified to ensure that disruption to the use of the building is kept to a practical minimum.

Prepare and submit records of failures or malfunctions of any part of the Works during the defects liability period, together with details of remedial action taken, subsequent re-testing and the results.

Notify the Contract Administrator of damage, failures or malfunctions to the Works demonstrably caused by incorrect operation of the installations, vandalism or other actions by a third party.

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Inform the Contract Administrator in writing when all defects are finally rectified so that an inspection may be carried out prior to the issue of a Final Certificate.

**310 Right of access during defects liability period**

Right of access will not be unreasonably withheld, at all reasonable working hours and at own risk and expense, to any part of the Works for the purpose of inspecting the working of the installations, or to the records of the working and the performance thereof.

Subject to the Contract Administrator's approval, which will not be unreasonably withheld, undertake any tests considered necessary at your own risk and expense.

During the defects liability period and all necessary remedial Works and / or rectification of defective materials and equipment, liaise closely with the Employer's staff. Carry out all such work in such a manner as to avoid or minimise shut-down time and inconvenience to the Employer.

**END OF SECTION A20**

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**A30 TENDERING/ SUB-LETTING/ SUPPLY**

**A30 TENDERING/ SUB-LETTING/ SUPPLY**

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#### **A30 TENDERING/ SUB-LETTING/ SUPPLY**

#### **100 ALTERNATIVE EQUIPMENT SUPPLIERS**

Include in the Tender for all equipment to be supplied by one of the manufacturers named in the schedule of preferred manufacturers and to be of the type described in the specification. Detail any alternative manufacturers offered for consideration together with:

1. the benefits to the Employer (cost / programme saving, technical benefits, value added, etc)
2. the cost difference at the time of tender
3. the impact on Part L compliance (including the CO<sub>2</sub> Target Emissions Rate and the final 'as constructed' CO<sub>2</sub> Building Emissions Rate).

Summarise on a "Schedule of Alternatives" sheet to be submitted with the tender, all alternatives offered, with all information pertinent to the evaluation of each alternative item and its operation.

Acceptance or rejection of any alternative is entirely at the discretion of the Contract Administrator, who is under no obligation to give a reason why an alternative is not acceptable. Note that alternatives will not be accepted for items for which a change would cause significant disruption to the design or construction of the Works.

Ensure that the Schedule of Alternatives states whether the alternative equipment proposed is included in (a) the UK Government's 'Energy Technology Products List' for Enhanced Capital Allowances purposes under the Government's Climate Change package of measures and (b), the UK Government's 'Water Technology List' for Enhanced Capital Allowances, which encourages sustainable water usage.

Where alternative manufacturers' equipment is offered, include for all measures necessary to make the equipment and the total installation equivalent to that specified, eg upgrading pumps where pressure drops are higher, upgrading cable sizes where electrical loads are higher. Also include for all necessary redesign, draughting and co-ordination to facilitate the successful installation, and the costs of submittals, consequential delays and professional fees. Advise on the impacts on energy consumption and carbon emissions, etc. Include these measures in the information issued with the tender. These requirements also apply where the Installer chooses equipment from the manufacturer specified, but having different performance characteristics from those specified.

Where the Contract Administrator agrees to accept equipment alternative to that specified, the proposer of the alternative will remain responsible for ensuring that the alternative is of equal performance and quality to that specified.

Additional costs resulting from non-compliance with the above will be borne by the proposer of the alternative.

Where a specific supplier / manufacturer is offered or agreed at tender then the Contract Administrator is under no obligation to accept alternatives during the progress of the contract.

#### **200 TENDER RETURNS**

Ensure that the tender includes for all work shown or described in the tender documents as a whole, and also includes everything that is clearly apparent as being necessary for the complete and proper execution of the Works but which is not explicitly referred to in the tender documents. Include within the tender for all costs necessary to ensure that the Works can be completed within the stated programme. Include for all necessary overtime and other expenses in the contract price that may be necessary in order to complete the Works in compliance with the contract programme, and/or to avoid disruption to the Employer. Payment will be made for the extra cost of overtime only if a prior written instruction has been issued by the Contract Administrator together with agreement to accept the costs involved.

Identify any aspects of the tender documents with which you, as tenderer, disagree or which in your opinion need to be changed to enable the Works to be properly completed. Submit particulars of each

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#### A30 TENDERING/ SUB-LETTING/ SUPPLY

such suggested alteration with the tender and state the consequential change, if any, to the tendered price.

As part of the tendering process examine the performance specification and associated tender documents and check that all building engineering services systems can be designed, installed and commissioned in accordance with the intent of the performance specification.

Examine the Architect's and structural engineer's drawings, if any, issued with or referred to in the tender documents (including those referred to in the main contract preliminaries). Submit all queries concerning such drawings to the Contract Administrator for clarification prior to submitting your tender.

Submit tenders for the Works on the tender forms accompanying this specification. Price preliminary items separately, in accordance with the pricing schedule, rather than including them in any of the materials and labour rates etc.

In addition submit the following information with the tender:

1. letter of conformity with the tender drawings and specifications, including a full reference to the tender documentation upon which the tender is based, and a statement that these preliminaries have been read, understood and included in the price. In the absence of any such confirmation, it is deemed that the contract includes full provision for compliance with these technical preliminaries.
2. schedule of proposed specialist installers and others to whom you intend to sub-let elements of the Works, identifying the trade association(s) of which each is a member. No sub-letting is to take place after award of contract without the Contract Administrator's consent.
3. schedule of proposed manufacturers and suppliers identifying the trade association(s) of which each is a member
4. details of any equipment proposed that causes any change to spatial requirements or allowances made in the tender scheme
5. simple bar chart programme to identify key dates, duration and sequencing of the main activities, including submissions
6. first draft of the proposed procurement schedule.
7. schedule of proposed drawings.
8. proposed management structure and CVs of key personnel working on the project. Ensure that the stated level of the management team is reflected within the cost included within the preliminaries and vice versa.
9. proposed site staff and CVs of key personnel working on the project
10. organisation chart showing the lines of responsibility on site and the reporting lines of authority with head office management
11. confirmation of willingness to provide a Design Warranty
12. confirmation that facilities for production of CAD drawings are available
13. proposed waste minimisation management plan
14. proposals for providing protective measures to materials and equipment before, during and after installation
15. quality management procedures
16. schedule of alternatives, if applicable

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#### **A30 TENDERING/ SUB-LETTING/ SUPPLY**

Tenders received after the time stated will be rejected.

Tenders qualified in any way will be rejected. All tenders will be assumed to be fully compliant with the tender documents unless explicitly stated otherwise in the tender return. You may, if you wish, submit on the tender summary sheet, a schedule of proposed derogations along with associated cost adjustments relative to your fully compliant tender. However, acceptance or rejection of any such derogation is entirely at the discretion of the Contract Administrator, who is under no obligation to give a reason why any proposed derogation is not acceptable.

No payment will be made for tenders.

The Employer is not bound to accept the lowest or any tender.

#### **300 SCHEDULE OF RATES**

Following receipt of formal written notice that your tender is being considered for acceptance, return, within one week of that notice, a fully priced schedule of rates with every item quantified and priced so that its sub-totals summate to the total of the tender. Include rates for all sub-traders' work included in the tender. The prices of such a schedule of rates will be the basis for the valuation of all variations of the Works.

The priced schedule of rates is deemed to include for all items required, whether mentioned in the schedule or not.

Ancillary items not shown separately in the schedule of rates will be assumed to be included in the general rates stated.

Prepare a draft final account immediately after Practical Completion of the Works, using the contract procedures for checking purposes together with all the necessary supporting documents. Prepare the valuation of variations, omissions and provisional work forming part of the Works based on the quantified schedule of rates prepared and submitted at the time of tender and accepted by the Contract Administrator.

#### **400 WARRANTY TO BE GIVEN BY THE INSTALLER**

Design warranties may be required from certain sub-contracts/Installers. Refer to the main contract preliminaries and sub-contract documentation for details. Confirm your willingness to provide such a warranty with the return of tender.

#### **500 POST-TENDER MEETING**

Upon selection of the prospective Installer, a meeting will be convened to obtain the final agreement of the prospective Installer on all matters raised in the tender, including all matters relating to the production of contract information and site liaison.

The agreed minutes of this meeting or meetings will (if required by the Contract Administrator) form part of the contract documents to demonstrate that the Installer has understood their responsibilities.

#### **600 ORDERS FOR MATERIALS**

Allow in the tender price for the purchase of all materials and equipment from stockists and other suppliers at such time, and in such a manner, as may be necessary to allow for the completion of the work in accordance with the contract programme.

Clearly state in the tender return any difficulty foreseen with the delivery periods for the selected equipment.

Bear any additional costs resulting from non-compliance with the above.

#### **END OF SECTION A30**

**EDEN GEOTHERMAL HEAT MAIN MEP DESIGN**

**MECHANICAL AND ELECTRICAL SPECIFICATION**

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**A31 PROVISION, CONTENT AND USE OF DOCUMENTS**

**A31 PROVISION, CONTENT AND USE OF DOCUMENTS**

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## EDEN GEOTHERMAL HEAT MAIN MEP DESIGN

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#### **A31 PROVISION, CONTENT AND USE OF DOCUMENTS**

##### **100 DRAWINGS AND SPECIFICATION**

Carefully and thoroughly examine the drawings and the specification, as no allowance will be made for any deficiency of work or materials resulting from unfamiliarity with the specification's or drawings' contents.

The tender drawings have been prepared primarily to describe, in a basic manner, the design of the building engineering system(s), the working principles of the systems and the general intended methods of installation. They are intended to be read in conjunction with the specification to facilitate the preparation of an estimate and tender and to enable all other participants to appreciate the interrelation of the building engineering systems installation Works, as applicable, and the main works as a whole. Not all items or matters referred to in the specification are indicated on the drawings, nor are all items detailed on the drawings described in the specification. The tender drawings have been produced for the purpose of tender preparation only. Aspects of the tender drawings are not fully detailed in all respects. The size, capacity and position of all components including connection points, accessories, apparatus, equipment and room terminals shown on the tender drawings are approximate and for guidance in tender preparation.

The tender drawings are accordingly part diagrammatic with runs of piping, ducts, cables, conduits, trunking and the like, being shown to small scale and not necessarily indicating exact installation positions.

Do not use the tender drawings alone for the detailed pricing of the Works. Take independent dimensions to verify quantities etc, for the preparation of the tender. Allow for all necessary sets, bends, transformations, expansion measures, supports and other components required, or recommended by the manufacturer, to achieve a safe and fully functional and operational installation in accordance with the design intent. Where you elect to depart from the principles and general arrangements depicted on the tender drawings, be responsible for undertaking detailed checks on the duties of all equipment affected, demonstrating to the Contract Administrator that neither performance nor spatial co-ordination are compromised and adjusting the sizing of plant as required. Do not proceed with the ordering of any resized equipment until you have provided the necessary calculations to the Contract Administrator and received and acted in accordance with the Contract Administrator's comments. Be responsible for all costs arising from such changes.

Do not use tender or contract drawings for installation purposes.

##### **200 CONFLICT AND AMBIGUITY**

Immediately after receipt of the Tender documents check that the documents are complete and legible (eg check page and drawing numbers, whether any writing or figures are indistinct, etc) and promptly notify the Contract Administrator accordingly. No subsequent claim for loss consequent upon failure to comply with this requirement will be allowed.

Where there is contradiction between any elements, clauses or sections of the project tender documents (including the specification, the schedules and the drawings or model), notify the Contract Administrator prior to returning the tender. In the absence of notice being given prior to tender submission and to ensure that a positive decision is made, the Contract Administrator is the final arbiter of which element, clause or section of the project tender documents is deemed to have been included.

Should there be any doubt about the meaning of any clause or aspect of the tender documents, inform the Contract Administrator in writing in order that clarification may be provided prior to the submission of tenders. Any clarification of the meaning or intent will only be valid if issued in writing. All tenderers will be notified of any such explanation.

No liability will be admitted, nor claim allowed, in respect of errors in the tender that could have been avoided in the manner described above.

## EDEN GEOTHERMAL HEAT MAIN MEP DESIGN

### MECHANICAL AND ELECTRICAL SPECIFICATION

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#### **A31 PROVISION, CONTENT AND USE OF DOCUMENTS**

Where the specification includes alternative choices, confirm the alternative selected in writing at tender stage. If the choice is not clarified at tender stage, the Contract Administrator's choice will be deemed to have been included.

#### **300 SITE DOCUMENTATION**

Notwithstanding the requirements of the main contract preliminaries, also allow in the tender for, and provide in a maintained indexed library on site, the following:

1. relevant copies of all technical equipment schedules 'as delivered to site'
2. relevant technical literature on every type of equipment or component used within the installation.
3. copies of all relevant information (technical queries, relevant instructions, current installation / working drawings, current programme)
4. copies of all signed daywork sheets

Ensure all of the above are accessible to the Contract Administrator (or Contract Administrator's representative) at all times that the site is open.

Keep all of the above up to date and in good order; it is solely for the Contract Administrator's (or Contract Administrator's representative's) use and must be maintained complete.

#### **400 CONFIDENTIALITY**

Treat all tender documentation as confidential and return them to the Contract Administrator if you are not successful.

Do not give any information relating to the Works to the press or other media without the written permission of the Contract Administrator or Employer.

#### **500 PHOTOGRAPHS**

Provide colour progress photographs of the Works at a minimum frequency of fortnightly. Agree the locations from which to take the photographs with the Contract Administrator. Date each photograph and state its location.

Provide 3 No. prints of all photographs submitted to the Contract Administrator.

Do not take any photographs of the site or the Works or any part thereof for any other purpose than the above without the permission of the Contract Administrator. Do not publicise or otherwise circulate photographs without the permission of the Contract Administrator or Employer.

#### **600 CALCULATIONS**

Present all calculations in a logical, recognised and agreed format and suitably indexed.

Agree with the Contract Administrator prior to commencement of design activities all software programs to be used in the preparation of the design.

Ensure that software used in calculating the energy performance of buildings, as required under Part L of the Building Regulations, is as approved by HM Government and agreed with the Contract Administrator prior to commencement of use. Arrange that such calculations are carried out by a suitably accredited energy assessor.

Reference calculations that are preliminary in nature, ie do not form part of the final submittal, independently and clearly mark them 'Preliminary'.

State the methodology, formulae, design criteria, assumptions and all design margins used in the calculations.

**EDEN GEOTHERMAL HEAT MAIN MEP DESIGN**

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**A31 PROVISION, CONTENT AND USE OF DOCUMENTS**

Where necessary, accompany calculation sheets with an annotated layout drawing identifying terminals, fittings and the particular sections of ductwork or pipework to which the calculation relates.

On each calculation sheet, drawing or schedule, clearly identify the originator, date of production, checker (who signs or initials) and date of check.

Allow ten working days for review or comment or otherwise on all calculations submitted to the Contract Administrator. Allow sufficient time in the programme for submittals with due allowance for incorporation of comments and resubmission in order not to cause delays.

**END OF SECTION A31**

**EDEN GEOTHERMAL HEAT MAIN MEP DESIGN**

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**A32 MANAGEMENT OF THE WORKS**

**A32 MANAGEMENT OF THE WORKS**

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## EDEN GEOTHERMAL HEAT MAIN MEP DESIGN

### MECHANICAL AND ELECTRICAL SPECIFICATION

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#### **A32 MANAGEMENT OF THE WORKS**

##### **100 SETTING OUT OF THE WORKS**

Accurately set out the Works and keep them correct in accordance with the final Installation Drawings, as amended by any Contract Administrator's instructions issued.

Take all necessary site measurements to ensure the Works are built in accordance with the Installation Drawings. Take responsibility for the accuracy of such dimensions and of the drawings made therefrom. Where services are to be installed adjacent to or near to other services take responsibility for the setting out of the new services and, if necessary, check the setting out of work by others that affects your own. Co-operate with all other trades such that all such work is completed within the programme.

Rectify all errors arising from the inaccurate setting out or lack of site co-ordination of services, at no additional cost.

##### **200 SITE CLEANLINESS**

It is the responsibility of all operatives to maintain site cleanliness. Provide and enforce all site cleaning procedures fully in accordance with the Contract Administrator's requirements.

Leave the site in a clean condition making good any damage caused to any parts of the site.

##### **300 INSPECTION OF THE WORKS**

##### **310 Installer's "snagging"**

Be responsible for ensuring that your own work (and that of any sub-contractors) is carried out in accordance with the specification and drawings and to a high standard of workmanship. Prior to offering any part of the Works to the Contract Administrator for inspection, carry out a full, independent inspection or "snag" of the Works, arrange rectification of any defects discovered, and produce a record of all remaining snags, proposed action and programme to clear. The Contract Administrator will then consider the quantum and impact of snags, carry out their own inspection and produce a composite schedule of defects. Prior to offering the Works to the Contract Administrator for re-inspection, provide a written response to each individual item on the composite defects schedule stating what has been done to rectify it. Global responses such as "all defects have been rectified" will not be acceptable and the Contract Administrator's re-inspection will not take place. If defects stated as having been rectified are found not to have been, reimbursement of the Employer for the Contract Administrator's abortive time to carry out the inspection will be charged at time charge rates.

##### **320 Inspection before concealment**

Whenever work requiring inspection or testing is subsequently to be concealed, provide due notice to the Contract Administrator so that inspection may be made or tests witnessed before concealment.

Failure to give due notice, of at least 48 hours, will lead to you being responsible for the expense of the work of uncovering, and subsequently reinstating the concealment, to allow proper inspection.

The Contract Administrator reserves the right to forego their inspection; this does not relieve you from responsibility for giving due notice.

Where the Contract Administrator believes that the installation may be defective, uncover, and subsequently reinstate concealment of, a specific area selected by the Contract Administrator for inspection, at no additional charge. This will be restricted to 1 linear metre or 1m<sup>2</sup>, depending on the nature of the work, for each area of concealment. Where Works are proven defective by such uncovering, uncover, bring into compliance with the specification, and subsequently reconceal, the entire installation, all at no additional charge.

Do not build in, cover or otherwise obscure any portion of the Works requiring the inspection and approval of statutory authorities and utility providers, until such approval has been obtained.

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#### **A32 MANAGEMENT OF THE WORKS**

#### **400 PROGRAMME AND ORDERING REPORTING**

Within two weeks of appointment, submit a detailed bar chart sub-programme for your Works, to assist the Main Contractor in producing a master programme for the Works. Ensure that this takes into account any restrictions on working hours etc detailed in the main contract preliminaries. No undertaking is given that the Works will necessarily be able to proceed continuously. No claim will be allowed for discontinuity of work due to the necessity to conform to the contract programme.

Make due allowance in the programme(s) of the Works for the following as a minimum:

1. notices to utility providers and those undertaking enabling / strip-out works
2. statutory authority approvals, including Building Regulations
3. ordering and installation periods
4. the completion of drawings and transmittals etc, and the minimum of ten working days for comment (including for subsequent resubmittals following the receipt of comments on the initial issue)
5. work resulting from instructions issued in respect of the expenditure of provisional sums
6. concurrent work by other trades
7. any temporary works necessary for the completion of the building engineering systems installations
8. pre-commissioning, commissioning and performance testing of the building engineering services installations
9. preparation and provision of Record Drawings and operating and maintenance instruction manuals
10. period for employer training and instruction
11. breakdown of works between sub-trades and areas of the site / building

Keep on site full, up-to-date, records of the programmed installation activities showing the 'critical path' and a full equipment procurement schedule.

The programme and critical path analysis will be taken as a record of intent and will be used by the Contract Administrator to minimise the cost and adverse effect of any instructions by ensuring that they are made in co-ordination with the programme.

#### **410 Information release schedule**

Within two weeks of appointment, submit a full information release schedule detailing in a single schedule all drawings, technical submittals, method statements, calculations, programmes, samples and other documents and information that you propose to issue during the contract, either to meet your obligations in this specification, or for any other reason. For each item, show on the schedule, as applicable, the proposed issue date of the draft for comment, the date by which comments are required, and the proposed final issue date.

#### **420 Monitoring**

Record progress of the Works weekly on a copy of the programme kept on site.

Update or redraft the programme without delay if any circumstances arise that affect the progress of the Works.

Liaise with the Main Contractor and other building engineering systems Installers as applicable to facilitate the programming and co-ordination of the work of all utility providers, to meet the main contract programme.

## EDEN GEOTHERMAL HEAT MAIN MEP DESIGN

### MECHANICAL AND ELECTRICAL SPECIFICATION

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#### **A32 MANAGEMENT OF THE WORKS**

Publish the bar chart programme, critical path analysis, and procurement schedule, at a minimum of two weekly intervals and, on demand by the Contract Administrator, at any revision.

#### **430 Commissioning programme**

Provide a separate and detailed commissioning programme for comment by the Contract Administrator. Make due allowance for the following:

1. commissioning, demonstration and instruction procedures
2. provision of a written notice before each (or each series of) test, inspection, commissioning or demonstration procedure is implemented
3. demonstration to the Contract Administrator that test instruments and equipment are accurate

#### **440 Procurement schedule**

Provide a procurement schedule that lists all items of plant and equipment that form part of the Works together with the following information:

1. delivery period from order to site
2. latest instruction date (date before which issue of an instruction affecting the item will not cause a delay nor incur a cancellation cost)
3. latest order date (date by which an order must be placed to ensure delivery in line with the programme)
4. actual order date

Provide with the tender return a first draft of the procurement schedule.

Publish all revisions to the programme, critical path analysis and procurement schedule as soon as practicable. Ensure that the programme, critical path analysis and procurement schedule are in accordance with those of the main contract.

#### **500 ACCESS FOR PLANT INSTALLATION AND SUBSEQUENT REMOVAL**

Check on site and with the Installation Drawings if plant such as boiler(s), tank(s), cistern(s), cylinder(s), calorifier(s), pressure vessel(s), switchgear, transformer(s), chiller(s) and all other large plant, has to be ordered before the building work is at a suitable point to enable the dimensions of all doorways etc, serving as access to be site checked. Ensure that every item can be admitted to its allotted position and installed in such a way, together with all other services, that it can be replaced with similar equipment at some future date.

Demonstrate, if requested by the Contract Administrator, that plant and equipment can be removed for replacement or maintenance purposes, and subsequently re-install it using the same materials, except that jointing materials (eg gaskets) must be renewed. If the installation arrangements preclude equipment removal, modify the arrangement accordingly. Equipment that cannot be readily maintained in position is not acceptable, unless specifically agreed in a particular case, in writing by the Contract Administrator, that maintenance after removal is acceptable. Interpret the absence of a response by the Contract Administrator on this matter as non-acceptance, should the decision become critical for programming purposes.

Review the provision of builder's work shown in the tender documents and highlight any additional requirements needed to ensure that access for plant installation and subsequent removal is adequate, and do so to suit the construction programme.

## EDEN GEOTHERMAL HEAT MAIN MEP DESIGN

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#### **A32 MANAGEMENT OF THE WORKS**

#### **600 EASE OF MAINTENANCE**

In selecting equipment and preparing Installation Drawings, consider access for maintenance and removal of equipment at all times. Ensure that there is adequate space provided for maintenance and to allow all serviceable components to be replaced without disturbance to the surrounding installations.

Include, whether or not specifically indicated in the specification, on the drawings or in the equipment schedules, all component parts and other items necessary to facilitate proper maintenance of plant and equipment, including, but not limited to, the following: cleaning and access ports on pressure vessels and heat exchangers; easy access to oiling and greasing points; low level drain plugs and / or cocks in all vessels, plant and/or pipework containing fluids or gases.

Ensure that all pipework in ducts and ceiling voids is fully accessible for repair, replacement and routine servicing and includes flanged and valved sections to permit easy removal of all pipework. Ensure all conduit, trunking and pipework etc for future use is installed with draw-wires to allow the installation of additional circuits without the removal of fixed sections of walls, ceilings etc.

Where pipes cross access routes at low level install purpose-made step-overs to provide safe access.

Ensure that ease of subsequent removal is achieved for all electric motors, thermostats, heat exchanger batteries, and of any other item to which it may be reasonably anticipated that maintenance would be required.

Select similar items of apparatus and equipment made and provided by the same manufacturer where practicable such that corresponding parts of all apparatus and equipment are interchangeable, to reduce the need for different attention and spares.

#### **700 CO-OPERATION WITH OTHER TRADES**

Through and as directed by the Main Contractor, co-operate with and provide information to other trades.

Take particular care to co-operate with other trades in setting out the Works where buried underground or installed in common ducts, subways, services shafts, trenches, ceiling voids, floor voids or any such areas that are to accommodate several building engineering systems.

Inspect each area of the site in good time to ensure it is in a suitable state, before commencing work in it, and also to ensure that any previous work carried out by others does not affect the quality of any work to be carried out.

#### **800 WASTE MANAGEMENT ON SITE**

Ensure that the following general principles of waste management are implemented:

1. the elimination of the need for material use where possible
2. reduction of the material used in the installation process
3. the reuse of materials where possible
4. the recycling of materials where possible
5. the responsible disposal of non-recyclable materials

Provide with the tender the name and contact details of the proposed recycling contractor for the Works. Ensure that such recycling contractor operates an approved quality / environmental management scheme accredited to ISO 9001 and ISO 14001 standards.

Co-operate with the Main Contractor and any recycling contractor that it employs, by sorting and placing in designated containers on the site, all waste materials from the Works that it is agreed will be recycled.



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**A32 MANAGEMENT OF THE WORKS**

**END OF SECTION A32**

## EDEN GEOTHERMAL HEAT MAIN MEP DESIGN

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#### A33 QUALITY STANDARDS / CONTROL

#### A33 QUALITY STANDARDS / CONTROL

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#### **A33 QUALITY STANDARDS / CONTROL**

##### **100 QUALITY MANAGEMENT PROCEDURES**

Provide for comment by the Contract Administrator a fully documented quality management plan (QMP) in accordance with the current edition of ISO 9001, prior to commencement of draughting, procurement or installation.

Provide the QMP in concert and agreement with the main contract procedures.

Ensure that the QMP details specific procedures related to the tendered project and is not generalised.

Provide the QMP with the tender return.

If you are not an ISO 9001 registered company, declare such at tender and operate a system for the project that is in accordance with the principles of ISO 9001.

##### **200 ENVIRONMENTAL MANAGEMENT PROCEDURES**

Provide for comment by the Contract Administrator a fully documented environmental management plan (EMP) in accordance with the current edition of ISO 14001, prior to commencement of draughting, procurement or installation.

Provide the EMP in concert and agreement with the main contract procedures.

Ensure that the EMP details specific procedures related to the tendered project and is not generalised.

Provide the EMP with the tender return.

If you are not an ISO 14001 registered company, declare such at tender and operate a system for the project that is in accordance with the principles of ISO 14001.

##### **300 HEALTH AND SAFETY MANAGEMENT PROCEDURES**

Provide for comment by the Contract Administrator a fully documented occupational health and safety management plan (OHSMP) in accordance with the current edition of BS ISO 45001, prior to commencement of draughting, procurement or installation.

Provide the OHSMP in concert and agreement with the main contract procedures.

Ensure that the OHSMP details specific procedures related to the tendered project and is not generalised.

Provide the OHSMP with the tender return.

If you are not a BS ISO 45001 registered company, declare such at Tender and operate a system for the project that is in accordance with the principles of BS ISO 45001.

Refer to the main contract preliminaries for the requirements of health, safety and welfare. Check that facilities provided by others fulfil the obligations and advise accordingly. Ascertain the accuracy and sufficiency of information provided by the Employer or the Contract Administrator to ensure the safety of all persons and the Works.

Undertake the management of health and safety in conformity with the requirements of the Construction (Design and Management) (CDM) Regulations and the corresponding Approved Code of Practice. Comply with the requirements of the CDM Regulations and of the Principal Designer and the Principal Contractor by:

1. compiling risk assessments.
2. preparing method statements.
3. providing information on the Works that might affect the health and safety of any person.

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4. providing all necessary input to the Pre-Construction Information and Construction Phase Plan.
5. Providing all necessary input to the Health and Safety File.

Comply with the Control of Substances Hazardous to Health Regulations and the Control of Substances Hazardous to Health (Amendment) Regulations 2003.

#### **400 EQUIPMENT AND PLANT PERFORMANCE GUARANTEES**

Where equipment and plant performance data and duties are identified in the specification, thoroughly check that the equipment offered by the manufacturer complies in every respect with the detailed materials and performance specification given. Obtain and submit for comment written confirmation from the selected manufacturer:

1. that all aspects of the stated specification are achieved, and
2. of whether or not the equipment is included in the UK Government's 'Energy Technology Approved Products List' for Enhanced Capital Allowances purposes under the Government's Climate Change package of measures, and
3. of whether or not the equipment is included in the UK Government's 'Water Technology List' for Enhanced Capital Allowances purposes, which encourages sustainable water use, and
4. that the equipment is 'CE' marked or that it does not legally require a 'CE' mark.

More than one clause of this specification may cover the total performance of the equipment. Therefore, ensure that suppliers obtain, or have seen, all relevant sections of the specification and all relevant drawings prior to giving the written guarantee of performance.

All of the equipment described in the tender documents (including specification, schedules and drawings) requires a performance guarantee. Prepare a schedule of guarantees, including every such item, detailing (a) manufacturer (b) equipment and (c) date of guarantee.

#### **500 OPERATIONAL LIFE**

Select equipment and carry out all installation work such that the operational life of each part of the installation achieves the economic life expectancy factors contained in the edition of CIBSE Guide M – *Maintenance engineering and management* current at the time of tender.

#### **600 TECHNICAL METHOD STATEMENTS**

In advance of any Works being carried out on site, submit for comment by the Contract Administrator a technical method statement for the following aspects of the installation:

1. TQ (technical query) procedures
2. quality control and samples procedure
3. the minimisation and management of waste materials
4. Installation Drawings production
5. temporary works
6. underground services coordination and installation
7. pipework installation
8. pipework flushing, cleaning and pressure testing
9. painting, thermal insulation and cladding

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#### **A33 QUALITY STANDARDS / CONTROL**

10. switchgear installation
11. fire protection installation
12. cabling and busbar installation
13. automatic control system installation
14. installation of large plant items (including offloading and positioning)
15. plant room installation
16. commissioning and testing
17. production of operating and maintenance instruction manuals
18. production of record drawings
19. all other method statements called for under the project Health and Safety plan, or otherwise required to satisfy Health and Safety criteria

#### **700 SUITABILITY OF MATERIALS**

Supply materials and components to suit the climatic conditions and other conditions of use to which the materials and components will be exposed during the installation process and after it is completed, and to withstand any test specified herein or in any document referred to herein.

Use materials and products that are:

1. new unless specified otherwise.
2. suitable for the services and conditions of use normally expected to apply after the installation is complete.
3. able to withstand the testing and commissioning conditions specified.
4. free from animal hair; unable to initiate mould growth, support vermin, or support bacterial life.
5. free from the use of CFCs at any stage of manufacture, installation or subsequent operation except where specified.
6. resistant to corrosion, oxidation, distortion, rot, etc.
7. resistant to attack from insects, animals and birds.
8. free from objectionable odours at the maximum or normal working conditions of operation.
9. prevented from suffering deterioration at the maximum or normal working conditions of operation.
10. capable of being applied to a base surface without causing damage or deterioration of the base.
11. not a fire hazard and that do not produce dense or toxic fumes when subjected to excessive heat, such as fire.
12. approved under the Water Regulations Advisory Scheme, as applicable.
13. not in themselves deleterious nor can become deleterious when properly maintained and used in the intended circumstances of the building(s) of this project. Refer to clause 900.

Confirm with each manufacturer that each component or item of equipment proposed to be installed is not foreseeably identified for withdrawal from either manufacture or continuing manufacturer support for a period of fifteen years. Do not use any equipment or components identified as end-of-line or

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otherwise not expected to have manufacturer continuing support or spares availability. Include within the technical submission a declaration of intent from the manufacturer, confirming the continuance of manufacture and manufacturer support for each component or item of equipment.

Whenever possible ensure products are manufactured and / or stocked:

1. under the BSI Kitemark Scheme, and/or
2. under the BSI Safety Mark Scheme, and/or
3. by firms of Assessed Capability to ISO 9001, and/or
4. by Stockists of Assessed Capability of ISO 9001.

#### **800 DELETERIOUS MATERIALS**

Do not use any materials and / or procedures deleterious to health or safety in the Works. Comply with all requirements in relation to deleterious or prohibited materials in the main contract, in addition to the below.

[For the purposes of this clause "deleterious material or product" means "a material or product that is generally accepted, or generally suspected in the construction industry at the time of tender as:

1. posing a threat to the health or safety of any person occupying or working in or being near any building(s) of this project, or
2. posing a threat to the structural stability, or performance, or physical integrity of any building(s) of this project or any part or component or system thereof, or
3. having the effect of reducing the normal life expectancy of any building(s) of this project or any part or component or system thereof, or
4. not being in accordance with any relevant British Standard, Code of Practice, good building practice or any applicable Agrément Certificate."]

#### **810 Prohibited Materials List**

The following materials or procedures should not be used in the installation:

1. asbestos or asbestos-containing product, as defined in the United Kingdom's 'The Control of Asbestos Regulations 2006' or any statutory modification or re-enactment thereof
2. lead where the metal or its corrosive products may be directly ingested, inhaled or absorbed. Applications of lead such as roofing, flashings, rainwater goods and copper alloy fittings containing lead that are specifically required are acceptable, until equal or better alternatives are available.
3. lead-based paints and primer
4. urea formaldehyde foam or materials that may release formaldehyde beyond British Standard limits
5. pitch polymer DPC
6. materials that generally comprise mineral fibres, either man-made or naturally occurring, that have a diameter of 3 microns or less and a length of 200 microns or less, or which contain any fibres not sealed, encapsulated, or otherwise stabilised to ensure that fibre migration is prevented. Test evidence must be available and produced confirming that the materials fulfil the requirements of European Directive 97/69/EC and the approved supply list of current HSE CHIP regulations and consequently are not classified as a possible human carcinogen.

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7. chlorofluorocarbons (CFCs) or hydrochlorofluorocarbons (HCFCs) or any goods and / or materials containing the same (eg materials in which CFCs, HCFCs or hydrofluoroalkanes (HFAs) have been used as blowing agents)
8. any species of hardwood from the tropical rainforests, unless it is obtained from sustainable sources
9. polychlorinated biphenyls (PCBs), polychlorinated terphenyls (PCTs) or any goods and /or materials containing the same
10. chrysotile amosite crocidolite
11. Cemfil
12. spray-applied fire protection / insulation of any kind
13. vermiculite-containing fibrous dust
14. polyurethane foam and polyisocyanurate foam (where these fail to meet LPCB – LPS 1181)
15. PTFE fabrics, except where the use of PTFE is as a jointing tape in plumbing applications and on specialist applications such as valve seats, bearing material or sealing rings in pre-manufactured items of plant and equipment
16. lindane – wood treatment / insecticidal spray
17. pentachlorophenol (PCP) or timber treated with pentachlorophenol – biocide / wood preservative
18. tributyltin (TBT)
19. CCA (chromated copper arsenate) preservatives where there is a likelihood of continuous skin contact, or for any domestic / residential situations. Refer to EC directive 2003/02/EC.
20. materials generally accepted within the construction industry as:
  - being deleterious in themselves, or in the particular situation or in combination with other materials known to be used, or
  - known to become deleterious with the passage of time, or
  - being damaged by or causing damage to the structure in which they are to be incorporated or to which they are affixed, or
  - posing a hazard to health and safety, or
  - posing a threat to the structural stability or performance or the physical integrity of the Works of any part or component.
21. materials having the effect of significantly reducing the normal life expectancy of the Works or part thereof.

#### 900 MATERIALS AND WORKMANSHIP

Use the best materials and workmanship of their respective kinds in accordance with the specification. Ensure that all materials (unless otherwise stated) conform to the statutory requirements detailed herein. References to recognised standards of materials and workmanship, ie British Regulations, Standards, Codes of Practice, BRE Recommendations, DIN Standard, ISO Standards, etc, relevant to the design, installation or performance of the Works, represent the minimum standard to be complied with. Transport, unload, stack, store, and fix / install / apply all materials in full accordance with manufacturer's instructions, including all safety precautions and any ancillary or associated components

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(eg warning label, electromagnetic screen, electrical isolator, fuse, pressure relief valve, isolating valve, strainer, air vent, drain valve) that such installation instructions require or recommend.

Where materials and components are not specifically described, use the best of their kind and, if required, submit samples or drawings of such materials or components to the Contract Administrator for comment.

Use competent and experienced operatives, appropriate to the work to be carried out. Ensure that standards of workmanship are supervised by a competent person. Ensure that an inspection of the installation is carried out by a competent person prior to offering it to the Contract Administrator for inspection.

Make available for inspection by the Contract Administrator when required copies of orders to suppliers.

Immediately remove and replace all materials considered by the Contract Administrator to be unsound, faulty or installed imperfectly or not in accordance with the specification, at no additional cost. Failure to act within a reasonable period of notice will empower the Contract Administrator to employ other persons for this purpose and to pay the same out of any monies that may be or become due to you.

The Contract Administrator may, at all reasonable times, inspect any drawings or inspect, examine and test the material and workmanship of any plant (or portion thereof) contracted for at the premises of the manufacturer or Installer.

Provide all equipment and materials by manufacturers who have available maintenance and servicing capability covering the project's geographical location.

Include adequate provision in the design and construction for appropriate fire barriers, building expansion joints and steelwork supports and fixings, as required and where detailed in the specifications and the architectural drawings provided or referred to in the tender documents. Make allowance for building movement in the installation of the engineering systems.

Pack all equipment carefully for transport so that it is protected against all climatic conditions. Take adequate precautions to prevent mechanical damage to any equipment during transit.

Within one month of appointment provide to the Main Contractor details of the dimensions and weight of all heavy and large items to be brought to the site and the dimensions and wheel loadings of the vehicles to be used in their transport.

For all the equipment supplied under this contract, level and adjust it on its foundations prior to grouting. Provide all shimming and packing required for adjustments. All necessary adjustment for foundation levels and all bedding and grouting of plant on foundations, and cementing into walls and floors will be carried out by others. Ensure that such work is adequately and properly carried out and that the above levels and adjustments made are not thereby disturbed.

#### 1000 DATE-DEPENDENT FUNCTIONALITY

For all items of equipment supplied under this contract that have date logic embedded in the control devices, date display devices or computer software that they contain, obtain from the manufacturer of the equipment a written statement that neither the performance nor the functionality of the equipment will be adversely affected by dates prior to, during and after the year 2000.

Where the control devices, date display devices or computer software of such equipment is required to interoperate or interact with other items of equipment or systems (including building management systems, programmable logic controllers) or computer software (including asset registration, maintenance scheduling, electronic operating and maintenance instruction manuals), obtain from the manufacturer of the equipment a written statement of the range of dates (eg "from 1st January 1950 to 31st December 2100 inclusive") over which the equipment will operate without either its performance or its functionality being adversely affected.



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#### **A33 QUALITY STANDARDS / CONTROL**

For each such item of equipment submit such written manufacturer's statements to the manufacturer of the equipment or system or computer software with which it must interoperate or interact, and obtain written confirmation therefrom, prior to placing the order for that equipment, that the said equipment or system or computer software and the item of equipment, have compatible date-dependent functionality.

To avoid ambiguity in all communications about this clause, use the edition current at the time, of BS EN 28601 *Specification for representation of dates and times in information interchange* regarding the expression of dates, including calendar dates, ordinal dates, week numbers and times in numeric form, including a combination of alphabetic and graphic characters.

#### **1100 PRESSURE EQUIPMENT AND PRESSURE SYSTEM SAFETY REGULATIONS**

Ensure that all pressure equipment, including but not limited to vessels, piping, safety accessories and pressure accessories, and assemblies, with a maximum allowable pressure greater than 0.5 bar comply with the Pressure Equipment Regulations. "Assemblies" means several pieces of pressure equipment assembled to form an integrated, functional whole.

As a minimum, mark pressure equipment with:

1. unique identification of the manufacturer
2. unique identification of the model and serial number
3. the year of manufacture
4. maximum / minimum allowable pressure limits
5. UKCA/UKNI/CE Mark

Provide a declaration of conformity for all pressure equipment.

Ensure that pressure equipment is:

1. designed for adequate strength taking into account internal / external pressure, ambient and operational temperatures, static pressure and mass of contents in operating and test conditions, corrosion and erosion, fatigue, etc.
2. provided with means to ensure safe handling and operation, examination, draining and venting.
3. provided with protection against exceeding the allowable limits of pressure.
4. where necessary, designed and fitted with suitable accessories to meet damage limitation requirements in the event of external fire.

Ensure all components or sub-assemblies in their finished assembly are used within their safe operating range and correctly installed and tested. Ensure that adequate instructions are provided by the manufacturer for the safe installation, testing and operation.

Where a system requires a 'Written Scheme of Examination' under the Pressure System Safety Regulations, have it prepared by an authorised competent person accredited by UKAS and incorporate it in the operating and maintenance instruction manual.

#### **1200 INFORMATION SECURITY**

##### **1210 General**

Provide network security system(s) to protect from potential information security and cybersecurity risks including, intrusion, remote access, viruses, spy-ware and malware. Put in place, and into use, effective protection and homogenous policies for infrastructure, servers, workstations, controllers, network

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#### **A33 QUALITY STANDARDS / CONTROL**

connected equipment, internet connected systems/devices, WiFi devices, IOT devices and mobile devices supplied under the contract. Include in the operating and maintenance instruction manuals details of the requirement for ongoing management of network and cyber security by the Employer. Where relevant and applicable, apply the requirements of ISO/IEC 27000 Series of Standards relating to “Information Technology - Security Techniques”.

#### **1211 Highly secure environments**

Identify highly secure government and military environments against the relevant country-specific standards, performed by an accredited Information Security advisor.

#### **1220 Design and construction**

Comply with policies and procedures as required by the contract to protect confidentiality, integrity and availability of information and systems performance.

#### **1230 System configuration**

Comply with policies and procedures as required by the contract to protect confidentiality, integrity and availability of information and systems performance.

Provide input to the technical and operational security risk assessment process, led by the Employer’s network contractor.

#### **1240 System hardening**

Take measures to configure systems and comply with procedures as required by the Employer to protect confidentiality, integrity, systems performance and availability of information. As a minimum and as applicable to the subcontract works:

- ~ Implement manufacturer recommendations, overriding such recommendations with the Employer’s more secure guidelines where available.
- ~ Provide an initial inventory of all assets within the environment on handover, ensuring continual inventorying of authorised and unauthorised devices and software, in accordance with the Employer’s policies and procedures where available.
- ~ Remove all default accounts and passwords from all devices, creating new accounts, implementing secure identity and access management (IDAM) controls and procedures, in accordance with Employer’s policies and procedures where available.
- ~ Ensure all software is up-to-date with proper patch management procedures in place and applied, including throughout the service period, in accordance with the Employer’s policies and procedures where available.
- ~ Ensure full disk encryption is enabled and enforced across all devices in accordance with the Employer’s policies and procedures where available.
- ~ Ensure secure configurations for all devices are implemented, disabling all unnecessary services, functions and/or daemons prior to go live, in accordance with the Employer’s policies and procedures where available.
- ~ Ensure continual vulnerability assessments and penetration tests are completed with at least one (1) vulnerability assessment and one (1) penetration test completed prior to handover, in accordance with the Employer’s policies and procedures where available.

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- ~ Ensure frequent system back-ups are completed, retained for a defined period of time in line with industry guidelines and/or regulatory controls, in accordance with the Employer's policies and procedures where available.
- ~ Ensure all service technicians are trained, and certified where applicable, to ensure compliance with established policies and notification of potential information security incidents, in accordance with the Employer's policies and procedures where available.
- ~ Ensure all other Employer's policies and procedures are enforced.
- ~ Ensure full compliance with any other regulatory framework and/or standard as required and defined within project contracts.

**END OF SECTION A33**

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**A34 SECURITY/ SAFETY/ PROTECTION**

**A34 SECURITY/ SAFETY/ PROTECTION**

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100	PROTECTION OF EQUIPMENT
110	Delivery
120	Handling
130	Storage
140	Protection of Works
150	Identification
160	Rotating Plant
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#### **A34 SECURITY/ SAFETY/ PROTECTION**

##### **100 PROTECTION OF EQUIPMENT**

The Contract Administrator is not obliged to accept anything other than new, totally undamaged, correctly installed and selected equipment.

Properly protect the installation at all times, as required by the main contract preliminaries. Where appropriate, (eg for some types of electrical installation work, or for some types of materials requiring particular environmental conditions) ensure that the installation work does not commence until the affected rooms or areas of the building can be maintained weathertight, without unacceptable risk of water or dust reaching the installations. If the measures taken prove to be inadequate, the Contract Administrator will decide whether repairs may be effected and suitable recompense made to the Employer, or whether damaged installations are to be completely replaced.

No payment or allowance for delay and disruption will be made for repair, if agreed appropriate by the Contract Administrator, or replacement, if required by the Contract Administrator.

##### **110 Delivery**

Provide adequate and safe protection for all materials and products during transport to site. Deliver, with open ends effectively plugged, capped and/or sealed for all ducting, piping, tubes, conduit, trunking and associated equipment.

##### **120 Handling**

Offload and transport about the Works, all materials and products in the manner recommended by their manufacturers.

##### **130 Storage**

Store all materials and products in the manner recommended by their manufacturers.

Provide sufficient, safe and secure storage for all materials and products.

Provide properly made racks with adequate supports to prevent distortion for storage of conduits, pipes and similar materials.

Store all fittings, accessories and sundry items in clean bins, or bagged and stowed on racks, and maintained under suitable weatherproof cover. Where not stored in dry buildings, raise all material off the ground and protect accordingly.

##### **140 Protection of Works**

Provide adequate and safe protection for all materials and products during and after installation stage to prevent wilful, accidental or resultant damage to the Works.

Ensure all items forming part of the Works, whether in storage, in the course of installation, or installed, are protected against ingress of water, dust or foreign bodies, formation of condensation, extremes and rapid changes of temperature, direct sunlight, high winds, excessive humidity, building works and operations to other items. Ensure that all protection is adequate for its purpose, including fire resistance. Maintain, alter, adapt, replace or repair protective measures as necessary as the Works proceed. Replacement parts or equipment or making good will not be accepted in lieu of protective measures. Prevent the Works from becoming wet or damp and dry out the Works accordingly.

Take all reasonable fire precautions in respect of stores, workshops and other installations. Where it is necessary to use any naked flame or welding equipment in executing the Works and where combustible materials are in use, give adequate protection to other adjacent materials and personnel. Ensure suitable fire extinguishers are readily available at the position where such work is proceeding.

Protect throughout erection and after installation, vulnerable or delicate materials or finishes, with hardboard covers or heavy duty polythene sheet.

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#### **A34 SECURITY/ SAFETY/ PROTECTION**

Such items include but are not limited to:

1. control panels
2. switchboards
3. distribution boards
4. heater batteries
5. finned piping
6. refrigeration condensers
7. heat emitters (radiators, convectors, trench, over-door heaters, etc)
8. gauge glasses.

Protect the surface finish of all items from damage and paint splashes. Install items such as grilles, diffusers, luminaires, switches, accessories etc, as near to completion as practicable.

Install filter media no earlier than when the plant items concerned are being commissioned and tested.

Cover all plant items with polythene sheeting (or plywood if more appropriate) except when being worked upon.

Cap all open ends of pipes, ducts, conduits and trunking etc, except when being worked upon.

Leave plant and equipment in a ready-to-paint condition where specified as part of the Works, or where they are to be painted by others.

Properly clean and paint with corrosion-resistant paint at works, and again immediately after installation or after the removal of temporary protection, all those parts that are liable to corrosion.

When final finishes are applied at the manufacturer's works, ensure adequate protection is provided up until the point of installation. Inspect on delivery and do not accept anything that is damaged.

Replace material, plant or equipment where deterioration has occurred prior to handover.

At Practical Completion, remove all protective measures (including removal from site) and clean down and prepare the Works for hand over.

Ensure all materials used for protection are recyclable.

Do not remove protection to the work of others without an instruction, and subsequently replace protection so removed, where required.

Provide proposals for providing protective measures as part of the tender return.

#### **150 Identification**

Where appropriate, ensure that materials, plant and equipment bear the brand name, serial / batch number and any other data required to identify their nature in relation to the Works.

#### **160 Rotating Plant**

Immediately prior to Practical Completion adjust, ease and lubricate moving parts as necessary to ensure easy and efficient operation.

Ensure that whenever, to avoid damage or deterioration, it is necessary to operate at regular intervals motive plant items delivered and/or installed, the necessary temporary electricity and/or fuel supplies are provided.

Ensure that rotating plant is hand-turned periodically throughout periods when such temporary supplies are not available.

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#### **A34 SECURITY/ SAFETY/ PROTECTION**

##### **161 Machine Guards**

Properly protect every rotating, reciprocating or moving part of compressors, pumps, fans and other machines supplied, using the machine manufacturer's standard or purpose-made machine guards to comply with the Factories Act. Ensure that all machine guards are manufactured from solid sheet metal or wire mesh or iron frame, all galvanised after manufacture, and have hinges and / or removable sections to allow for maintenance and tachometer readings.

##### **200 NOISE AND NUISANCE**

Ensure that the Works are undertaken with as little noise as possible. Ensure that no nuisance by noisy working is caused to the occupants of either the premises in which the Works are located or of adjacent buildings outside the site boundary.

Take all necessary precautions to prevent nuisance from smoke, rubbish and other causes.

Fit all compressors, percussion tools and vehicles with effective silencers of a type recommended by the manufacturers of the equipment.

Ensure all internal combustion engines used in the execution of the Works are fitted with efficient suppressors in the ignition system in accordance with the recommendations of British Standards so as to prevent electrical interference to radio or television equipment in the vicinity. Prevent all temporary electrical installations, such as motors or the like, from creating such interference and fit with suppressor equipment in accordance with British Standards and to the satisfaction of the Contract Administrator.

**END OF SECTION A34**

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#### A37 OPERATION/ MAINTENANCE OF THE FINISHED INSTALLATIONS

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#### **A37 OPERATION/ MAINTENANCE OF THE FINISHED INSTALLATIONS**

##### **100 RECORD DOCUMENTS**

Ensure that the record documents make it possible to comprehend the extent and purpose of the Works and the method of operation thereof.

Ensure that the record documents set out the extent to which maintenance and servicing is required and how, in detail, it should be executed.

Ensure that the record documents provide sufficient, readily accessible and proper information to enable spares and replacements to be ordered.

Correlate record documents so that the terminology and the references used are consistent with those used in the physical identification of the component parts of the installations.

Issue operating and maintenance instruction manuals and record drawings of the final as-built layouts in draft form for comment prior to the testing and commissioning period, or eight weeks prior to completion or completion of section, whichever is earlier, to allow checking for accuracy. Comments will be provided within four weeks of receipt of the drawings. Revise as necessary the complete set of draft operating and maintenance instruction manuals and record drawings to incorporate testing and commissioning data where applicable, and hand over the final set(s) of operating and maintenance instruction manuals and record drawings in accordance with the main contract preliminaries.

Issue at a time in accordance with the main contract preliminaries, the complete agreed package of operating and maintenance instruction manuals and Record Drawings made up of 2 sets of "hard copy" white prints / bound manuals and 2 electronic sets on a USB flash drive or USB hard drive.

Issue a further copy of the final version of the O&M instruction manual and Record Drawings to the Principal Contractor for insertion into the Health & Safety File in accordance with the Principal Contractor's programme.

##### **110 CAD RECORD DRAWINGS**

Provide Record Drawings of the complete installation on completion or completion of section as defined in the main contract preliminaries.

Produce all Record Drawings upon common building outlines and structural details agreed by the Contract Administrator.

Produce all Record Drawings using AutoCAD (latest release). Provide every drawing in DWG, DXF and PDF format.

Provide the information contained upon the final versions of Record Drawings such that independent 'layers' are created with selected categories of information on each layer. Agree the content of each 'layer' with the Contract Administrator prior to creation of the CAD drawing files.

Produce Record Drawings to comply with the definitions in BSRIA's Building Applications Guide BG 6 *A Design Framework for Building Services*, Appendix C.

Include the following information on the Record Drawings:

1. location, including level if buried, of utility service connections, including those provided by the appropriate authority, indicating points of origin and termination, size and material of service, emergency shut-off isolation locations, pressure and/or other relevant information
2. disposition and depth of all underground systems
3. schematic drawings of each system indicating principal items of plant, equipment, zoning, means of isolation etc in sufficient detail to make it possible to comprehend the system operation and the interconnections between various systems
4. details of the principles of application of automatic controls and instrumentation

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5. diagrammatic dimensioned plans and sections / of each system or service showing sizes and locations of all ancillaries, plant, equipment controls, test points, and means of isolation etc including any items forming an integral part of the engineering systems provided by others (such as plenum ceilings, builder's work shafts, chimneys etc)
6. identification of all terminals/cables etc by size/type and duty/rating as recorded from the commissioning results
7. detailed wiring drawings / diagrams / schedules for all systems, including controls, showing origin, route, cable / conduit size, type, number of conductors, length, termination size and identification, and measured conductor and earth continuity resistance of each circuit. Ensure routes indicate whether cable / conduit is surface-mounted, concealed in wall chase, in floor screed, cast in-situ, above false ceiling etc
8. details of co-ordination of wiring and connections with cable core identification, notation of fire alarm, security, control and instrumentation and similar systems provided as part of the Works
9. details to show inter-connections between the Works and equipment or systems provided by others to which wiring and connections are carried out as part of the Works
10. location and identity of each room or space housing plant, machinery or apparatus
11. dimensioned plans and sections of plant rooms, service subways, trenches, ducts and other congested areas where in the opinion of the Contract Administrator smaller scale drawings cannot provide an adequate record. Indicate the location, identity, size and details of each piece of apparatus.

Ensure that the Record Drawings conform to the following standards:

1. all hard copy Record Drawings on best quality paper, with CAD files provided on a USB flash drive or USB hard drive.
2. all titles, headings, etc have a height not less than 5mm
3. all other lettering upper case in a height of not less than 3mm
4. all non-essential setting-out dimensions from installation drawings removed

Show the following information on every Record Drawing:

1. Employer's name
2. name of contract and, where appropriate, the zone or floor designation
3. description of drawing, its number and scale
4. name and address of originator
5. your confirmation that the completed Record Drawing is a true record

Note that in the event of non-compliance with this clause, the Contract Administrator reserves the right to have the Record Drawings prepared by others and to deduct the cost of preparation from monies otherwise due. The sum deducted will be the actual cost and may be greater than any sum declared in the schedule of rates or prior quotations.

#### 200 OPERATING AND MAINTENANCE INSTRUCTION MANUALS

##### 210 General

Note: some of the following is reproduced from *BSRIA BG 79/2020 Handover Information and O&M Manuals*.

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#### A37 OPERATION/ MAINTENANCE OF THE FINISHED INSTALLATIONS

This section of the specification details the type and content of the O&M manual required, to provide for the safe and efficient operation and maintenance of engineering services, including as-fitted and other drawings.

Issue of operating and maintenance instruction manuals is a pre-requisite of Practical Completion of the Works and the Practical Completion certificate will not be issued until the Contract Administrator is satisfied that the manuals have been produced in accordance with this specification.

#### 211 Scope

The engineering services covered by this specification are:

##### Mechanical

- Cooling water installations
- Heating systems including boilers
- Mechanical ventilation systems
- Natural ventilation
- Vibration control (engineering services)

##### Electrical services

- Cable containment
- Data and IT systems
- Earthing and bonding
- Electrical substations and switchgear
- Energy metering and monitoring systems
- High voltage switchgear and distribution
- Low voltage switchgear and distribution
- Lighting circuits and control
- Power circuits and control
- Power and containment for mechanical and public health systems
- Security - intruder detection and alarm

##### Public health services

- Cold water systems (domestic)
- Drainage above ground – foul
- Potable water systems

##### Utilities

- Incoming communications services
- Incoming electricity
- Incoming mains water

##### Fire engineering services

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- Fire detection and alarm systems

Submit to the Contract Administrator with the draft version of the operating and maintenance instruction manual, written confirmation from the manufacturer of every major plant item, a list of documents that the manufacturer considers should be held on site for the proper operation and maintenance of the plant supplied. The Contract Administrator will use these written confirmations when determining whether or not the operating and maintenance instruction manual is complete.

#### **212 Definitions**

Refer to BS 5643 for guidance on defining terms in the technical documentation. In addition to the terms defined in that standard, and those in section A10 of this specification, the following definitions of terms will apply:

- ~ Equipment: Any engineering plant, machine or component
- ~ System: A basic concept of equipment or appliances, connected, associated, or independent so as to form a complex unity
- ~ Installation: A specific system placed in position and set up for use
- ~ Specialist author: The person or organisation that writes, collates and presents the information and produces the final operating and maintenance manual (this could be the installer or a third party employed by the installer).

#### **213 Writing style and use of English**

Write all documentation in plain English. If appropriate, refer to a style guide nominated by the Client. Make the text of descriptive sections concise and complete. The overall aim of the document is to provide clarity in conjunction with brevity on a need-to-know basis.

Avoid jargon. Define all new terms when first introduced. Where appropriate, use terminology that accords with BS 5643.

Only use abbreviations once their meaning has been made unambiguous. Use imperatives for instructions regarding the operation, maintenance and disassembly of engineering services.

#### **214 Graphics and illustrations**

Ensure all graphical material is legible and fully annotated to suit the purpose for which it has been included in the O&M manual. Ensure that illustrations, drawings and diagrams that are incorporated in the manual are easily understood in conjunction with the supporting text.

Where possible, use original artwork rather than second or third generation scans. If original artwork cannot be obtained, and where necessary to ensure legibility, redraw diagrams and illustrations.

Where diagrams are provided in electronic format, check the resolution and file format of the imagery for suitability. Where possible use compressed file formats (such as JPG) for their small file size, but ensure the images retain enough resolution for fine detail to be readable. If necessary for legibility, use higher resolution bit-mapped file formats (such as TIF).

Use EPS or PDF files where possible, to ensure a reasonable file size with no loss of detail and enable layering. If EPS files are provided, supply the name and version of the original software that created them, and include in the O&M manual a freeware EPS viewer. If PDF files are provided, include a freeware PDF reader in the final manual.

#### **215 Indexing and cross-referencing**

Provide the manual with an alphabetical index or indexes, which follow the text and comply with BS ISO 999.

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Arrange the indexing and cross-referencing included in other parts of the manual to provide easy access to any required information.

#### **216 Errors in the documentation**

Make the specialist author responsible for the correction of any errors or omissions in the documentation provided to the Client.

#### **217 Collection of information**

Make the specialist author responsible for maintaining close liaison with all parties who are required to provide information for the manual, including designers, installers and equipment manufacturers and suppliers. Ensure each of these sources is aware of the information required by the specialist author. Arrange such liaison to give all parties adequate time to collate the necessary information.

Provide copies of all orders for plant and equipment to the specialist author. Arrange for the specialist author to ensure that the performance and technical information included within the manual is for the actual equipment installed, preferably by undertaking a site inspection.

Arrange for the specialist author to use all the information provided and such other information believed to be necessary to produce a satisfactory O&M manual. Where appropriate, modify information to provide a single, uniform presentation.

#### **218 Reader ability**

Prior to commencing production of the manual, identify the intended maintenance strategy for the installation and the level of technical competence and comprehension of the personnel likely to be employed. Prepare the manual to suit this level of reader. Ensure that the manual states the reader's assumed level of technical comprehension and competence. Provide training in the use of the manual for searching for specific items, so that the building operators will be able to use them after the building is handed over.

The personnel expected to use the manual will be:

- Non-technical (such as a property manager or caretaker)

#### **219 Copyright**

Confirm that the Client has sole copyright to the O&M manual document and is able to reproduce any part for its own use.

#### **220 Manual presentation**

Present the manual in a fully digital, searchable, editable and updateable environment where documents can be collated, sorted, distributed, accessed, edited and printed within a systems user's access rights.

Ensure that the manual supplier suitably responds to the end user's computer competence, computer system compatibility, technical competence, and intended maintenance strategy, to ensure that the manual is suitably presented. Confirm that the manual supplier has ensured that full software support is provided in the form of a 'help desk'.

Make the final electronic O&M manual clear to read, easy to navigate and easy to understand by all levels of user. Ensure that the electronic manual is capable of being printed out clearly, both in its entirety and as selected pages from it. Ensure that the manual is capable of having images loaded into it that can be printed legibly. Ensure that the manual is protected to prevent overwriting of information.

Arrange for the manual to comprise loose-leaf A4 pages on good quality paper that is strong enough to stand up to heavy use and sufficiently opaque to avoid show-through. Use a paper weight of at least 100 gsm.

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Use loose-leaf, four-ring binders for the binding, constructed from PVC-covered heavyweight card. Where a thicker type of binder is required, provide steel locking pins.

Provide dividers between sections and parts using stepped, overlapping, printed card. Label the divider as to the section of the manual. Do not obscure the labels with the manual's content, ie where a drawing or other information is incorporated using a transparent plastic pocket, ensure the label/ tab is visible.

Print on the cover the following information:

"Operating and maintenance instruction manual (Project name and system)".

Where more than one volume is required, print the volume number on the cover.

Print all written instructions within the manual with a margin on the left-hand side.

Ensure that the general contents and format of the manual are in accordance with BS EN 82079-1 *Preparation of instructions for use. Structuring, content and presentation. General principles and detailed requirements* and BSRIA BG 79/2020 *Handover Information and O&M Manuals*. Ensure that manufacturer's information is prepared in accordance with BS 4940 *Technical information on construction products and services*.

#### 230 Contents

Follow the guidance and include all the information set out in section 4.6 of BSRIA Guide BG 79/2020.

Ensure that all product information included within the operating and maintenance instruction manual is in compliance with the Code for Construction Product Information (CCPI, [cpicode.org.uk](http://cpicode.org.uk))

In addition, ensure that the following are included:

1. diagrammatic drawings of each system indicating principal items of plant, equipment, valves etc
2. a set of drawings of the installation upon which is recorded all plant settings, water flow-rates, pump heads and noise level readings as adjusted and measured during the testing and commissioning period. Record protection and overload relay settings and incorporate calibration charts.
3. legend of all colour-coded services
4. schedules (system by system) of plant, equipment, valves etc, stating their locations, duties and performance figures. Each item must have a unique number cross-referenced to the record and diagrammatic drawings and schedules.
5. a copy of all test certificates, inspection and test records, commissioning and performance test records including, but not limited to, electrical circuit tests, corrosion tests, type tests, start and commissioning tests, for the installations and plant, equipment, valves etc, used in the installation
6. schedules of all fixed and variable equipment settings established during commissioning
7. procedures for seasonal change-overs and / or precautions necessary for the care of apparatus subject to seasonal disuse
8. a list of normal consumable items
9. procedures for fault-finding in diagrammatic and tabular form to show the action necessary to correctly identify defective pieces of equipment and the steps to be taken to rectify faults
10. documentation of the procedures for updating and / or modifying software operating systems and control programs

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11. instructions for the creation of control procedure routines and graphic diagrams
12. details of the software revision for all programs provided
13. two back-up copies of all software items, as commissioned
14. performance guarantees (as detailed in clause A33, 2000)
15. a schedule of Energy Technology Products that lists all items of plant, equipment and components incorporated in the Works that are on the UK Government's 'Energy Technology Product List' for Enhanced Capital Allowances purposes under the UK Government's Climate Change package of measures
16. a schedule of Water Technology Products that lists all items of plant, equipment and components incorporated in the Works that are on the UK Government's 'Water Technology List' for Enhanced Capital Allowances purposes, which encourages sustainable water use
17. health and safety (CDM) relevant information (eg safety measures in maintenance, COSHH substances, disposal instructions, risk assessments etc), written schemes of examination for pressure systems, written schemes of examination and tests for systems at risk of causing Legionellosis

Provide and permanently fix an indelible asset label to all plant and equipment listed in the asset register. Ensure that each label is located in an accessible position on the asset and it is of a design, size and format accepted by the facilities manager

In the absence of a project-specific schedule, use the form in appendix B of BSRIA BG79/2020 to record the issue or certificates and other handover documentation.

#### 240 Specialist author

Forward the intended specialist author's name, address and details to the engineer for comment prior to procurement.

#### 250 Standards

Notwithstanding the above, provide O&M manuals, system records and full documentation in accordance with the legislation, standards and guidance applicable to individual systems, as referred to in the system sections of this specification and as listed below.

For intruder alarm systems:

BS 4737 Intruder alarm systems in buildings

For heating systems, as applicable:

BS EN 12170 Heating systems in buildings. Procedure for the preparation of documents for operation, maintenance and use. Heating systems requiring a trained operator

BS EN 12171 Heating systems in buildings. Procedure for the preparation of documents for operation, maintenance and use. Heating systems not requiring a trained operator

#### 300 BUILDING LOG-BOOK

Provide documentation for the users of the building to meet the requirements of Part L of the Building Regulations.



## EDEN GEOTHERMAL HEAT MAIN MEP DESIGN

### MECHANICAL AND ELECTRICAL SPECIFICATION

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#### **A37 OPERATION/ MAINTENANCE OF THE FINISHED INSTALLATIONS**

##### **310 Non-residential buildings**

FOR EVERY INDIVIDUAL BUILDING AND FOR EVERY COMPLEX OF BUILDINGS THAT ARE NOT DWELLINGS provide a 'Log-book' in accordance with Approved Document L2 of the Building Regulations, using the list of contents, format and templates in CIBSE TM31, *Building log book toolkit*.

Ensure that the log book is contained in a binder that has the following features:

25mm (or thicker as appropriate), A4, steel standard spacing 2 No. D-ring binder mechanism, rigid opaque spine and covers, transparent plastic pocket on the front cover and on the spine, transparent plastic pocket inside the front cover, every leaflet contained in a top-opening transparent polypropylene A4 pocket, every pocket with a multi-punched reinforced filing strip.

Provide a leaflet inserted in the outer pocket of the front cover bearing the words 'Building Log-book or 'Site Log-book' as appropriate, and identifying the number or other identification of the building or site.

Include on the contents page a statement that this log-book is issued in accordance with the Building Regulations.

#### **400 PRODUCTION OF CAD RECORD DRAWINGS AND OPERATING AND MAINTENANCE MANUALS**

Employ a technical documentation specialist to produce the Record Drawings and operating and maintenance instruction manuals.

Ensure that the selected technical documentation specialist produces a fully word-processed document and CAD drawings, with various packages of work in an agreed common style and suitably indexed for ease of use. Ensure that, prior to production of drawings or documentation, their final required content, format and style is confirmed and agreed by the technical documentation specialist. No manufacturer's literature will be accepted except as a supplement to the document; a full understanding of all items or systems must be achieved without such literature.

Refer to the "Lead Co-ordinator's additional responsibilities" in relation to Record Drawings and operating and maintenance manuals in section A11 of this specification.

#### **500 PROVISION OF SCHEDULE OF SPARES AND SPECIAL TOOLS**

Compile and submit to the Contract Administrator one month before completion of the Works, a complete list of special tools, test equipment and spare parts to cover 12 months' operation of the installations. Submit an additional list of special tools and test equipment likely to be needed during the useful life of the installation, ie over and above the 12 month period. This requirement is in addition to the provision of the spares and tools detailed elsewhere in the specification.

Wherever spares or tools, special or otherwise, are required by other clauses within the specification, provide them irrespective of the requirement of this particular clause.

Provide a fully itemised schedule of spares for each and every system and item of equipment installed as part of your Works.

Price each item of equipment upon the spares schedule highlighting those items that are specified and thus included in the tender price, together with a total cost. Forward the priced schedule to the Contract Administrator for consideration by the Employer, noting that the Employer reserves the right to choose the spares that will be supplied by you up to the value included in the tender and to choose the spares that will be supplied at additional cost to the contract.



## EDEN GEOTHERMAL HEAT MAIN MEP DESIGN

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#### **A37 OPERATION/ MAINTENANCE OF THE FINISHED INSTALLATIONS**

#### **600 SOFTWARE LICENCES**

For all computer software supplied as part of your Works, obtain on behalf of the end user all appropriate licences, permissions, copyright waivers, rights of use, source codes, etc, from the owners of the software rights.

Ensure the end user is registered with the software supplier for updating, etc.

For any equipment that requires a maintenance “code” to reset the system, ensure that the code is unique to that specific item of equipment, and include all such codes in the O&M manual.

#### **700 PATENT RIGHTS**

Indemnify against all claims, costs or expenses in connection with any patented, copyrighted or protected articles supplied and used on or in connection with the Works. Include in the contract price, and make any payments or royalties payable in one sum or in instalments to whomsoever they may become due. In the event of any claim being made in connection with such patented or protected articles, conduct any negotiations or litigation in connection with such claims at your own expense.

#### **800 WATER MANAGEMENT LOG-BOOK**

Where the project includes Water Fittings, provide, as part of the handover documentation, a building water management log-book in accordance with the requirements of BS8558 and, for healthcare projects, HTM 04.

#### **900 REMOTE COMMUNICATION WITH PLANT AND EQUIPMENT**

Where plant and equipment is provided with the capability to communicate with a manufacturer’s/installer’s service personnel or remote monitoring facility via a mobile data connection, make all necessary arrangements to ensure that the item is within range of a reliable mobile data signal. Pay particular attention to this item in basement locations, where extensions to the antennae may be necessary.

**END OF SECTION A37**

**EDEN GEOTHERMAL HEAT MAIN MEP DESIGN**

**MECHANICAL AND ELECTRICAL SPECIFICATION**

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**A40 MANAGEMENT AND STAFF**

**A40 MANAGEMENT AND STAFF**

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100 INSTALLER'S STAFF

## EDEN GEOTHERMAL HEAT MAIN MEP DESIGN

### MECHANICAL AND ELECTRICAL SPECIFICATION

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#### **A40 MANAGEMENT AND STAFF**

##### **100 INSTALLER'S STAFF**

Maintain on the site of the Works an experienced engineer and site staff for carrying out your Works.

Designate a senior member of your office staff to be your organisation's representative.

Ensure that this person is an experienced engineer-designer and is competent and duly authorised to:

1. co-ordinate the work in your office, between your office and the site, and between the suppliers and your office and site, and
2. liaise with the Main Contractor and/or Architect/engineer and other parties, and
3. attend progress meetings, and
4. generally represent your organisation on all aspects related to your contract and interfaces with all other Installers.

All directions or instructions given by the Main Contractor or Contract Administrator to your representative are deemed to have been given to your organisation.

#### **END OF SECTION A40**

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**A42 SERVICES AND FACILITIES**

**A42 SERVICES AND FACILITIES**

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**A42 SERVICES AND FACILITIES**

**100 FUEL, POWER AND CONSUMABLES FOR THE ENGINEERING WORKS**

Until the acceptance of the mechanical, electrical, vertical transportation and fire protection installations at completion or completion of section as defined in the main contract preliminaries, with all of the relevant duties discharged, cover the costs of all electrical, gas, and water supplies for testing, commissioning and proving of your Works.

Replace all consumables on the project as and when they are used, and provide the requisite full complement of spares to the Employer at completion or completion of section as defined in the main contract preliminaries.

Read and record all water, gas and electricity meters at Practical Completion of the Works.

**END OF SECTION A42**

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**A50 WORK / MATERIALS BY THE EMPLOYER**

**A50 WORK / MATERIALS BY THE EMPLOYER**

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200	WORKS BY / ON BEHALF OF THE EMPLOYER

**EDEN GEOTHERMAL HEAT MAIN MEP DESIGN**

**MECHANICAL AND ELECTRICAL SPECIFICATION**

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**A50 WORK / MATERIALS BY THE EMPLOYER**

**100 MATERIALS PROVIDED BY OR ON BEHALF OF THE EMPLOYER**

Details of such products are given in the relevant sections of this specification, for fixing under the contract.

Advise the Contract Administrator not less than 90 days before the date such products are required on site. Advise of related dates to suit any changes to the contract programme.

Take delivery, check condition, mark receipts and take into appropriate storage. Advise the Contract Administrator of details and number of items.

Use for no other purpose than the specified works.

Keep safe any surplus to requirements and obtain instructions in relation thereto.

Once products provided by or on behalf of the Employer are in your possession, all conditions of the contract and technical specifications are applicable to such items, including all requirements for protection, storage, distribution, fixing, insurances, replacement of damaged/stolen/lost goods etc, painting, identification, setting to work and commissioning.

**200 WORKS BY / ON BEHALF OF THE EMPLOYER**

Details of such works are given in the relevant sections of this specification.

Advise the Contract Administrator not less than 90 days before the date such works are required to be completed. Advise of related dates to suit any changes to the contract programme.

**END OF SECTION A50**

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**A53 WORK BY STATUTORY AUTHORITIES**

**A53 WORK BY STATUTORY AUTHORITIES**

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100 WORKS BY PUBLIC BODIES / UTILITY SUPPLIERS UNDERTAKING THEIR  
STATUTORY OBLIGATIONS



## EDEN GEOTHERMAL HEAT MAIN MEP DESIGN

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#### **A53 WORK BY STATUTORY AUTHORITIES**

#### **100 WORKS BY PUBLIC BODIES / UTILITY SUPPLIERS UNDERTAKING THEIR STATUTORY OBLIGATIONS**

Co-operate with and work in conjunction with the public bodies / utility suppliers including the following:

- Gas transporter    Wales and West Utilities:
- Electricity distribution network operator                          Western Power Distribution:
- Regional water supply company                                  South West Water:
- Regional sewage disposal company                                  South West Water:
- Telecommunications company 1                                  BT Openreach:

Integrate their works within the contract programme. Make application to the public bodies / utility suppliers in the first instance requesting that the site be serviced, and giving the programme and handover dates. Make the public bodies / utility suppliers and their agents fully aware of the construction programme, and any changes to it that affect servicing dates. Negotiate any necessary agreements or revisions in the programming of the works by public bodies / utility suppliers.

Co-ordinate the carrying out of the Works with the public bodies' / utility suppliers' works and comply with any instructions issued by the Contract Administrator in relation to such co-ordination. No action, or lack of action, by the public bodies / utility supplier nor any instruction by the Contract Administrator will entitle any extension of time or monies.

Provide the public bodies / utility supplier with all general and other attendances and all other necessary facilities to carry out their work and be satisfied that it is adequately and effectively completed to facilitate the completion of the Works.

Afford facilities to properly accredited representatives of public bodies / utility suppliers to access any existing apparatus as may be necessary for inspecting, maintaining, removing, diverting, renewing or any other purpose.

Clear away within a reasonable time all materials or other obstructions that may lie in the way or be of hindrance to the public bodies / utility supplier.

Ensure that meter termination positions and service duct entries are correctly located and aligned, clean and clear of obstruction. Take total responsibility for the procurement, supervision and works as executed by public bodies / utility supplier.

Arrange for all builder's work requirements associated with the works to be carried out by the utilities suppliers.

**END OF SECTION A53**

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**B1 INTRODUCTION**

**B1 INTRODUCTION**

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100	TITLE AND NATURE OF PROJECT
100	THE SITE
200	CLIENT/ PROFESSIONAL TEAM

## EDEN GEOTHERMAL HEAT MAIN MEP DESIGN

### MECHANICAL AND ELECTRICAL SPECIFICATION

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#### **B1 INTRODUCTION**

##### **100 TITLE AND NATURE OF PROJECT**

Eden Geothermal – Heat Network – MEP Design

The project involves the design for the District Heat Network installations, which will include (but not limited to):

- the primary heating network circulation pressurisation units;
- expansion vessels and other ancillaries (buffer vessels as required);
- piped distribution and associated ancillaries;
- pumpsets;
- controls;
- associated electrical installation;
- associated plantroom enclosures;
- local plate heat exchangers (Greenhouse, Biome Energy Centre, Potential ;
- upgrade of utility supplies where required.

##### **100 THE SITE**

The geothermal site is located to the north of the main Eden Project. The site comprises of the main well head / borehole and associated site accommodation.

Site access is made from the main road adjacent to the site with no particular restrictions.

##### **200 CLIENT/ PROFESSIONAL TEAM**

Names and contact information of parties involved in the design and construction of the project and its administration:

- Client - Eden Geothermal
- Project Manager - TBC
- Contract Administrator - TBC
- Principal Designer - TBC
- Quantity Surveyer - TBC
- Mechanical Engineer - Hoare Lea
- Electrical Engineer - Hoare Lea
- Public Health Engineer - Hoare Lea

**END OF SECTION B1**

**EDEN GEOTHERMAL HEAT MAIN MEP DESIGN**

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**B2 SCOPE OF WORKS AND RELATED SERVICES**

**B2 SCOPE OF WORKS AND RELATED SERVICES**

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200	SCHEDULE OF DRAWINGS
300	SCOPE OF WORK

## EDEN GEOTHERMAL HEAT MAIN MEP DESIGN

### MECHANICAL AND ELECTRICAL SPECIFICATION

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#### **B2 SCOPE OF WORKS AND RELATED SERVICES**

##### **100 SUMMARY OF BUILDING ENGINEERING SERVICES SYSTEMS TO BE PROVIDED**

The building engineering services systems covered under the scope of this document include systems described under the following Common Arrangement of Work Sections (CAWS) system categories, and any other system or sub-system detailed in the attached specification(s) or on the associated tender drawings:

- N1 General purpose fixtures / furnishings / equipment
- N2 Special purpose fixtures / furnishings / equipment
- R1 Drainage
- S1 Water supply
- T1 Heat source
- T2 Primary heat distribution
- T3 Heat distribution / utilisation – water
- V1 Generation / supply / HV
- V2 General LV distribution / lighting / power
- V3 Special types of supply / distribution
- V4 Special lighting
- V5 Electric heating
- V9 General / other electrical work
- W3 Communications – data
- W4 Security
- W5 Protection
- W6 Central control

##### **200 SCHEDULE OF DRAWINGS**

See Volume 4 - Appendices

##### **300 SCOPE OF WORK**

All Works detailed in the specification or schedules or shown on the tender drawings, and the following site-based activities:

(Only activities specifically declared as "at works" or "off-site" may take place off site.)

1. Undertake specific design activities as indicated in section A20.
2. Note that Soft Landings procedures are to be used on this project. In addition to the aftercare requirements detailed in section B4 of this specification, carry out all of the activities assigned to the "Constructor" in *BSRIA BG 54/2014, Soft Landings Framework*, as they relate to your installation, at all stages of the project.
3. Provide and operate CAD / Drawing Production Facilities as specified in section A11 of this specification.

## EDEN GEOTHERMAL HEAT MAIN MEP DESIGN

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#### **B2 SCOPE OF WORKS AND RELATED SERVICES**

4. Provide Technical Design Drawings, Co-ordinated Working Drawings, Installation Drawings, Builder's Work Information, Builder's Work Details and Record Drawings, as defined in BSRIA BG 6 and as specified in section A11 of this specification.
5. Provide detailed wiring diagrams for all equipment and control panels as specified in section A11 of this specification.
6. Undertake surveys as detailed in section A12 of this specification.
7. Ensure the complete integration of the Works with the remainder of the project.
8. Inspect all plant, equipment and materials as delivered or, where specified, at the manufacturer's works.
9. Arrange delivery, offloading, lifting, hoisting and all other storage and movement of all plant, equipment and materials as specified in section A34 of this specification.
10. Install and fix correctly all plant, equipment and materials including positioning, levelling, packing, and shimming. Install and fix all secondary steelwork necessary to support the installed plant. Provide all supports up to and including the final attachment to primary structure.
11. Supply and install all collars, flashings, kerbs, stopping up and sealing required for the associated building engineering system(s) to achieve weatherproofing and acoustic stopping of services passing through the internal and external elements of the building.
12. Ensure all associated work (including electrical wiring, connecting pipework, builder's work, etc), is properly executed.
13. Test and commission the complete installation(s) as specified in section B4 of this specification.
14. Prepare such reports, calculations and details as required for submission to any appropriate authority including the co-ordination of such information by suppliers, specialists etc needed to be included in any submission.
15. Demonstrate that the equipment is capable of the performance and method of operation specified, and that the overall and complete systems perform correctly in the required manner and as intended by the specification to the satisfaction and acceptance of the Contract Administrator (including return visits for seasonal tests). Provide the full set of test results in an approved format for all tests, commissioning and balancing operations. Refer to sections B4, W60, Y51 and Y81 of this specification.
16. Provide operating and maintenance instruction manuals for the complete systems as specified in section A37 of this specification.
17. For residential projects provide householder operating and maintenance instructions as specified in section A37 of this specification. (On projects that have separate mechanical and electrical Installers this is the mechanical Installer's duty, unless specified otherwise.)
18. Provide tenant log-books, building log-book(s) and, if applicable, a site log-book as specified in section A37 of this specification. (On projects that have separate mechanical and electrical Installers this duty is the mechanical Installer's duty, unless specified otherwise.)
19. Instruct the Employer's staff in the use, operation and maintenance of the installations, as specified in section A37 of this specification.
20. Hand over all specified tools, keys, spares, oils, chemicals, etc as detailed in section A37 and elsewhere in the specification.
21. Remove existing building engineering services systems as described elsewhere in this specification, where applicable.

**EDEN GEOTHERMAL HEAT MAIN MEP DESIGN**

**MECHANICAL AND ELECTRICAL SPECIFICATION**

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**B2 SCOPE OF WORKS AND RELATED SERVICES**

22. Mark on site actual locations of all builder's work holes, chases etc as described in section A11 of this specification.
23. Carry out maintenance of existing building engineering services systems during or throughout, as appropriate, the Works.
24. Provide material samples, method statements, equipment technical literature and any other submissions detailed within this specification. Refer in particular to sections A11 and A33 of this specification.
25. Ensure all materials, equipment and components used, together with methods of installation, comply with Statutory Requirements.
26. Prepare an asset register and provide asset labelling as specified in section A37 of this specification.
27. Ensure that the location and installation of all building engineering systems meets the requirements of the project access consultant.

**EDEN GEOTHERMAL HEAT MAIN MEP DESIGN**

**MECHANICAL AND ELECTRICAL SPECIFICATION**

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**B3 DESIGN CRITERIA AND STANDARDS**

**B3 DESIGN CRITERIA AND STANDARDS**

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300	BUILDING REGULATIONS PART L COMPLIANCE



## EDEN GEOTHERMAL HEAT MAIN MEP DESIGN

### MECHANICAL AND ELECTRICAL SPECIFICATION

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#### **B3 DESIGN CRITERIA AND STANDARDS**

##### **100 DESIGN CRITERIA**

As detailed in the particular specifications.

##### **200 CODES AND STANDARDS**

##### **210 Statutory requirements and regulations**

Carry out the Works in accordance with all relevant standards and Codes of Practice current at the time of Tender and applicable to the location of the project, and all Statutory Instruments and Regulations as they apply to the project,

Ensure that all products that are subject to 'The Construction Products Regulations' (CPR) bear a UKCA/UKNI/CE marking as required by relevant market and are accompanied by a Declaration of Performance (DoP). Include the DoP, along with any other information required to be provided by the Regulations, in the operating and maintenance manual.

Ensure that all energy-related products that are subject to 'The Ecodesign for Energy-Related Products Regulations' are compliant on installation with the applicable implementing measure(s) listed in the Schedule 1 - Declaration of Conformity as amended from time to time by The Ecodesign for Energy-Related Products and Energy Information (Amendment) Regulations. Ensure that all energy-related products bear a UKCA/UKNI/CE marking as required by relevant market and comply with all other labelling requirements of the Energy-Related Products Regulations.

Comply with *Fire Prevention on Construction Sites, The Joint Code of Practice on the Protection from Fire of Construction Sites and Buildings Undergoing renovation*, published by the Fire Protection Association, including, where required, producing a strategy for the execution of your Works in accordance with the Code.

Carry out the Works in accordance with the requirements and regulations of all relevant local authorities, fire brigades, and utility providers including drainage, electricity, gas, telecommunications, and water supply. Notify all such authorities in accordance with their regulations and obtain any required approvals for the installation.

Comply with British Telecom LN 550 (all buried ducts for services other than piped or LV/HV cabling).

For dwellings, ensure that all wiring and electrical work is designed, installed, inspected and tested in accordance with the requirements of BS7671 and the Building Regulations, Part P, by an Installer registered with a Part P competent person electrical self-certification scheme authorised by the Secretary of State. Within 30 days of completion of the work provide the building control body with, the Installer's self-certification registration body's confirmation that the scheme has been successfully self-certified, and a copy of a Building Regulations compliance certificate.

##### **220 REFERENCE DOCUMENTS**

Legislation, standards and guidance applicable to individual systems and products are listed in the individual system and reference specification sections.

##### **300 BUILDING REGULATIONS PART L COMPLIANCE**

For new buildings, calculate the building emission rate (BER) of the actual building as constructed and submit the calculation to the building control body.

In accordance with the requirements of the Building Regulations, provide an Energy Performance Certificate (EPC) for the building, and provide to the building control body a copy of the EPC including the reference number under which the EPC has been registered. Also provide a "recommendation report" produced by an energy assessor for the cost-effective improvement of the energy performance of the building, unless there is no reasonable potential for energy performance improvements, in which case provide a statement to this effect.

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**B4 TESTING, COMMISSIONING, HANDOVER AND AFTERCARE**

**B4 TESTING, COMMISSIONING, HANDOVER AND AFTERCARE**

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210	Specialist commissioning engineer
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## EDEN GEOTHERMAL HEAT MAIN MEP DESIGN

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#### B4 TESTING, COMMISSIONING, HANDOVER AND AFTERCARE

##### 100 TESTING

For mechanical testing requirements refer to section Y51 and the testing and commissioning clauses of the individual system specification sections.

For electrical testing requirements refer to section Y81 and the testing and commissioning clauses of the individual system specification sections.

Ensure that the commissioning of natural ventilation, renewable energy systems, metering installations and effective user interfaces, are included in the commissioning of the building services installations, as applicable.

##### 200 COMMISSIONING

For mechanical commissioning requirements refer to section Y51 and the testing and commissioning clauses of the individual system specification sections. In particular note the requirements for performance and acceptance testing, BMS soak testing and environmental testing, in sections W60 and Y51.

For electrical commissioning requirements refer to section Y81 and the testing and commissioning clauses of the individual system specification sections.

The systems that will be commissioned in this project are shown in the following tables.

##### Heating, ventilation and air-conditioning systems

Element description	Yes/no	Applicable specification sections (in addition to Y51)
Heat generation plant	No	
Cooling generation plant	No	
Chilled water systems	No	
Refrigeration systems	No	
Medium temperature hot water systems	No	
Low temperature hot water systems	Yes	T31
Steam heating systems	No	
Ventilation systems	No	
Heating and cooling terminal units	No	
Heat recovery	No	
Smoke evacuation systems	No	
Gas installations	No	

##### Electrical and control systems

Element description	Yes/no	Applicable specification sections (in addition to Y81)

## EDEN GEOTHERMAL HEAT MAIN MEP DESIGN

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#### B4 TESTING, COMMISSIONING, HANDOVER AND AFTERCARE

High voltage power systems	No	
Low voltage power systems	Yes	V12, V20, V22
Lighting installations	Yes	V21, V40,
Security systems	No	
DC supplies / batteries	No	
Uninterruptible power supply (UPS) systems	No	V32
Standby generators	No	V10
Combined heat and power systems	No	V15
Telecommunication systems	No	W10
Fire and smoke alarm systems	No	W50
Public address / paging systems	No	W11, W12, W14
Earthing and bonding systems	Yes	W51
Lightning protection systems and surge protection devices	No	W52
Information and communication technologies (ICT) installations	No	W15, W30
Building management system	Yes	W60
Metering, monitoring and management systems	Yes	W66
Renewable power generation	No	V16, V17

#### Plumbing systems

Element description	Yes/no	Applicable specification sections (in addition to Y51)
Drainage systems	No	
Domestic hot and cold water systems	Yes	S10,

#### Specialist systems

Element description	Yes/no	Applicable specification sections
Lifts	No	
Escalators	No	
Compressed air / vacuum systems	No	
Sprinkler installations	No	

## EDEN GEOTHERMAL HEAT MAIN MEP DESIGN

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#### B4 TESTING, COMMISSIONING, HANDOVER AND AFTERCARE

Laboratory / medical gas systems	No	
Audio-visual systems	No	
Fuel oil installations	No	
Wet and dry risers and fire hydrants	No	
Gas and foam fire-fighting systems	No	
Trace heating systems	Yes	Y24
Acoustic testing	No	
Electromagnetic compatibility	Yes	W53
Services support and suspension systems	Yes	Y93

#### 210 Specialist commissioning engineer

Directly employ a specialist company to undertake commissioning of the mechanical engineering systems.

Ensure that the specialist company undertakes a review of the installation drawings and include any additional components deemed by the specialist to be required to ensure all systems are fully commissionable.

Ensure that the specialist company is a member of the Commissioning Specialists Association (CSA).

These clauses relate to commissioning of the mechanical engineering systems. The commissioning of other engineering systems, or items of plant, may be undertaken by the Installer or the manufacturer but ensure that commissioning of interfaces between systems is witnessed by all parties concerned and proven to operate to the satisfaction of all parties concerned.

#### 220 General

Provide the Contract Administrator two weeks' notice in writing when your Works, or parts thereof, are ready for testing and commissioning. Carry out the tests and issue the results to the Contract Administrator. After successful completion of all commissioning, carry out specific demonstrations as requested by the Contract Administrator to prove that all test results accord with the specification. Agree the dates and times of such demonstrations with the Contract Administrator. The Contract Administrator may require up to one week's notice to attend such demonstrations.

The extent and proportion of results to be witnessed by the Contract Administrator will be at the discretion of the Contract Administrator.

Make provision for all independent inspections / insurance company approvals etc of components or parts of the installation, where required by legislation.

Notify the necessary statutory authorities (Building Control, Fire Officer, Environmental Health, etc) in respect of all tests and demonstrations required by them.

Comply with the requirements of the Building Regulations (Part L) for the inspection and commissioning of the building engineering systems. Prepare all necessary submittals including commissioning plans and reports. Obtain all compliance approvals from the building control authority.

Establish procedures with all parties to allow demonstration of normal, emergency, shutdown and standby mode operation of plant and systems.

## EDEN GEOTHERMAL HEAT MAIN MEP DESIGN

### MECHANICAL AND ELECTRICAL SPECIFICATION

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#### **B4 TESTING, COMMISSIONING, HANDOVER AND AFTERCARE**

If the initial tests fail to demonstrate that the plant and equipment are properly installed and functioning correctly, investigate the cause of the failure. If this is due to incorrect or faulty work by you, or your sub-traders or suppliers, then without delay, carry out such remedial measures and adjustments as may be necessary and repeat the commissioning and testing procedure to the satisfaction of the Contract Administrator.

Where portions of the Works are commissioned and tested separately, upon completion or completion of section, as defined in the main contract preliminaries, demonstrate to the Contract Administrator that all the separate sections are capable of proper simultaneous operation.

In cases where the construction programme is such that there is a need to return to a portion of the building previously handed over and currently occupied by the Employer in order to undertake testing, balancing, adjustment, etc, take all necessary precautions against, and be responsible for repairing, any damage caused whilst working in such areas for that purpose (unless such damage is proven to be outside your reasonable control).

Provide all necessary skilled and unskilled labour and all necessary instruments and testing equipment for the purposes of commissioning and testing of the installation. Produce up-to-date calibration certificates for all testing equipment on request.

#### **230 Integrated system testing**

After commissioning of all systems is completed, undertake integrated system testing of all life-safety systems with the associated interfaced systems. Carry out tests to demonstrate systems are fully functional and all interfaced systems function correctly:

- ~ under normal power conditions
- ~ under partial power failure conditions (i.e. primary or secondary supply failure)
- ~ under worst case scenario of both incoming power supplies failing
- ~ to confirm that systems operate for the duration specified
- ~ to confirm that systems return to normal operation, with no intervention, when power returns.

Undertake comprehensive planning of the testing, including developing and submitting for comment a cause and effect matrix that includes interfaces with site-wide systems. Document all results and include them in the O&M manual, including a detailed description of actions required by the Building Manager to return the building to normal operation for all non-life-safety systems.

#### **300 PRACTICAL COMPLETION AND HANDOVER**

##### **310 Practical Completion**

Practical Completion of the Works, or agreed phase or part of the Works, will not be effected until all obligations under the Main Contract conditions are fulfilled, and in particular that it is demonstrated to the satisfaction of the Contract Administrator that the following aspects are complete:

1. All installation Works are complete other than minor 'snags', omissions or defects that could reasonably be completed within an agreed programme without causing disruption to the Employer's or their Agent's use of the Building or agreed part thereof. In respect of this clause, specifically but not uniquely, the Contract Administrator shall be the sole arbiter of what may be considered 'minor', 'reasonably be completed', 'an agreed programme' and 'disruption to the Employer'.

## EDEN GEOTHERMAL HEAT MAIN MEP DESIGN

### MECHANICAL AND ELECTRICAL SPECIFICATION

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#### **B4 TESTING, COMMISSIONING, HANDOVER AND AFTERCARE**

2. All tests and demonstrations have been undertaken in the presence of the Contract Administrator as required in the specification(s).
3. All final copies of the Record Drawings, schedules, operating and maintenance instruction manuals and 'Part L' Log-books have been supplied to the Contract Administrator in an agreed format.
4. All spares, keys, tools, oils, chemicals and other materials required by the specification for the running and maintenance of the building engineering services systems as specified, have been supplied.
5. All instruction of the Employer's staff has been satisfactorily completed in accordance with the programme for handovers agreed with the Contract Administrator.
6. All necessary certification by the Employer's insurers has been completed.
7. All documentation required for the completion of the Health & Safety File under the CDM Regulations has been issued to the satisfaction of the Principal Designer and/or Principal Contractor, as appropriate, and that the complete file has been passed to the Client.
8. All required evidence provided in relation to the BREEAM / Code for Sustainable Homes and/or other specified environmental assessment scheme(s), Renewable Heat Incentive (RHI), and/or Feed-in Tariff (FiT) (as applicable).

In the case of phased or partial handovers continue to operate and maintain all elements outwith the partial handover that are necessary for full enjoyment of the handed-over area and access thereto.

#### **320 Instruction of Employer's representatives**

At a time to be agreed prior to completion, or completion of section as defined in the main contract preliminaries, instruct a number (to be agreed) of representatives of the Employer in the use and correct operation of the Works, being satisfied that such staff are capable of taking over the installation. Throughout this period of instruction, be responsible for the correct operation and maintenance of the installation.

Submit to the Contract Administrator a detailed programme for the training of the Employer's staff.

Issue handouts for the training sessions in the form of précised versions of the Operating and Maintenance Instructions detailing in simple terms the functions and method of operation of each system.

Issue a certificate of attendance to each attendee at the end of each training session.