SPECIFICATION

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0117 238 0909

Project: Chippenham Town Hall

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G1 PRELIMINARIES CLAUSES

G1.1 CONTRACT DOCUMENTS

These Engineering Services Preliminary Clauses shall be read in conjunction with the Main Contract Preliminaries and General Conditions, together with any Drawings and the Engineering Services Specification issued in conjunction with the Contract.

The Main Contract Tender Documents, these Engineering Services Preliminaries Clauses, the Engineering Services Specification, the Drawings and any other documents are to be taken, read and dealt with as one instrument collectively showing the works to be done and the obligations of the Contractor.

The Drawings and Specification are to be read as a whole. If any detail is not clearly shown, or any discrepancy is apparent between the Specification and Schedules, the Conditions of Contract or the Drawings, or any other documents issued in connection with this Contract, the Tenderer for the Sub-Contract is to point out these to the Tenderer for the Main Contract prior to submitting their Tender. Failure to do this will not relieve the successful Contractor of the obligation to execute such items in accordance with the Architect's intentions as part of the Contract and without any extra payment.

G1.2 DEFINITIONS

In all documents relating to the Engineering Services Sub-Contract, words in the singular number shall include the plural and the following words shall be interpreted to have the meanings hereinafter set forth and assigned to them:

The "EMPLOYER" shall mean Chippenham Town Council

The "ARCHITECT" shall mean MEA – who are acting in the architect's role for the purposes of this contract.

The "QUANTITY SURVEYOR" is to be MEA.

The "STRUCTURAL ENGINEERS" shall mean Giraffe.

The "PRINCIPAL DESIGNER" is to be Core Compliance.

The "CONSULTING ENGINEERS" shall mean E3 Consulting Engineers.

The "MAIN CONTRACT" shall mean the agreement between the Employer and the company appointed by the Employer to execute the works covered by the Pricing Document for the whole project.

The "MAIN CONTRACTOR" is to be confirmed.

The "MECHANICAL (or ELECTRICAL or LIFT) ENGINEERING/SERVICES CONTRACT/ SUB-CONTRACT" or "THIS/THE CONTRACT", or "THIS/THE SUB-CONTRACT", shall mean the agreement between the Main Contractor, and the individual, or firm, or company appointed by the Main Contractor to execute the works covered by the Specification for the supply and installation of the Mechanical (and/or Electrical or Lift or other) Engineering Services.

The "MECHANICAL (or ELECTRICAL or LIFT) ENGINEERING/SERVICES CONTRACTOR/ SUB-CONTRACTOR" or "THIS/THE CONTRACTOR", or "THIS/THE SUB-CONTRACTOR", shall mean the individual or firm, or company appointed by the Main Contractor to execute the works covered by the Mechanical (and/or Electrical or Lift) Engineering Services Contract.

G1.3 CONDITIONS OF CONTRACT

The work is to be carried out as a Sub-Contract, to the Main Contractor.

Save as may be expressly mentioned elsewhere or in the Contract, there shall be no privity of Contract between the Employer and the Contractor. The privity of Contract is to be between the Contractor and the Main Contractor.

G1.4 EXTENT OF CONTRACT

Except where otherwise specifically stated, the Contract is to include the supply, delivery, fixing, testing, commissioning and demonstration of all systems specified and/or shown on the drawings. Additionally any responsibility for Design is defined in the following clauses.

The Contractor is to provide such temporary services as may be necessary during the progress of the works, and shall remove these temporary services upon completion. All systems and equipment shall be handed over ready for service. Certain post-Completion services are required, as stated in the Engineering Services Specifications. Responsibility for drawings, builderswork, and any other ancillary works, is defined elsewhere.

The Contract may include items for sectional completion. Where this is indicated, the Contractor shall ensure that all building services engineering systems serving or required to serve this area of sectional completion are operational. All operational requirements are as outlined in the Specification.

G1.5 DESIGN RESPONSIBILITY

The Mechanical and Electrical Services are performance specified and all design responsibility rests with the Contractor for the Engineering Services concerned.

The Contractor is not to alter the design principles indicated in the Specification or on the Drawings unless they consider it necessary for reasons of performance, or to improve co-ordination of services with one another and with the building. Any proposed change is to be discussed in advance with the Architect and Consulting Engineer, giving reasons for the proposal, and is not to be implemented without agreement.

The Contractor is to be fully responsible for the satisfactory design and performance of the Engineering Services. Tenderers are to scrutinise carefully the concepts illustrated in the design brief.

If a Tenderer considers that the concepts cannot be developed into a design and installation that will provide a satisfactory environment for the proposed use of the various areas and rooms, they are to state in their tender what the reservations are, how they can be overcome, and the effect on their tender sum of the alternative proposals.

The design work is to result in a fully functional system meeting any performance requirements set down in the Consulting Engineer's Specification and is to include (but not be limited to):

- Detailed design to determine the size of all plant and equipment to meet the specified requirements, in compliance with all relevant standards. Where requested by the Consulting Engineers design calculations shall be issued for comment.

- Production of Co-ordination and Installation Drawings showing details of pipework, ductwork, cable, trunking, and tray sizes and runs, plantroom/plant area/ switchroom/riser layouts, and plant sizes and locations. These drawings are to be based on the Consulting Engineers' tender documents, but are to be developed to suit architectural and structural requirements, and to co-ordinate with one another, with the building, and with other building services. This co-ordination and detailing work may necessitate the amendment of the sizes of ductwork, tray, trunking, cabling, etc., and alterations to routes, including additional changes of direction, (but widths of trays and cross-sectional areas of trunking and ductwork are not to be reduced without approval). These amendments will not be treated as variations to the Contract.

- Design of brackets, supports, anchors, guides etc. All to be allowed for in the tender sum.

- Selection of dosing and water treatment fluids, and design and incorporation of flushing hardware (valves, drain cocks, etc), to meet BSRIA and HSE recommendations for all systems.

- Amendment of the design where necessary to suit the requirements of the Local Authority's Building Control Officer, the Fire Officer, Utilities Companies, and relevant British Standards. Any consequent changes will be treated as a variation in respect of materials and installation cost only

- Production of Builderswork Drawings showing requirements for holes, fixings, bases, etc., beyond the scope of normal marking out on site.

- (In the case of the Mechanical Engineering Contract): Calculation of acoustic and anti-vibration measures necessary to ensure that the plant, equipment, and installed systems meet the specified acoustic performance.

- (In the case of the Mechanical Engineering Contract): Check by calculation the fan static pressures and pump heads necessary to deliver the required flowrates with the sizes and routes as proposed in the final installation drawings. Fan static pressures and pump heads are to include a 20% margin of pressure above the calculated requirement, (unless otherwise agreed with the Consulting Engineers). Any consequent changes to specified fan and pump duties will be treated as a variation in respect of materials and installation cost only.

- (In the case of the Mechanical Engineering Contract): Ensure via the Contractor's Gas Safe registration, that the general arrangement of the gas installation, combustion equipment and flue gas disposal systems are compliant with Gas Safe requirements, Institution of Gas Engineering publication IGE/UP/10 Edition 3 and BS 6644 : 2005. Confirmation of Gas Safe compliance is to be obtained no less than four weeks prior to the commencement of any installation requiring such compliance.

Additionally refer to section G5, the Design Brief, for further requirements.

G1.6 CONTRACT PROGRAMME

The Contractor will be required to agree and adhere to a programme for the works with the Main Contractor, to achieve the overall dates stated in the Main Contract tender documents.

The Contractor is to issue for comment a detailed programme specific to the Mechanical and Electrical Installation. It is to include as a minimum the following information:

- Contract start
- Contract completion
- Issue date(s) for Contractor's drawings.
- Issue date(s) for Contractor's technical submissions.
- Issue date(s) for O&M manuals and record drawings
- Procurement date(s) for significant plant items
- First fix (per area and/or service as appropriate)
- Second fix (per area and/or service as appropriate)
- Incoming services
- Testing and commissioning
- Consultant demonstration
- End User training
- Seasonal commissioning activities
- End of defects liability period

The programme is to allow sufficient time for receipt of Consultant comments on all documentation, and additionally time for resubmission of documents if necessary to address comments. Procurement timescales are to be considered for all items.

G1.7 TENDERING PARTICULARS

The Tenderer shall be deemed to have visited the Site and to have taken into consideration all local and existing conditions. They are to acquaint themselves thoroughly with details of the site, and with the

position and accessibility of the proposed works and the conditions under which they have to be carried out. Any claims due to lack of knowledge in this respect will not be admitted. Arrangements to visit the site must be made through the Main Contractor.

All the relevant architectural and structural building drawings and detail drawings are available for inspection at the Main Contractor's offices. The Contractor shall have no claim due to lack of knowledge of the details of the building construction.

Any further information required by the Contractor in connection with this Tender may be obtained from the Main Contract or to whom Tenderers for this sub-contact are submitting a tender.

The Bye-Laws and Regulations of the Statutory and Local Authorities shall be complied with, and the Tenderer, when tendering, should draw attention to any requirements indicated in the Specification and Drawings which are not in accordance with such Bye-Laws and Regulations.

The tender price is to include for the attendance of a suitably qualified representative of the Contractor at all meetings relevant to the respective Sub-Contract, including all site meetings, and all meetings held at the Offices of the Main Contractor, the Architect, the Employer, or the Consulting Engineers. This representative shall be a responsible person fully authorised to make, and/or agree to, any decisions regarding alterations, programme, expenditure of monies etc.

Neither the Employer nor the Main Contractor bind themselves to accept the lowest or any specific tender, and, furthermore, reserve the right to accept or omit any portion thereof.

Tenderers shall also refer to the Main Contract Preliminaries and General Conditions. If there is any discrepancy between these Preliminaries and the Main Contract Preliminaries, the Main Contract Preliminaries shall take precedence.

G1.8 BUILDERSWORK

Tenderers are to ensure that the overall Main Contract tender includes for all builderswork associated with this Sub-Contact, such as plant bases, forming of holes for cutting and chasing required to brickwork, woodwork, concrete, etc.

Where holes are to be formed in the structure, the Contractor is to provide the Main Contractor with drawings, marked up to show all details of holes or cutting out required, fully dimensioned. Any holes required in structural elements that are additional to the holes already provided must be identified urgently at the start of the Contract. They will only be considered if no reasonable alternative route for services is available.

The Contractor will also be required to prepare detailed drawings of plant bases, etc., or any Builderswork requirements outside the scope of normal setting out. The Contractor is to include for any secondary steelwork needed to support their installations.

The Contractor will also be required to prepare detailed drawings of service entries, to allow the Main Contractor to cast in ducts and form openings as required.

The Contractor shall plug walls or ceilings for their fittings and any other items where fixing is by means of specially made plugs or screws.

The Contractor is to make good all builderswork holes once the work has been completed.

G1.9 DRAWINGS AND INFORMATION

Tender Documents

The tender documents comprise:

- Tender Drawings, refer to tender drawing issue sheets.

- Tender Specifications:
    - GSP: General Specification (this document)
    - MSP: Mechanical Services Specification
    - ESP: Electrical Services Specification

A folder of additional information included for the information of the tendering contractors.

Contractor's Installation Drawings

Each Tenderer should note that all drawings supplied by the Consulting Engineers in connection with this Contract, are for tendering purposes only. The Contractor will be required to produce, at their own expense, installation drawings necessary for the carrying out of this Contract. All drawings are to identify that information needed by the tradesmen on site to install the works and are to be submitted to the Main Contractor, Architect, and Consulting Engineers for comment before work is commenced.

The Mechanical Engineering Contractor should note that they are responsible for the production of any composite installation drawings required for the co-ordination of services. These are to show data containment, rainwater, and drainage services as well as those services provided under the Mechanical and Electrical Engineering Sub-Contracts, and this will include services and/or equipment to be provided by a Sub-Contractor or Supplier, whether Domestic or under a P.C. item within the various Sub-Contracts. The Mechanical Engineering Contractor will be responsible for obtaining all necessary drawings from these Sub-Contractors and Suppliers to enable them to produce the above-mentioned composite drawings.

The main requirements of installation drawings are as follows:

- Plan layouts to a scale of at least 1:50, accompanied by cross-sections to a scale of at least 1:20 for all congested areas.
- A spatially co-ordinated drawing, i.e. no physical clashes between the system components when installed at the scaled-off positions shown on the drawing.
- Make allowance for inclusion of all supports and fixings necessary to install the works.
- Make allowance for the service at its widest point for spaces between pipe and duct runs. Allow for insulation, standard fitting dimensions and joint widths on the drawing.
- Make allowance for installation details provided from shop drawings.
- Make allowance for installation working space; space to facilitate commissioning and space to allow ongoing operation and maintenance in accordance with the relevant health and safety requirements.
- Make allowance for plant and equipment including those which are chosen as alternatives to the designer's specified option.
- Provide dimensions where the positioning of services is considered to be important enough not to leave to the tradesmen onsite.
- Plantroom layouts to a scale of at least 1:20, accompanied by cross-sections and elevations to a scale of at least 1:20.
- Detailed sections and installation details as required by the Consulting Engineer or Architect.
- Fire alarm drawings are to show the information required for 'As fitted' drawings as defined in BS5839-1: 40 Documentation: 40.2 Recommendations Item c)

Also, detailed drawings are required by the Main Contractor to facilitate the carrying out of builderswork, these shall be produced and supplied by the Contractor responsible for the particular service or equipment, and allowance made in the tender price for all the associated costs. Any detailed drawing so required must be submitted for comment to the Main Contractor, Structural Engineer, Architect and Consulting Engineer before issue to the Site. The Contractor concerned will be required to make an issue of up to 10 prints of each approved drawing they are required to produce, together with an electronic version in DWG and PDF, or other agreed format.

The Contractor is responsible for obtaining the building dimensions necessary for the production of any drawings, either from the latest revision of the architectural drawings, or from site measurement, as appropriate.

It should be noted that any drawings and information affecting cladding, and/or structural components, and/or works below ground, will be needed as a matter of urgency, and the Contractor must proceed with the production of these drawings immediately.

Any further drawings required in connection with the Contract are referred to in the Specification.

All other drawing issues required from the Contractor in connection with the execution of their Contract shall, similarly and after comment or approval, be produced by them to the Main Contractor for distribution, and up to 10 copies of each shall be provided, together with an electronic version in DWG and PDF or other agreed format, as required. The Contractor remains responsible for the accuracy and sufficiency of any drawings which they submit, irrespective of approval.

The Contractor is to use the PDF drawings issued by the Consulting Engineer as the starting point for installation drawings. At tender stage the Contractor is not to assume that DWG format will be provided by the Consulting Engineer. The Consulting Engineer reserves the right not to issue DWG format drawings, however any DWG format drawings issued will be strictly by private arrangement between the Consulting Engineer and the Contractor, on the following basis:

1. That the date of issue will in no way affect the contract programme.
2. The background "xref" drawings are to be obtained from the client directly. The drawings provided to E3 have been included in the "additional information" folder.
3. All design and design-development duties described in the specification will be carried out as if DWG drawings had not been issued.

BIM

There are no BIM requirements for this project.

Record Drawings

Record Drawings showing the complete installation shall be prepared by the Contractor. These drawings must detail all services provided under their contract including composite Plant Room details and valve chart, full diagrammatic layouts of all electrical circuits, and shall generally enable maintenance staff to understand and service the whole installation called for in the Sub-Contract.

Draft copies of all record drawings must be submitted to the Main Contractor, Architect and Consulting Engineer well in advance of Completion of the Contract, to allow time for any comments to be acted upon and the drawings to be resubmitted, so that correct record drawings are available at Completion. Four paper copies of each drawing are required. Additionally, drawings are to be provided in DWG and PDF or other agreed format on Compact Disk, or other agreed medium, in duplicate.

The final drawings are to be submitted at least two weeks prior to Practical Completion and will remain the property of the Employer. All costs in preparing these drawings are to be included in the Tender Sum. At the Contractor's request, negative copies and/or AutoCAD, DWG and/or PDF copies of the Architect's and/or Consulting Engineers' drawings can be supplied, subject to payment by the Contractor for the printing or computer costs involved.

The words "RECORD DRAWINGS" in 20 mm block capitals, are to be included on each drawing, near the title block. The name of the Consulting Engineers is to be shown in the title block, not less prominently than the name of the Contractor.

The Contractor shall also provide a record drawing for external services and incoming site services, irrespective of whether the services were installed by the Contractor or the Main Contractor. These shall be fully dimensioned and show the routes of all below ground services as-installed.

Consulting Engineers' Drawings and Information

Drawings supplied to the Contractor in executing this Sub-Contract shall be deemed to have been superseded by any drawings of a later date showing the same part of the Works. The Contractor will be held to have full knowledge of such drawings if they have been delivered to their office or to their representative. Proposed Variations will be discussed with the Contractor's representative, and confirmed either by written instruction or by issuing revised design drawings. The Contractor will be responsible for incorporating the Variations into all drawings they have prepared.

If the Contractor needs any further instructions, details or drawings to enable them to complete their own drawings, or to enable work to proceed, they shall apply in writing (via the Main Contractor), to the Architect for such information, at a time which is neither unreasonably distant from nor unreasonably close to the date when such information is needed.

The Consulting Engineers' drawings do not purport to detail all services that may be required. Tenderers are to include for everything necessary to complete the installation to achieve the specified performances, and in all respects to be in accordance with the standards of materials and workmanship required by this Specification.

Any divergences from the design concept or from the requirements of this Specification proposed in order to facilitate erection or to achieve the required performances are to be discussed with the Consulting Engineers' representative in good time before the relevant section of work is carried out, and are subject to the Consulting Engineers' acceptance of the proposals.

Survey of Existing Systems

Where existing systems are to be retained, extended or modified, the contractor is to carry out a condition survey measuring all flow rates and temperatures. This will take place prior to installation work being commenced. All measurements and defective items will be highlighted in a survey report.

G1.10 SUBMISSION OF DOCUMENTS

Design calculations, installation drawings, specifications, and Technical Submissions (TS) of manufacturer's data are to be submitted to the Main Contractor and copied to the Architect and to the Consulting Engineers, for comment, for all items installed under this Contract.

Each technical submission is to include a cover sheet identifying the service, scope, plant reference number revision and is to include commentary on any options proposed (eg ratings, sizes, colours, controls options etc). Where applicable an accompanying schedule is to be included (including but not limited to grilles, louvres, radiators, fans and luminaires).

All drawings are to be issued with a drawing issue sheet.

Calculations must specifically demonstrate that any performance requirements of this Specification have been met. The Contractor's programme is to allow a minimum of 15 working days, from receipt of any documents by the Architect and Consulting Engineer for inspection and comment.

The Consulting Engineer's comments may include a "Status", as defined below:

- "A" Status. No comments. Proceed.

- "B" Status. Incorporate Consultant's comments. Make changes where necessary, and ensure the record documents incorporate the comments where applicable. Provide any further information requested prior to installation on site. Proceed.

- "C" Status. Resubmit information. Do not proceed on site until the comments are addressed. Under these circumstances no claims for delays will be accepted due to a document being returned at "C" Status.

It is emphasised that:

- The Consulting Engineer will provide comments, not "approval". Any comments, or absence of comment, do not relieve the Contractor of responsibility for ensuring that the works comply with this Specification, and for ensuring that the installations co-ordinate with the building and other services.

- All documents must be checked by the Contractor prior to submission. Attention is drawn to the Clause headed "Responsibility for Submissions".

- The documents must be submitted in a steady flow so that the process of reviewing and commenting continues throughout the Contractor's design period. A schedule of Technical Submissions including target dates is to be prepared at the contract start and is to be issued to the Consulting Engineers for comment.

- Unless comments alter the requirements of this Specification, they are to be accommodated by the Contractor at no extra cost, and within the contract programme. If the Contractor regards any comments as alterations to the requirements of this Specification, they are to immediately to state their case in writing, giving reasons. Retrospectively claimed variations will not be considered.

G1.11 RESPONSIBILITY FOR SUBMISSIONS

The Contractor is responsible for drawings or other documents, prepared or issued by themselves or their specialists or sub-contractors, being fully in accordance with the requirements of this Specification and the Drawings, (including any subsequent Variations), and being in every way satisfactory, before they are submitted for comments or approval. They are expected to check that this is so as part of their quality control procedures.

The Consulting Engineers reserve the right to charge the Contractor on a time basis at their normal hourly rates of charging, for time spent in reviewing submitted drawings and documents which are not satisfactory.

Comments on drawings or documents by the Architect, the Consulting Engineers and/or their representatives are in principle only, and do not relieve the Contractor of responsibility for the accuracy and sufficiency of the drawings or documents.

Any documents or drawings submitted other than for comment or approval, e.g. "for information", are presumed to be for record only, and to be in accordance with the requirements of the contract.

G1.12 MATERIALS

Where one or more manufacturers' names and/or specialist sub-contractors' names are stated in the Specification, the Contractor must include in their tender for supplying plant and apparatus, equipment and materials, manufactured by one of the preferred makers specified (in each case) or for using one of the specialist sub-contractors (in each case). Where the Contractor considers that alternative companies offering similar performance and quality are more economic, or where they are not confident of the ability of the preferred company/ companies to achieve the specified performance, they are to schedule, at tender stage, each alternative being offered, and state when tendering the alternative included, giving manufacturer, catalogue number, and performance, (or name of sub-contractor, with details of their experience), and the decrease or increase in the tender sum if the alternative is adopted.

Any alteration proposed will be strictly subject to agreement and approval by the Architect.

If the Tenderer has reservations about the suitability of any item/specialist that is specified, or about its/their ability to perform as specified and to programme, the Tenderer is to state their reservations at the time of Tendering. Any such reservations will be discussed and resolved pre-Contract. The Contractor will thereafter be fully responsible for ensuring that all items/specialists meet the requirements of the Contract documents.

If the Contractor later proposes alternatives other than those makes and models, or other than those specialist sub-contractors, that are specifically identified in the Schedule of Alternative Materials/Sub-Contractors, the Architect and the Consulting Engineers reserve the right to charge the Contractor, at their normal time-basis rates, for time spent by them or their representatives in reviewing the alternatives, irrespective of whether the alternatives are considered acceptable following the review.

The successful Contractor must, if so directed, submit other makes of apparatus, equipment and materials for consideration and, if approved, any variation in cost between the approved article and that provided for in the tender will be adjusted by increasing or decreasing the Contract amount by a sum or sums equal to the nett increase or decrease in the cost of such other approved article or articles, which cost or costs may exceed or be less than the cost or costs of the article or articles provided for in the tender, but it is to be distinctly understood that non-approval of such other makes shall not in any way affect this Contract.

All materials and equipment supplied under the Contract are to be new and unused.

All articles or things not specified, but which are required to complete the installation are to comply with the relevant British Standard, where such exists. In the event of a specified article or item of equipment being modified or redesigned during the course of the Contract, prior to its delivery, the Contractor is to submit details of the modifications to the Architect and Consulting Engineers, and receive their approval to same before installation of the item.

G1.13 INSTRUCTIONS

The authority for work to be carried out at site which entails a deviation from the contract drawings and/or the specification issued for this contract shall be:

1. By Architect's Instruction issued through the Main Contractor.

2. In an emergency, by Site Instructions issued by the Architect's representative.

In the case of (2) the Site Instructions when agreed, will be confirmed by an official Architect's Instruction.

The Contractor shall allow in their tender for sending a fully authorised representative to attend meetings on site, during the course of the Contract, at intervals determined by the Architect to settle the valuation of Variations with the Quantity Surveyor.

G1.14 MONIED-OUT SCHEDULE

Notwithstanding the requirement for completion of the Contract Sum Analysis at the time of tender, the Contractor shall provide, prior to the acceptance of any tender, and at their own expense, four copies of a fully-itemised Schedule of Quantities and Rates drawn up as indicated, fully monied-out and priced to make up the amount of their Tender. Each item priced to include the cost of the item, fixing same, any supports, bolts and nuts or jointing materials required, and overheads and profit, to be used for assessing additions to, deductions from or deviations from the Contract which may be ordered by the Architect or their representative, also for assessing the value of work done for interim payments. The Contractor's overheads and profit percentage shall be clearly stated in the tender submission.

The Monied-out Schedule of Rates is to be compiled under the following headings:

Item & Size	Quantity	Unit Price	Amount £. p.

and is to be given for all groups of work and materials of which the following are typical:

- All piping (price per lineal metre for each size of each class of pipe including cost of pipe, fixing bolts, nuts, jointing materials, supports, and profit, giving lengths of each size of each class of pipe).
- All supports, brackets, etc., (other than for pipe).
- All other fittings.
- All valves.
- All jointing, bolts and nuts (other than for pipes).
- All other allowances such as breaking-in etc., (itemised).
- Insulation (price per linear metre for each size and class of pipe to specification, giving total length of each size and class of pipe and total cost of covering for each size and class of pipe, and similarly for ductwork. Also price per item for valves, tee pieces, calorifiers, etc., including profit and labour).
- All air-conditioning units, fans, filters, etc.
- All control valves and panels.
- Ductwork per metre, in different sizes, and in different pressure classifications.
- Turning vanes, grilles, and other ductwork fittings.
- Commissioning costs.
- Distribution: Cable (price/metre for all sizes and classes of mains cabling, including bracketing, etc.), Terminations (for all sizes and classes of mains cabling), Switchgear (itemised), etc.
- Power Sub-circuits: Cable/conduit/MICC (price/metre for all sizes and classes), Switch-sockets/Spur units etc., (all itemised), Isolators etc.
- Lighting Sub-circuits: Cable/conduit/MICC (price/metre for all sizes and classes), Luminaires (price including fixings for all types), Switches (itemised), Clocks, etc.
- Fire Alarms: Contacts, Detectors, Panel, Bells, Cabling (price/metre), etc.
- I.T. Containment: Conduit (price/metre), Cabling (price/metre), Outlets, Tray (price/metre).
- All items of plant.
- P.C. Sums.
- Provisional Sums.
- Overheads and Profit on P.C. Sums.

G1.15 LOSS OR DAMAGE TO WORKS, MATERIALS AND EQUIPMENT

The Contractor shall ensure that every care is taken of the various works, materials, and equipment included in the Contract. During times of frost or inclement weather, suitable protection shall be provided where necessary, to all items.

The Contractor shall, at their own expense, make good any loss or damage occurring to the various works, materials and equipment, included in the Contract, before acceptance of the completed works. This shall include not only items to be supplied by the Contractor, but also items handed over to them for installation.

G1.16 SUPPLY COMPANIES

The Contractor is to comply with the requirements of, and is to give all necessary notices to the Electricity, Water and Gas Companies, and is to pay all fees arising in connection with testing of the installation by these Supply Companies, excluding those already paid by the Employer or Main Contractor, unless otherwise stated in the Specification.

G1.17 TESTING

Tests shall be conducted as specified for the installation at times agreed with the Main Contractor and the Consulting Engineers, either or both of whom may wish to be represented.

G1.18 SITE SUPERVISION

Site supervision and management is to be adequate for the complexities and tight programming of the project. Minimum requirements are given in the Specification. The Contractor's principal site representative shall have the necessary authority vested in them to discuss with the Architect or their representative all modifications and such supplementary instructions as from time to time are found necessary at site.

G1.19 SITE OFFICES, STORAGE AND SITE WORKSHOPS

Site Offices, storage containers and site workshops shall be supplied, installed, maintained and removed at the end of the contract by the Contractor at their own expense. Any such site accommodation shall be to the approval of the Architect and kept in a clean and tidy condition. The location, and any necessary relocation, of these buildings shall be as directed by the Main Contractor.

G1.20 COMPLETION OF WORKS

On completion of all works covered by the Contract, the Contractor shall ensure that all such work including all equipment is left in a clean and tidy state. They shall also be responsible for ensuring that all packing materials, empty cartons, unusable equipment, and all waste materials are removed from the site.

G1.21 REFERENCE TO OTHER DOCUMENTS

In the Specifications attached to this document, reference is made to British Standard Specifications, etc., the provisions of which must be adhered to by the Contractor. The Contractor should note that it will be their responsibility to check that any such Specification referred to, is in fact the latest edition and any reference to particular clause numbers or tables shall apply to clauses and tables of corresponding content in the latest editions.

G1.22 SAMPLES

Before materials are ordered, the Contractor is to submit for the approval of the Architect, the type and make of all items of plant, apparatus, and fittings and, if called upon to do so, to submit samples of all materials and fittings for approval, either on the works or as directed and these samples are to remain with the Main Contractor or at such other place as may be appointed by the Architect. In the case of articles of special construction, working drawings may be submitted for such samples and such drawings, when approved, will be retained by the Main Contractor for reference.

The Contractor shall submit to the Architect for approval samples of all fixtures and fittings which are on view. Samples shall include, but not be limited to, the following:

- Light fittings, of each type
- Grilles and Diffusers
- Switches and socket outlets

- Data and communications outlets
- Television and AV outlets
- Smoke/Heat Detectors

No material is to be used until it has been approved by the Architect.

The Contractor is to clearly mark samples, etc., with their own name and the Contract to which they refer.

G1.23 MATERIALS AND WORKMANSHIP TO CONFORM TO DESCRIPTION

All materials and workmanship shall conform to the relevant B.S. or Code of Practice, where such exists, and in other cases shall be of the best of their respective kinds. All materials and workmanship are subject to the approval of the Architect and client and samples shall be submitted free of charge if required.

The Contractor shall arrange for and/or carry out any tests of any materials which the Architect may, in writing, require and the cost thereof shall be added to the Contract Sum, unless otherwise specified or directed, or provided for by way of a Provisional Sum, or unless the test shows that the said materials and/or workmanship are not in accordance with the Specification.

Materials and equipment must be delivered to site in manufacturer's packaging.

The Contractor shall employ skilled and experienced workers and the Employer shall be at liberty to require the Contractor to remove from site any person who is in their opinion incompetent, negligent or misconducts themselves.

All materials, components and equipment supplied shall be new and unused. The manufacturer of items of equipment in the same general classification shall be consistent, notwithstanding that more than one manufacturer may be approved in this Specification.

All methods of installation and quality of workmanship shall be to the Architect's or their advisors satisfaction. The Architect's decision in all matters relating to interpretations and compliance with this Specification and/or to the quality of the materials, equipment, and workmanship, is final and binding upon all parties to this Contract.

The Architect has the right to order the removal and subsequent replacement and/or reinstatement of any faulty or inferior materials or components supplied, or work carried out by the Contractor which is not in accordance with this Specification or drawings without additional charge to the Employer. The Contractor shall be solely responsible for all costs incurred through failure to comply with this requirement.

When sending out enquiries for equipment, specialities, etc., the Tenderer, and subsequently the Contractor, is to be responsible for supplying the firms to whom they send the enquiries with all necessary particulars complete, as set out in the Specification, to enable them to quote correctly as, under no circumstances, will the Architect supply such particulars to any of the makers of apparatus, equipment, fittings, etc.

Enquiries should draw attention to the fact that, as a result of design development, the requirements and details stated in the tender documents are likely to differ from those in any pre-tender quotations to, discussions with, or information from, the Architect or the Consulting Engineers.

G1.24 TEMPORARY SITE WATER SUPPLY

Any water necessary for the works will be supplied by the client, but the Contractor is to provide all hoses, tanks and other connections necessary for such water supply. A connection point is to be agreed with the client prior to use.

G1.25 TEMPORARY SITE ELECTRICAL SUPPLY

The electric supply for the works will be supplied by the client. A connection point is to be agreed with the client prior to use.

The Contractor must arrange with the Main Contractor for any supply of electric current for arc welding or alternatively include for the use of their own portable diesel-driven welding sets and the cost of same must be included in this Sub-Contract.

G1.26 LABOUR

The use of self-employed and/or temporary labour for skilled work on this project will not be acceptable. Tenderers will be expected to be able to provide skilled labour for the project from their own permanently employed staff. The successful Contractor will be asked by the Main Contractor, on a regular basis, to produce evidence that they are complying with this requirement. The Contractor will be required to dismiss immediately any temporary labour discovered on site, and work carried out by such labour will be removed and reinstalled by the Contractor's permanent skilled labour. The Contractor will be wholly responsible for any costs, delays, and acceleration measures that result.

Contractors whose policy is to use temporary labour for skilled work should not tender for the Engineering Services Contracts on this project.

G1.27 MAIN CONTRACT PRELIMINARIES

The Preliminaries and General Conditions for the Main Contract, and including Appendix Completion Notes for the Main Contract, are available for inspection at the offices of the Main Contractor during the tender period.

Anything in the Main Contract Preliminaries and General Conditions which the Tenderer considers to have a financial effect on this Contract is to be taken into account in compiling the Tender Sum. Any claims due to lack of knowledge in this respect will not be entertained.

Attention is drawn to the Main Contract amendments and requirements for providing Warranties as contained in the Main Contract Preliminaries and General Conditions.

G1.28 CONSTRUCTION (DESIGN AND MANAGEMENT) REGULATIONS

The Contractor is to undertake all aspects of the contract works in compliance with the CDM Regulations and is required to consult the Health & Safety Plan prepared by the Principal Designer and updated by the Main Contractor throughout the works.

The Contractor is to provide all necessary and relevant information to assist in the completion of the Health & Safety File by the Principal Contractor, to the satisfaction of the Principal Designer.

NOTE – the client is undertaking asbestos searches currently. The findings of this will be shared with the contractor, when available.

G1.29 PLANNED AND BREAKDOWN MAINTENANCE

The Contractor is to include in the tender, as a separate itemised sum, the cost of providing planned and breakdown maintenance for the mechanical and electrical services installed under the Contract for a period of 12 months after Practical Completion.

Planned maintenance and inspection work shall be carried out by the Contractor at intervals in line with the Building Engineering Services Association (BESA) SFG20 Maintenance Standard.

All maintenance, testing and inspection work is to be carried out in accordance with the above standard and all plant and systems are to be maintained in good working order and operating condition.

The Employer may accept or decline this quotation for maintenance, at any time prior to Completion.

The Contractor retains the normal 12 months defects liability irrespective of the placing of the Maintenance Contract.

G1.30 BUILDING REGULATIONS REQUIREMENTS

The Contractor shall be responsible for providing all information as required by the relevant Building Regulations. All such information shall be provided to the Main Contractor, who shall co-ordinate the application to the approved authority.

Approved Document L

Particular attention is drawn to the requirements of Approved Document L. The Contractor is liaise with the Building Control Approved Inspector, and with the Consulting Engineer, to provide information and carry out testing and commissioning that is required to demonstrate compliance. The information to be provided shall include (but not be limited to):

- Plant (including pumps and fan) power consumption and efficiency information.
- Details and efficacy of lighting and luminaires.
- Commissioning plan.
- Commissioning notice.
- Ductwork airtightness certificates.
- Systems for energy consumption metering.
- Building log book or home user guide

All systems provided shall be compliant with the detailed requirements of Approved Document L 2021, such as system efficiencies, insulation thicknesses etc.

The Mechanical Engineering Contractor is to appoint the Commissioning Manager and produce the Commissioning Plan and serve the Commissioning Notice, as required under Approved Document L 2021. The Electrical Engineering Contractor is to cooperate with this process.

Approved Document L calculations

A BRUKL is not required for this project, subject to confirmation with Building Control.

G1.31 ENERGY PERFORMANCE CERTIFICATES

An energy performance certificate is not required for this project.

G2 GENERAL REQUIREMENTS

G2.1 CONTRACT PARTICULARS

This Specification covers the complete Engineering Services Installation and associated services, including the supply (except where otherwise stated) of all equipment, materials, accessories, plant, etc., for the construction of the Building. At the Main Contractor's option, the Mechanical Services and the Electrical Services may be carried out by separate Contractors, or by a multi-service Contractor.

This Contract shall be deemed to include for all work described herein and/or indicated on the drawings and also any variation work which may be ordered during the progress of the Contract.

The Contract Sum Analysis (included in the Appendix to the Form of Tender) indicates the component parts of the Tender Sum, which are required to be shown separately.

The Tenderer is to examine the Main Contract documents and allow in the Tender for any items therein and any items in the Engineering Services Preliminary Clauses which they may consider to be of monetary value.

G2.2 STANDARDS AND REGULATIONS

The design (where applicable), installation, testing, and commissioning of the contract works are to comply with the following:

- The Guide to Current Practice, The Commissioning Codes, and all other relevant technical publications of the Chartered Institution of Building Services Engineers.
- Technical Publications of the Building Services Research and Information Association.
- The Building Engineering Services Association (BESA, formerly B&ES), especially: DW144 Specification for Sheet Metal Ductwork, and DW172 for Kitchen Ventilation Systems, and including DW143 Ductwork Leakage, DW154 Plastics Ductwork, DW191 GRP Ductwork and TR19 Internal Cleanliness.
- The publications of the Institution of Gas Engineers and Managers (IGEM)
- British Standards.
- British Standard Codes of Practice.
- The Building Regulations, and any other requirements and recommendations of the local Authority and the Fire Brigade.
- The requirements and recommendations of the Water Supply Company.
- The requirements and recommendations of the Gas Supply Company.
- The requirements and recommendations of the Electricity Supply Company.
- The requirements and recommendations of the Health and Safety Executive.
- The Factories Acts, The Offices Shops and Railway Premises Acts, Workplace Regulations, statutory energy conservation requirements, and any other relevant statutes.
- The Electricity at Work Regulations 1989.
- The Construction (Design and Management) Regulations.
- The LPCB List of Approved Fire & Security Products and Services – "The Red Book"

- CIBSE TM 13 and the HSE Approved Code of Practice for the control of Legionella.
- The Water Supply (Water Fittings) Regulations

In all cases, the current revision is to be used.

G2.3 STATUTORY AUTHORITIES AND PUBLIC UTILITIES

The Contractor will be responsible for liaising with all relevant Utility Companies to ensure that their approval to the proposed works is obtained as soon as possible. The Contractor is also to assist the Architect and Main Contractor in obtaining Local Authority, Building Control, and Fire Brigade approval to all building and engineering items associated with the Engineering Services.

The Contractor will be responsible for agreeing, where relevant, the details of the incoming service and metering with the Utility Companies. Where relevant, the Contractor is also to arrange for the Utility Companies' works to be carried out, and to co-ordinate their own works with the Utility Companies' works.

The nett charges made by the Utility companies for installing the incoming services as far as the metering location are to be allowed for in the tender as Provisional Sums unless further information is made available by the companies. The Tenderer should clearly state these as required. The Mechanical/Electrical Contractor is to include in their tender for all management, liaison, provision of installation details, co-ordination, assistance with meter installation, etc., as necessary to achieve operational incoming services, together with any profit they require on these activities.

G2.4 DESIGN STAFF

The Mechanical and Electrical Engineering Contractor(s) are to appoint a senior engineer in supervisory charge of all Mechanical Engineering design development work, and a senior engineer in supervisory charge of all Electrical design development work. These two engineers are to keep themselves fully conversant with all design matters, and are to take responsibility for the development of the designs. They are to be available for discussions with the Architect, the Consulting Engineers, and the Main Contractor whenever called upon, and are not to be transferred to other work without the prior consent of the Architect.

These senior engineers shall have personal experience of designing projects of similar scale and complexity, and shall have Chartered Engineer status or approved similar qualifications. They are to be supported by such staff as are appropriate.

G2.5 SITE SUPERVISION AND CO-ORDINATION OF WORKS

Each Contractor is to appoint an Engineer as Contract Manager in supervisory charge of all work carried out under their Engineering Services Contract. This Contract Manager is to be experienced in work of a similar nature. They are to be in a position of continuous responsibility from the commencement of works under this Contract, until the end of the Defects Liability Period. They shall not be transferred to other work without the prior consent of the Architect. The Contractor is to vest in the Contract Manager the necessary authority to discuss with, accept from, and execute for, the Architect, the Consulting Engineers, or the Main Contractor, as appropriate, all modifications and such supplementary instructions as are found necessary from time to time.

The Contract Managers for the Mechanical and Electrical Services Contracts are to be site-based.

Each Contract Manager is to be supported on site by such staff as are appropriate and necessary for the proper execution of the works, including one or more draughtsman, who is/are to assist in producing installation drawings, builderswork drawings, etc., and who is/are to produce and keep up-to-date a full set of drawings of the Engineering Services Contract Works.

G2.6 ORDERING OF MATERIALS ETC.

The Contractor shall place orders for all materials, equipment, etc., to ensure their arrival on site at the earliest possible date, consistent with any limitations of storage accommodation and deterioration consequent upon long storage periods with certain types of materials, equipment, etc.

Orders for materials shall allow ample time for any delivery difficulties and/or defective or incorrect materials, quantities, etc., so that the uninterrupted continuity of all works on site is assured.

G2.7 SITE MEETINGS

Site Meetings will be arranged by the Main Contractor and/or the Architect and each Engineering Services Contractor's Contract Manager is to arrange to be present at these meetings, whenever called upon, to discuss the Contract with all interested parties.

G2.8 PLANT ATTENDANCE

On completion of the Contract works or sections of the Contract works, the Mechanical Engineering Contractor assisted by technical representatives of their Sub-Contractors, as necessary, is to test and commission the Contract works, set and regulate the various sections to maintain the design pressures, temperatures etc., and then demonstrate to the satisfaction of the Consulting Engineers the ability of the Contract works to fulfil the function for which they have been designed.

When the systems have been successfully demonstrated, and the Mechanical Engineering Contractor have satisfied themselves that the installation is in full working order, and expressed to the Architect and Main Contractor in writing their approval to the installation being put into normal service, the Mechanical Engineering Contractor will assume responsibility for running the whole of the Contract Works for a period of 20 working days from the date of Practical Completion, and will provide skilled supervision and attendance during the hours of 9 a.m. to 6 p.m. During this period the Contractor is to be responsible for lubricating and maintaining all moving parts, and for instructing the Employer's operating staff in the proper operation of the various systems.

The Electrical Engineering Contractor is similarly to instruct the Employer’s operating staff in the proper operation of the various electrical systems, with particular reference to specialist systems such as the Fire Alarm System, Security Systems, etc., Pool and Water Treatment Systems.

The Contractor is during this running period to indemnify themselves against any damage or injury to the Contract Works and against any damage or injury to any person or to any property, and against all actions, suits, claims, demands, costs, charges and expenses arising in connection therewith which in the opinion of the EA are occasioned by the negligence of the Contractor, by the use by the Contractor of defective materials or workmanship, or by defective design, other than design made, furnished or specified by the Consulting Engineers and for which the Contractor has disclaimed responsibility in writing within a reasonable time after receipt of the EA's instructions.

It is to be understood that the Employer is at liberty to use any part of the installation which the Consulting Engineers may deem to be suitable for use without in any way relieving the Contractor of their obligations under the terms of the Contract and the Contractor may be required to operate the plant, or sections of the plant, as may be possible or required during the currency of the Contract.

The cost of fuel, electricity, and water for the Contractor's requirements are to be excluded from the sub-contract tender sum. Payment will be by the Main Contractor or Employer, as determined by the Main Contract documents.

G2.9 RECORD DOCUMENTS

The Contractor is to provide, in duplicate, copies of all applicable operating and maintenance instructions, manuals and drawings, for each item of plant or equipment installed under this Contract.

Timescales

A draft version of the complete manual is to be submitted to the Consulting Engineers for comment not later than 6 weeks prior to Practical Completion. Comments returned by the Consulting Engineers are to be incorporated into the version issued to the Employer at handover.

The two completed sets of Operating and Maintenance Instructions in binders are to be handed to the Employer, together with the accompanying Record Drawings, at the time of handing over the completed works to the Employer, incorporating all comments raised by the Consulting Engineer. The pdf versions (described below) are to be provided by means of a downloadable weblink.

In the event of satisfactory documents not being supplied at the appropriate time, any outstanding payment will be withheld, and the Employer reserves the right to employ others, at the Contractor's expense, to prepare and provide the documents.

It should be noted that the provision of a complete and correct set of documents will be a condition precedent for the granting of Practical Completion, as this is a requirement for Health & Safety purposes.

Format

In addition an electronic copy of the manuals is to be provided in pdf format and issued via a downloadable weblink to the Employer, the Main Contractor, and the Consulting Engineers. The pdf file is to be bookmarked. The electronic copy is to be an exact match of the hard copy, and is to include commissioning records and record drawings. If the manual is provided in a folder structure, all file names are to reflect the contents of the file. These are to be issued at the time of handover.

Attention is drawn to BSRIA document BG 79 "Handover information and O&M manuals" which provides guidance for the content, structure and layout of O&M manuals. The guidance suggested therein is strictly to be followed.

The structure shall be in accordance with BG 79, as follows:

1. Contractual and Legal Records
2. Overall Purpose
3. Systems Description
4. Asset Register/Equipment Schedule
5. Parts Identification, spares and spares policy
6. Commissioning Information
7. Operation
8. Maintenance Instructions
9. Maintenance Schedules
10. Modification Information
11. Fault Finding
12. Lubrication
13. Disposal Instructions
14. Names and Addresses of Manufacturers
15. Index of Plans and Drawings
16. Emergency Information
17. Manufacturers Literature

Particular attention is to be paid to the following aspects:

- A maintenance Schedule listing all items which require maintenance, including recommended intervals between inspections, and a schedule of the correct grades of oil and grease to be used on each item of plant installed under the Contract requiring oil or grease.

- A copy of all test and commissioning records submitted to the EA in accordance with tests and commissioning procedures specified elsewhere in the Specification, in addition to the test records therein specified.

- A list of all "As Fitted" drawings prepared by the Contractor and accompanying the manuals.

- A copy of each wiring diagram, valve chart, detail drawing and Manufacturer's drawing prepared by or for the Contractor during the currency of the Contract unless superseded or included in the "As Fitted" Drawings.

- A copy of the identification code adopted for all sections of the installed works.

- An adequate description of the whole of the system with particular reference to the arrangement, regulation and operation of the Automatic Controls. A draft of the proposed description is to be submitted to the EA for approval prior to duplication.

- Unique plant and equipment references, which are to be cross referenced on record drawings, schedules and noted on all manufacturers literature.

It should be emphasised that concise, project specific information is required. Extensive generic text is not useful to the end user and will only serve to dilute the relevant information.

G2.10 BUILDING LOG BOOK

Not required

G2.11 TESTING, COMMISSIONING, AND DEMONSTRATION

Commissioning of Mechanical Services is to be in accordance with the procedures set out in the C.I.B.S.E. Commissioning Codes and the relevant B.S.R.I.A. Application Guides. Tenderers are to indicate their price for commissioning and demonstrating the systems, in the Tender Documents, where shown. Commissioning is to be carried out in accordance with best practice and the current Building Regulations.

Electrical Services are to be commissioned and tested as required by the British Standards, etc., as appropriate.

All services are to be demonstrated to show that they meet the required performance, insofar as this can be done before the building is put to use.

Temporary connections are to be provided, under the Contract, as necessary to enable water flowrates and airflows to be set to the full ultimate values indicated by the Specification, (simulating the resistances of any future additions), and thereby to demonstrate the adequacy of every fan and pump.

The programming and procedures are to be as follows:

General

The Contractor shall be responsible for ensuring that correct testing and commissioning procedures are completed on all mechanical services, electrical services and plant, equipment and installations, supplied under the Contract. The Main Contractor's Clerk of Works shall witness and sign the written results which are to be provided for all testing and commissioning.

The Contractor shall employ a specialist commissioning agent (or agents) to carry out commissioning of complex systems, including:

- Mechanical ventilation systems
- Automatic natural ventilation control systems
- Air conditioning systems
- Building management systems
- Renewable energy systems

The Consulting Engineers shall be afforded the opportunity to observe all such procedures irrespective of whether they are to be conducted on site or at manufacturer's works. Accordingly, the Contractor shall give the Consulting Engineers at least 4 days notice in writing of the dates of all tests and 14 days notice of the commencement of commissioning procedures.

Any testing and commissioning that takes place without the stipulated notice being given shall, if required by the Consulting Engineers, be repeated for the benefit of the Consulting Engineers.

Equipment or systems failing to meet testing or commissioning requirements shall, to the extent that is necessary, be re-tested or re-commissioned. The Contractor's obligations relative to notice to be given shall remain as previously stated subject, in this instance, to a possible reduction in the notice period which shall be at the discretion of the Consulting Engineers.

The presence of the Consulting Engineers during any of the testing and commissioning procedures and any comments, observations or opinions that they may express, written or verbal, shall in no way relieve or limit the Contractor of responsibility and obligations under the Contract.

Phased Completion

For a Contract with phased completions, partial possessions, sectional handovers or other equivalent phasing arrangements, the Contractor shall be responsible for ensuring that at the end of each phase, all mechanical and electrical services installations relevant to the phase are to be completed tested and commissioned. All test and commissioning records are to be presented to the Consulting Engineers for review, prior to handover of each phase.

The Contractor is also to allow for the commissioning of the whole M&E installation at the end of the last phase to ensure that the whole system is correctly operational, prior to practical completion.

Standards

The Contractor shall ensure that all testing and commissioning procedures are carried out to the latest requirements of the appropriate Acts, Standards, Regulations, Codes of Practice and Bye-Laws, etc., appropriate to the scope of works involved under the Contract as current at the time of testing, e.g.

- The Health and Safety at Work Act
- British Standards
- C.I.B.S.E. Commissioning Codes
- B.S.R.I.A. Publications
- National and Local Regulations and Bye-Laws for all Statutory Authorities and Utility Supply Companies.
- The Recommendations of Manufacturers for all materials, plant and equipment.

The Contractor shall ensure that all other standards where appropriate for testing and commissioning a specific item of equipment or system are fully complied with and in accordance with the manufacturer's recommendations.

Testing at Manufacturer's Works or other Off-Site Premises

Equipment to be tested off-site includes but shall not necessarily be limited to the following:

- Building Management System and Control Panels
- Plant and Equipment requiring acoustic measurements
- Air Supply Diffusers (samples)
- Main Switchboards
- Lift Machinery and Control Equipment

The Contractor shall provide details of the proposed testing procedures to the Consulting Engineers for their approval at least 14 days prior to the date of the test. This should include tabulated design performance data, the proposed method of testing and testing standard, and details of the test equipment to be used.

Upon satisfactory completion of the tests, the Contractor shall give the Consulting Engineers copies of manufacturer's Test Certificates, which should tabulate the design performance data and measured test results. Further copies of the manufacturer's Test Certificates must be bound into the Operating and Maintenance Manuals and "as built" documents.

Testing on Site

The Contractor shall be responsible for ensuring that all systems installed on the site are subjected to and pass appropriate tests. Systems may be tested in their completed or partially completed form, the latter particularly relating to sections of the works which are intended to be buried, cast in or otherwise concealed. Partially tested systems shall be subjected to re-testing once a system is completed in its overall form. Systems to be tested include but shall not be limited to the following:

- Ventilation Systems and Ductwork
- Drainage Systems (including Condensate)
- Distribution Pipework and Systems (e.g. gas, domestic hot and cold water, chilled water and LPHW heating)
- Refrigeration Plant
- Heating and HWS plant and systems
- Control Systems and B.M.S.
- Electrical Installations
- Lightning Protection System
- Fire Alarm/Detection Systems
- Emergency Lighting
- Security and Access Control Systems
- Data and Communications Systems
- AV and Television Systems

The Contractor shall provide details of the proposed testing procedures to the Consulting Engineers at least 28 days prior to the date of the test. This shall include tabulated design performance data, the proposed method of testing and testing standard, and details of the test equipment to be used.

Upon satisfactory completion of the tests, the Contractor shall provide copies of the Test Certificates which should tabulate the design performance data and measured test results, to the Consulting Engineers. Copies of all Statutory and Utility Supply Company applications and approvals must be included. Further copies of the Test Certificates and approvals must be bound into the "as built" documents and Operating and Maintenance Manuals.

Commissioning and Demonstration

All engineering services installations must be available for commissioning not less than 2 weeks prior to the date of Practical Completion. Commissioning and subsequent demonstration of commissioned results to the Consulting Engineers must be satisfactorily completed and all final adjustment made not less than 1 week prior to the date of Practical Completion.

The Contractor shall ensure that commissioning of the installation is only carried out when the building is sufficiently advanced to permit accurate and representative figures to be obtained, (i.e. all windows, doors, etc., must be in place, the building must be sufficiently clean and free from builder's debris for commissioning of air systems). All other trades must be substantially complete to permit systems to be run in a steady state situation. Inter-related systems must likewise be in an operational condition to ensure that the mass, volumetric and control characteristics of the systems are commissioned as an entity.

The Contractor shall provide to the Consulting Engineers marked up drawings and tables of design data and performance requirements that will be used during commissioning, not less than 4 weeks prior to the commencement of commissioning.

Upon satisfactory completion of the commissioning of each system, and before demonstration of that system, the Contractor shall furnish the Consulting Engineers with copies of all commissioning results including drawings and tables no less than 48 hours before an arranged demonstration.

If the consultant attends for a demonstration but systems are found not to be in full working order, all costs associated with a repeat visit by the consultant will be deducted from the Contractor's final account.

Further copies of the results must be bound into the "as built" documents and Operating and Maintenance Manuals.

Certification

The Contractor shall provide certification for all systems including, and not limited to, those listed below where applicable.

- Mechanical Certification
    - Air conditioning system test certificates
    - Air conditioning system performance testing results and certificates
    - Ventilation system test certificates
    - Heating system test certificates
    - Pressure vessels and systems written schemes of examination
    - Pipework systems pressure test certificates
    - Drainage systems test certificates
    - Water distribution systems, and flushing, cleaning and dosing certificates
    - Other equipment where applicable.

- Electrical certification
    - IEE electrical system test certificates
    - Fire alarm test certificates

Test Equipment

The Contractor shall ensure that equipment for testing is of proprietary make and range to suit specific testing or commissioning requirements. Valid Calibration Certificates from a recognised body shall be provided for all test equipment.

Fuel for Testing

All energy supplied for final commissioning and proving shall be derived from the permanent supply connections to the building and not from temporary builder's power supplies.

Familiarisation and Training of Employer's Personnel

Familiarisation and Training of the Employer's personnel in the operation and use of all the systems forms part of the Contract. It is very important that the Employer's staff are confident in the use of the systems at the time of handover.

Familiarisation and training are to be provided in two phases. Classroom-based teaching considering the processes and nature of the systems is the first stage and is independent of the status of the works on-site. The on-site second stage of training is to be a hands-on experience of the finished systems showing control systems, maintenance regimes and the relationship between causal inputs and effects. For this to occur, each system needs to have been commissioned.

Handover is both a status point in the contract and a transfer of the documentation of the final system. The constituent elements of the Operating and Maintenance Manual and the Health and Safety plan need to be delivered in draft, reviewed by the professional team and issued in final form prior to handover. Handover also marks the status of practical completion for that system and the stage at which the system can be adopted by the Maintenance Contractor.

Not less than 6 weeks before handover the Contractor must prepare and agree a detailed programme for this two-stage Familiarisation and Training, for each system in the building.

G2.12 SEASONAL COMMISSIONING AND SOFT LANDINGS

Seasonal Commissioning

The Contractor is to include for 3 additional visits to site post construction, and post fit out, during the first 12 months of operation after the building has been occupied. The principal purpose of the visits will be to optimise the operation of for complex systems to ensure that they continue to operate at maximum efficiency. The scope of the seasonal commissioning is to include (but not limited to):

- Air conditioning systems
- Mechanical ventilation systems
- Heating systems
- Renewable energy systems

The works are to be carried out by the same specialist agent (or agents) that carried out the initial commissioning.

The works are to include interviews with building users and maintenance staff to determine any operational issues that have been identified in use, and to rectify the issues where appropriate.

The visits are to be timed to cater for a full range of seasonal and occupational conditions. For example, heating equipment is to be commissioned in mid winter, cooling and ventilation in mid summer and all equipment under part load conditions (spring / autumn).

A programme and method statement for seasonal commissioning is to be issued for comment.

G2.13 WARRANTIES AND DEFECTS LIABILITY

The Contractor is required to provide a Warranty for the design development and installation of the works in the form required by the Employer. Also, the Contractor shall provide Warranties in favour of future funders, tenants, or purchasers of the building and other parties as required by the Employer.

The Forms of Warranty will be provided to Tenderers by the Main Contractor.

The costs of the Warranties, and Defects Liability are to be included in the Tender Sum.

G3 GENERAL TECHNICAL CLAUSES

This Section describes the procedure and/or the methods of installation of plant, materials etc., to the Standard Requirements of the Consulting Engineers, and shall apply to this Contract, where appropriate, in extension and amplification of the general intent and meaning of the basic descriptions given elsewhere in this Specification and the associated Drawings.

G3.1 LAYOUT OF WORK

It is emphasised that a good standard of appearance is required. To this end:

- Each Contractor shall exercise care and consideration when installing the Contract Works and shall plan all pipe runs, trunking, etc., to fit into surroundings as neatly and unobtrusively as possible and shall position all accessories, sensors, units, equipment, etc., with due consideration for appearance and so that they shall not clash or interfere with other units, equipment or services.

- The exact position of electrical accessories, sensors, cable/tray/trunking/conduit routes, pipe runs, equipment etc., are required to be adjusted to suit final arrangements of room layouts, architectural features etc. Each Contractor shall be responsible for checking details.

- Each Contractor is responsible for satisfying the Main Contractor and Architect that the above two requirements have been satisfactorily accomplished.

- Workmanship on services which are exposed to view shall be considered of paramount importance.

- Work which is installed without full compliance with the foregoing is to be removed and redesigned and/or reworked as appropriate. The cost of so doing, and of consequent costs for others will be the responsibility of the offending Contractor.

- Plantroom sizes are important to the building's appearance and are critical to planning permission. Tenderers must therefore ensure that they can achieve the specified requirements in the spaces shown on the drawings, while satisfying the necessary clearance for maintainability, safety, and future replacement of plant. Any concerns in this respect must be specifically itemised by the Tenderer at the time of tendering.

G3.2 STANDARD OF WORKMANSHIP

The workmanship shall be in accordance with the best accepted practice and the installation work shall be carried out in accordance with the current codes of practice where these are relevant.

G3.3 UTILITY SUPPLY COMPANIES' REGULATIONS

The Contractor is to ensure that the installation complies in all respects with the rules and regulations of the various Utility Supply Companies and with the provisions of all Acts of Parliament, in particular the Factories Act, and any other applicable laws or rules. If any such Act, Regulation or Bye-Law is made or amended after the date of the Contractor's Tender, the cost to the Contractor of conforming with the Act, Order, Regulation or Bye-Law shall be added to/subtracted from the Contract Price as the case may be.

Before placing orders, the Contractor is to ensure that all items, devices, and equipment comply with any regulations laid down by the Supply Companies, and the Contractor shall include for all necessary testing and fees. Such equipment as the appropriate Company requires for testing shall be provided in good time and the cost of any delays resulting in the execution of the Contract as a whole due to the failure of the Contractor to observe this requirement will be debited to the Contractor.

G3.4 CONNECTION OF EQUIPMENT

The Contractor may be required to install, test, connect up and commission equipment shown on the Drawings, as existing or supplied by others in addition to equipment supplied by them.

In such cases as are mentioned herein or noted in the Drawings, the Contractor is to submit a report to the Architect detailing:

- Results of Tests
- Condition of Equipment
- Missing or defective parts together with a quotation for making good as necessary.

G3.5 HOT WORKS PERMITS

The contractor must obtain a permit from the client for any hot works.

G3.6 FOUNDATION BOLTS

Foundation bolts of approved diameter of straight shank type threaded at each end with a nut and square steel holding down plate of approved size at the lower end, and an approved type of self-securing locknut at the upper end, are to be provided by the Contractor for each item of equipment which incorporates moving parts and wherever also specifically mentioned and/or recommended by the manufacturer of the equipment.

The Contractor is responsible for aligning and levelling all items of equipment to be supplied under the Contract, using steel shims as necessary, for placing any holding down bolts in the correct positions and for superintending the grouting in of the bolts and the shims.

G3.7 ROBUST MATERIALS

All equipment, accessories, etc., must be robust, resistant to corrosion, and (where externally situated) weatherproof. If the Contractor has any concerns regarding the systems described in the specification or on the drawings, and their suitability for the location, then the Contractor shall highlight this in the Tender and suggest alternatives as appropriate. These alternatives are to be clearly costed as separate or additional items.

G3.8 BANNED MATERIALS

The Contractor is to ensure that, in respect of substances or materials used in the Contract works:

It will act in accordance with the guidance contained in the publication "Good Practice in the Selection of Construction Materials" (published by the British Council for Offices, 2011).

No other substances or materials generally known to be deleterious at the time of specification or approval, or which are prohibited by the Building Contract, or which do not comply with any applicable British Standard or European Standard or any applicable Code of Practice are used.

Provided that where in the opinion of the Contractor this results in any conflict with any relevant statutory requirements, or where the construction of any part of the Project in accordance with this Deed would be prejudiced through lack of suitable materials, then the Contractor shall immediately notify the Architect in writing specifying the conflict or prejudice which has arisen and the substance which the Contractor wishes to specify or use and the Contractor shall not specify or use the same without in each case the prior written consent of the Architect.

The Consulting Engineers are not aware of any items specified contravening these requirements, but this has not been checked. Tenderers are to verify with manufacturers whether any changes are necessary to comply with this Clause, and are to allow in their tender for suitable alternatives. When tendering they are to state whether any item has been substituted, by what, and the reason for so doing.

Notwithstanding any of the above, the Contractor is to ensure that none of the substances listed below are included in any materials, plant, or equipment that are provided under this Contract.

The banned materials are:

- High alumina cement in structural elements.
- Woodwool slab in permanent formwork to concrete or in structural elements.
- Calcium chloride in admixtures for use in reinforced concrete.
- Aggregates for use in reinforced concrete which do not comply with British Standard Specification 882 (1983) and aggregates for use in concrete which do not comply with the relevant provisions of British Standard 8110 (1985).
- Calcium silicate bricks or tiles
- Asbestos or asbestos-based products
- Lead or any products containing lead for use in connection with drinking water.
- Urea formaldehyde foam or materials which may release formaldehyde in quantities which may be hazardous with reference to the limits sets from time to time by the Health and Safety Executive.
- Slip bricks
- Vermiculite plaster
- Lightweight or air-entrained concrete blocks or structural elements
- CFC or HCFC blown insulation products
- All tropical hardwoods unless they can be readily shown that they have come from sustainable farmed sources (all plywood should be temperate, e.g: solid birch)
- Crocidolite, woodcrete, chipcrete, tricovite concrete, or the Gilbert Ash Integrid System
- Any materials likely to produce deleterious alkali silica reactions in concrete
- Materials which are generally composed of mineral fibres either man-made or naturally occurring which have a diameter of 3 microns or less and a length of 200 microns or less or which contain any fibres not sealed or otherwise stabilised to ensure that fibre migration is prevented.
- Other substances which have been publicised in the Building Research Establishment Digest at the time of specification to be deleterious to health and safety or to the durability of the development or the works in the particular circumstances in which they are used.
- Any other substances not in accordance with British Standards and codes of practice and good building practice current at the date of specification or otherwise generally known at such time to be deleterious or otherwise not in accordance with good building practice or techniques.
- Any other substances identified in the Warranty documents as being banned.

G3.9 MAINTENANCE AND ACCESS

All plant and equipment is to be arranged to give the maintenance clearances recommended by the respective manufacturers, and to provide a route by which any equipment can be completely exchanged for a replacement, from outside the building, without the need to disassemble major components further than is normally acceptable. Sizes of doorways, etc., necessary for this purpose are to be checked, and any problems discussed with the Main Contractor, Employer, Architect, and Consulting Engineer as soon as possible.

Headroom below high level services (including brackets, etc.) in plantrooms and across access routes must not generally be less than 2.1 metres above finished floor level; any exceptions must be agreed in advance with the Consulting Engineers.

All valves, switches, and other similar items requiring access are to be located as conveniently as possible, but so as to discourage tampering in the case of items that should only be accessed by maintenance staff. All sections of pipework must be installed in such a way as to enable them to be replaced without seriously disturbing other work.

Where services are to be installed above a ceiling, whether accessible or not, the Contractor is to clearly identify access requirements on the installation drawings, including panel size and type. No installations are to commence until the access requirements have been agreed with the Consultants, and in particular the Architect. When the works are complete, each access panel is to have a black and white traffolyte engraved plate identifying the item of equipment above. This shall be applied for fully accessible ceilings, and is to include for all equipment, including void detection systems, commissioning valves, isolating valves etc. All to be identified on the as installed drawings.

The Contractor is to include instructions for plant replacement in the O&M manuals for the project.

G3.10 SUPPORT STEELWORK

The Contractor is to include for providing all support and trimming steelwork, including any steelwork necessary to transfer or spread the weight of plant, equipment, fan-coil units, pipes, ducts, cable tray/trunking, etc., to suit the structure and complete the installations. This is to include all steel and Unistrut (or similar) spanning between steel joists or beams, or necessary to achieve sound fixings in concrete slabs.

The Contractor is to provide the Structural Consultants with any information that they may need in connection with loads on supports, anchors, etc., and is to provide any additional steelwork, Unistruts, etc., that the Structural Consultants consider necessary for a safe and satisfactory installation.

Where existing steelwork is required to be amended to allow the installation of the plant as specified, then the Contractor is to make due allowance for this in their tender. The Contractor shall make due allowance for the employment of a suitable structural engineer to provide any support in terms of design. The design of all structure required for the installations is to be included in the Contract.

The structural engineer to be employed is to be:

Giraffe Engineering, www.giraffeengineering.com
Contact: Ralph Pelly

Or equal and approved.

The Tender Sum is to include for all such steelwork, and the tendering Contractors are advised to inspect the Architectural and Structural Drawings to assess the extent of such work.

Fixings into concrete floor and roof slabs must be located to avoid reinforcing bars, and to avoid spalling of concrete, and the Contractor is to comply with any constraints on the type and locations of fixings that may be imposed by the Structural Consultant.

The Contractor should particularly note the thickness of any fire-casing to any structural steelwork when detailing pipework for fabrication.

Steel plinths, etc., are to be detailed by the Mechanical Engineering Contractor. Plant, ducts, cables, pipework, etc., on roofs are to be supported on galvanised steel supports, which are to be designed and fabricated by the Mechanical or Electrical Engineering Contractor, (as appropriate) and mounted on plinths, or piers, or spreader plates, constructed by the Main Contractor to details provided by the Mechanical Engineering Contractor.

Where roof penetrations or fixings are not permitted by the Architect, non-penetrating systems shall be used. These shall be designed so that the plant is robust and secure to protect against wind, gravity and other reasonably conceivable forces (including vandalism). The position and magnitude of point loads shall be agreed with the Structural Engineer. As BigFoot Systems or equal and approved.

The Contractor is to provide the Structural Consultants with any information that they may need in connection with loads on supports, anchors, etc.

G3.11 ACOUSTIC REQUIREMENTS

Attention is drawn to the following acoustic requirements:

- The mechanical and electrical installation must not compromise the acoustic rating of any building element, including floors, ceilings and walls. The Contractor's installation detail must include all measures necessary to meet this requirement including but not limited to:
    - Acoustic sealing of penetrations
    - Appropriate cross talk attenuators in ventilation systems
    - Acoustic cladding of ventilation ductwork as required.
- Acoustic treatment of ventilation systems (see Mechanical Specification).

The Contractor is to obtain specialist advice on this matter.

G3.12 FIRE SEALING OF PENETRATIONS

Attention is drawn to the requirement for the Main Contractor to procure a Specialist Subcontractor to design and install fire sealing of all penetrations through fire rated constructions throughout the building. Refer also to the Architectural specification and main contract preliminaries. If these documents do not include a requirement for the Main Contractor to provide fire sealing of penetrations, this should urgently be made known to the Contract Administrator during the tender period and additionally (if not resolved) at the start of the contract.

Note – at this time, it is not known which existing constructions are fire rated. The contractor is to allow for fire sealing of all penetrations until this information is available.

The Mechanical and Electrical Contractors are to cooperate fully with the Specialist as follows:

- At an early stage in the contract provide information on all services passing through fire compartments including the type, number, and material of services.
- Provide builderswork information as specified elsewhere, to include hole sizes, and setting out information for holes.
- Liaise with the Main Contractor to ensure that the proposals for fire sealing are resolved prior to first fix of services on site.
- Review the proposals by the specialist and carry out all preparatory work required, including but not limited to:
    - Installing fire dampers
    - Installing pipe sleeves
    - Installing intumescent pipe collars
    - Installing sleeves or containment for electrical services
    - Spacing services at adequate distances.
    - Providing adequate support of services either side of penetrations.
- Review the proposals against both the fire strategy report and fire strategy drawings and ensure that all penetrations through fire rated constructions have been catered for. Point out any omissions that the Specialist may have overlooked.
- Carry out a sample installation for inspection by the Architect.
- Inspect all completed penetrations and raise any concerns.

The works are to be planned and implemented in accordance with guidance contained in BSRIA "Firestopping of Service Penetrations Best Practice in Design and Installation". Note the references to relevant British Standards and industry guidance.

G3.13 RECYCLING OF WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE)

The Contractor is to ensure that all waste electrical and electronic materials, and especially batteries, LED fixtures, lamps and control panels, from the strip out are properly recycled via a certified WEEE compliant recycling firm.

Specialist: Recolight
W: https://www.recolight.co.uk

or equal approved.

G3.14 PENETRATIONS THROUGH AIR BARRIER

Grommets or flexible collars shall be used around services penetrating the air barrier and sealed to the air barrier with air-sealing tape or sealant as per UK Building Regulations Part L.

G4 SUBMISSION SCHEDULE

The following schedule summarises the principal written submissions that are to be produced by the Contractor, with reference to the relevant clause in this specification.

Ref	Item	When required
1.	Provide contract programme to tie in with main contract programme. Programme to include procurement dates, order dates for major equipment..etc	At contract start.
2.	Provide schedule of builderswork drawings. Builderswork drawings to be provided to the main contractor to meet their programme.	Prior to start of main works on site.
3.	Provide design and installation drawing schedule. Drawings to be provided to suit overall programme with due allowance for comments process.	At contract start.
4.	Provide schedule of technical submissions to meet procurement schedule.	At contract start.
5.	Provide schedule of alternative suppliers/manufacturers.	With tender return
6.	Provide full monied out schedule to Project Manager.	Prior to contract start.
7.	Confirm schedule of samples for review.	Prior to procurement
8.	Provide proposal and cost for planned maintenance for 12 months.	With tender return
9.	Building regulations and EPC submission information.	4 weeks prior to completion.
10.	Provide schedule and details of key staff with CVs etc.	Prior to contract start.
11.	Provide draft record documents, including O&M Manuals, Record Drawings and Log Book and Building User Guide (where applicable) for comment.	12 weeks prior to completion.
12.	Provide full details for testing and commissioning, including specialist details, programme and method statements, and commissioning plan.	8 weeks prior to commissioning start.
13.	Provide programme and method statement for seasonal commissioning.	4 weeks prior to completion.

G5 DESIGN BRIEF

G5.1 INTRODUCTION

This Section of the Specification sets out the Basis of Design to which the Mechanical and Electrical Services must comply. The Contractor is to ensure that all matters required and described in this Section are achieved. Additionally, all requirements of the Mechanical and Electrical Specifications are to be satisfied. If there is any discrepancy between the Basis of Design and the Mechanical and Electrical Specification, Tenderers are to resolve the discrepancy with the design team, prior to submitting their tender. The submission of the Tender will be deemed to be confirmation by the Tenderer that there is no unresolved discrepancy, and that the Tenderer undertakes to design and install the engineering systems so as to achieve all requirements of this Section and all other Sections of the General and (as appropriate) the accompanying Mechanical and/or Electrical or Lift Specifications.

G5.2 EXECUTIVE SUMMARY

The Contractors' design is to include but not limited by the following works and installations:

1 The design of all internal and external services, including electrical, mechanical and public health installations to meet the performance and installation standards outlined in the employers requirements, whether shown on drawings, specifications or room data sheets where relevant.

2 The provision of all necessary calculations and supporting information required for submission and approval by the Building Control Authority. Particular attention is to be paid to the requirements of Approved Document L of the Building Regulations, which shall be fully complied with.

G5.3 BRIEF DOCUMENTS

The following documents form part of the brief:

1 E3 Consulting Engineers Scheme Design report

2 E3 Consulting Engineers General Specification (this document).

3 E3 Consulting Engineers Mechanical Specification

4 E3 Consulting Engineers Electrical Specification

5 All architectural and structural drawings and specifications

Where any discrepancy exists between the requirements of the above documents the Contractor should assume that the most onerous applies, or seek clarification.

G5.4 DESIGN CRITERIA

Design criteria are generally included in the room data sheets and detailed specifications. The list below outlines other generic design criteria:

- Design life for major plant items: 15-20 years
- Design life for terminal units: 15 years.