FOWLER MARTIN

CHARTERED BUILDING SERVICES ENGINEERS

ELECTRICAL SERVICES SPECIFICATION AND TENDER SUMMARY

UNIVERSITY COLLEGE LONDON
119 – 123 AND 125 GOWER STREET
REFURBISHMENT
SUMMER WORKS 2017

REF: SA-1606-ES-SPEC (VERSION 1.0)

10 MARCH 2017

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BAFE Modular Scheme SP203 - Part 1
Modular Scheme SP203 - Part 4

THE BRITISH ASSESSMENT BUREAU ISO9001

THE BRITISH ASSESSMENT BUREAU ISO14001

DOCUMENT RECORD

UNIVERSITY COLLEGE LONDON
119 – 123 AND 125 GOWER STREET REFURBISHMENT
SUMMER WORKS 2017

SPECIFICATION AND TENDER SUMMARY
ELECTRICAL SERVICES

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FORMAT OF THE SPECIFICATION

SCOPE OF WORKS

A brief outline of the works to be undertaken.

CONTENTS

A schedule of Parts, Sections and Clause headings as they appear in the Specification.

ABBREVIATIONS

A list of abbreviations which may be used in this Specification and on the Contract Drawings.

SITE SPECIFIC WORKS INFORMATION NEC

This part of the Specification details the Form of Contract and any other alterations required to the Contract together with additional general conditions that must be observed.

THE WORKS

This part of the Specification describes the extent of the works and general requirements applicable to all trades.

REFERENCE CLAUSES

This part of the Specification comprises detailed clauses that are to be cross referenced with 'The Works' clauses.

APPENDICES

Additional information as appropriate.

SCOPE OF WORKS

Arthur Tattersall House is a five storey student residence building for University College London. This specification details the electrical services for the major refurbishment works within 119 – 123 Gower Street and the minor works within 125 Gower Street.

In brief the mechanical services elements comprise:

- Strip out of all redundant systems.
- Full rewire of all installations except Building '125' which is partly refurbished.
- Temporarily modify Fire Alarm to remove items stopping works proceeding and temporary installation of heat detectors (by programming) during the works and change back on completion.
- New mains distribution and metering network.
- New lighting installation.
- New emergency lighting installation.
- New emergency lighting testing system.
- New small power installation.
- Retention of existing fire alarm system with modifications.
- New data installation.
- New containment systems.
- New mechanical supplies and items of specialist equipment.
- Earthing and bonding.
- New lighting and power to building '125' Kitchen.
- New Corridor lighting to Building '125'.

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ABBREVIATIONS:

A	Ampere
AAV	Automatic air vent
ABS	Acrylonitrile budadiene styrene
AC	Alternating current
ad hoc	for this special purpose, improvised
ad lib	impromptu
ad libitum	impromptu
ac	air changes
ACE	Association of Consulting Engineers
ACOP	Approved Code of Practice
AS	Access door
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ATD	Air terminal device
ASD	Atmospheric sensing device
AV	Air vent
AVCD	Automatic volume control damper
BE	Black enamel
BEAMA	British Electrical and Allied Manufacturers' Association
BEMS	Building Energy Management System
BESA	British Electrical Systems Association
BHWS	Blended hot water service
Bone fide	in good faith, genuine
BSRIA	Building Services Research and Information Association
BPV	Ball plug valve
BRE	Building Research Establishment
BRECSU	Building Research Establishment Conservation Support Unit
BS	British Standard
BSC	Biological safety cabinet
BSI	British Standards Institution
BSCP	British Standard Code of Practice
BSPT	British Standard Pipe Thread
BSRIA	The Building Services Research and Information Association
BZP	Bright zinc plated
CA	Contract Administrator
CD	Compact Disc
CFC	Chlorofluorocarbon
CI	Cast iron
CIBSE	Chartered Institution of Building Services Engineers
CIC	Construction Industry Council
CF	Cold feed
CFR	Constant flow regulator
CORGI	Council for Registered Gas Installers
COSHH	Control of Substances Hazardous to Health
CPC	Circuit protective conductor
CS	Commissioning set
CT	Constant temperature
CVS	Commissioning valve set

CWS	Cold water service (Cistern fed)
DC	Direct current
DCV	Double check valve
DIN	Deutsches Institut fut Normung
DN	Diamètre nominal (nominal bore)
DOE	Department of the Environment
DRV	Double regulating valve
DV	Drain valve (includes draw-off cocks and drain taps)
DZR	Dezincification resistant
EC(UK)	Engineering Council (UK)
ELCB	Earth leakage circuit breaker
EPBD	Energy Performance and Buildings Directive
EPSCR	Engineering, Physics and Science Research Council
ESI	Electricity Supply Industry
ESTA	Energy Systems Trade Association
ETB	Engineering and Technology Board
F	Flow
F&E	Feed and expansion
FA	From above
FB	From below
FC	Fume cupboard
FD	Fire damper
FEANI	Fédération Européen d'Associations Nationales d'Ingénieurs (European Federation of National Engineering Associations)
FFL	Finished floor level
FMD	Flow measurement device
FMV	Flow measurement valve
FOC	Fire Offices' Committee
FODRV	Fixed orifice double regulating valve
GC	Gauge cock
GPFC	General purpose fume cupboard
GRP	Glass reinforced polyester
GSS	Galvanised sheet steel
HCFC	Hydrochlorofluorocarbon
HDPE	High density polyethylene
HL	High level
HOFR	Heat resisting, oil resisting and flame retardant
HPHW	High pressure hot water
HRC	High rupture capacity
HSE	Health and Safety Executive
HTG	Heating
HU	Hose union
HV	High Voltage
HVAC	Heating Ventilating and Air Conditioning
HVCA	Heating and Ventilating Contractors Association
HWS	Hot water service
Hz	Hertz
IBV	Isolating ball valve

IEE	Institution of Electrical Engineers
IET	Institution of Engineering and Technology
ICEL	Industry Committee for Emergency Lighting
I Mech E	Institution of Mechanical Engineers
IR	Insulation resistance
IV	Isolating valve
J	Joule
JCT	Joint Contracts Tribunal
k	kilo
LFCDA	London Fire and Civil Defence Authority
LIF	Lighting Industry Federation
LL	Low level
LPHW	Low pressure hot water
LPV	Lubricated plug valve
LSF	Low smoke and fume
LSV	Lock shield valve
LV	Low Voltage
m	metre(s)
MCB	Miniature circuit breaker
MCCB	Moulded case circuit breaker
MEL	Maximum exposure limit
MICC	Mineral insulated copper covered
mm	millimetre(s)
MPHW	Medium pressure hot water
MSC	Microbiological safety cabinet
MTel	Mobile telephone number
MuPVC	Modified unplasticised polyvinylchloride
MWS	Mains water service
N	Newton
NB	Nota bene (note well)
nb	nominal bore
NICEIC	National Inspection Council for Electrical Installation Contracting
NRV	Non-return valve
od	outside diameter
ODD	Oxygen depletion device
OES	Occupational exposure standard
ODPM	Office of the Deputy Prime Minister (UK Government)
OV	Open vent
P	Primary
Pa	Pascal
PB	Polybutylene
PCB	Polychlorinated biphenyl
PCB	Printed circuit board
PE	Polyethylene
PE-X	Cross linked polyethylene
ph	phase
PHE	Plate heat exchanger
PP	Polypropylene
ppm	parts per million
PSA	Property Services Agency

PTFE	Polytetrafluoroethylene
PVC	Polyvinylchloride
PVC-C	Chlorinated polyvinylchloride
PVC-U	Polyvinylchloride (unplasticised)
PVDF	Polyvinylidenefluoride
PWC	Physical water conditioner
R	Return
RAEng	Royal Academy of Engineering
RAFC	Radio active fume cupboard
RCBO	Residual current breaker with over-load protection
RCCB	Residual current circuit breaker
RCD	Residual current device
REHVA	Federation of European Heating and Air Conditioning Associations
RIBA	Royal Institute of British Architects
RICS	Royal Institution of Chartered Surveyors
RSJ	Rolled steel joist
RV	Regulating valve
SAP	Standard Assessment Procedure
SC	Stop cock
SEC	Secondary
SBEM	Simplified Building Energy Model
SO	Socket outlet
SO	Supervising Officer
SV	Safety valve
TA	To above
TB	To below
Tel	Telephone number
TP	Test point
UPS	Uninterruptible power supply
uPVC	unplasticised polyvinylchloride
UCL	University College London
UV	Ultra violet
V	Volt
VAV	Variable air volume
VCD	Volume control damper
VIR	Vulcanized India rubber
VODRV	Variable orifice double regulating valve
VRF	Variable refrigerant flow
VRI	Vulcanized rubber insulated
VRV	Variable refrigerant volume
W	Watt
WHV	Wheel head valve
WRAS	Water Regulations Advisory Scheme
WRC	Water Research Company
XLPE	Cross linked polyethylene

A10 PROJECT PARTICULARS

110.000 THE PROJECT

Particulars of the project as a whole are:

University College London
Residents Summer 2017 Works

Gower Street - Building Services Modifications and Additions

120.000 THE EMPLOYER – (CLIENT)

University College London
Engineering, Maintenance & Infrastructure
UCL Estates
Bidborough House
20 Mabledon Place
London WC1H 9BF

125.000 THE CHIEF ENGINEER

The Deputy Head of EM&I
University College London
Engineering, Maintenance & Infrastructure
UCL Estates
Bidborough House
20 Mabledon Place
London WC1H 9BF

130.000 PRINCIPAL CONTRACTOR (CDM)

To Be Confirmed

140.000 EMPLOYER'S REPRESENTATIVE

Faithful & Gould
31st Floor
Euston Tower
286 Euston Road
London NW1 3AT

150.000 PRINCIPAL DESIGNER

Faithful & Gould
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200.000 CONSULTANTS

MECHANICAL AND ELECTRICAL CONSULTANT

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The Limes
Ingatestone
Essex
CM4 0GB

Tel: 01277 350 802

A11 TENDER AND CONTRACT DOCUMENTS

110.000 THE TENDER DRAWINGS

The tender drawings are listed in Appendix A.

120.000 THE CONTRACT DRAWINGS

The contract drawings are the tender drawings.

140.000 THE PRE-CONSTRUCTION INFORMATION

The 'Pre-Construction Information' is a separate document included in the tender package if the project is subject to the requirements of the Construction (Design and Management Regulations).

150.000 INSPECTION

Drawings and other documents relating to the Contract generally may be inspected, by appointment, prior to the submission of tender.

A12 THE SITE/ EXISTING BUILDINGS

110.000 THE SITE/EXISTING BUILDINGS

Drawings showing the site/existing buildings are listed in Appendix A.

130.000 EXISTING MAINS AND SERVICES

The existing services have been identified by visual inspection only and the precise routes/locations of some services cannot be established at this stage.

The Sub-Contractor is to inspect the existing services installation prior to tender and to establish any further information needed to programme and accurately price the works.

The Sub-Contractor's attention is drawn to the drawings showing known existing services and drainage within the site. No claims for want of knowledge of the location/depth of services shall be awarded.

The Sub-Contractor shall establish all necessary levels for the setting out of the works and the location of all services passing through the site, whether necessary for the Contract works or not.

The Sub-Contractor shall protect and maintain all pipes, ducts, sewers, service mains cables and the like until the completion of the works. If they are damaged due to any cause within the Sub-Contractor's control he shall arrange for their prompt reinstatement to the satisfaction of the authorities concerned and pay any costs or charges in connection therewith.

The Sub-Contractor shall not interfere with the operation of existing services.

140.000 HEALTH AND SAFETY FILE

The Health and Safety File for the site/ building may be seen by appointment during normal office hours at the office of Estates, UCL, by arrangement with the Employer.

160.000 ACCESS TO THE SITE

Access to the area of work will only be granted by prior arrangement with UCL Estates/Main Contractor.

The Sub-Contractor will not be given possession of any passenger lifts serving the building(s).

The Sub-Contractor will be given possession of the relevant plant rooms in the building under the UCL 'Permit to Work' procedure in order to carry out mechanical

and electrical work. Access is to be maintained and allowed at all times for UCL maintenance staff to those plant rooms.

Access for operatives will be available during normal working hours Monday to Friday (except Public Holidays) and at other times by special permission from the ER at least 72 hours in advance of commencement of works.

All rubbish debris and bulk materials to be bagged at its point of origin before being moved through the building.

161.000 PARKING

Restrictions on parking of the Sub-Contractors' and employees' vehicles:

The 'site' lies within the Congestion Charging Zone and the Sub-Contractor is deemed to have included all such costs from complying with the congestion charge with its tender.

Parking of the Sub-Contractor's vehicles will not be permitted other than for delivery and/or collection of materials.

Adequate arrangements for reception of materials and equipment shall be made with suppliers to ensure rapid unloading and to minimise time spent on UCL premises.

162.000 USE OF THE SITE

General: Do not use the site for any purpose other than carrying out the works.

The Sub-Contractor is to note that existing buildings will be occupied by staff and students at all times.

Entrances and exits are to be kept clear and unobstructed at all times.

163.000 SITE RESTRICTIONS

The playing of portable radios will not be permitted under any circumstances on UCL premises. The Sub-Contractor should make full provision for working safely within an occupied building.

The Sub-Contractor must also allow UCL Student Accommodation to carry out their summer business activities throughout the contract period in a safe and un-impeded manner.

All areas (other than specific work areas) will be fully occupied for the full duration of the works. Works hours are to be between 8.30am and 5.00pm with no noisy work prior to 10.00am and after 4.00pm Monday to Friday.

All staircases, corridors and entrances must be kept free of all plant, materials and rubbish during UCL hours.

The Sub-Contractor shall provide all his staff and visitors entering UCL property with means of identification to be produced when requested to do so by any member of UCL staff.

164.000 SURROUNDING LAND/ BUILDING USES

General: Adjacent or nearby uses or activities are as follows:

Restricted Areas: Where it is essential to work outside of his designated site area, it will be necessary for the Sub-Contractor to obtain a 'Permit to Enter/Work'.

This will include the following areas:
a) all plant rooms
b) all switch rooms
c) all lift motor rooms
d) all water tank rooms
e) all telephone exchange/Comms rooms

165.000 PERMIT TO WORK SYSTEMS

UCL operates a number of Permit to Work systems. The Sub-Contractor will require a permit to work for the following:

a) permit to work/enter a restricted area
b) entry into confined spaces
c) hot work - use of heat or flame producing equipment (welding/burning)
d) permit to work on specific system

Permit to Work procedures are attached at Appendix B. The Sub-Contractor shall allow in his tender for all costs associated with complying with these requirements.

The Sub-Contractor shall allow for co-ordinating all permits for sub Sub-Contractors and be responsible for signing for access keys. Access keys and permits shall be returned to issuing officer at expiry of the permit. Failure to return a key may result in the Sub-Contractor being charged £100 for its replacement.

170.000 SITE VISIT

Before tendering, ascertain the nature of the site, access thereto and all local conditions and restrictions likely to affect the execution of the contract Works. The Sub-Contractor may make site visits by prior arrangement with University College London, Estates.

A13 DESCRIPTION OF THE WORK

130.000 PREPARATORY WORK BY OTHERS

Prior to the Contract commencing the Employer will remove all items of loose equipment from the area. Fixtures and fittings will not be removed by the Employer.

140.000 THE WORKS

The works shall generally be as described under 'The Scope of Works' at the front of this Specification

240.000 ELECTRICAL SUPPLY

The definition of voltage levels used in this document are as follows:

High Voltage – Voltages exceeding low voltage, as defined in The Electricity Supply Regulations 1988.

Low Voltage – Voltages exceeding extra low voltage but not exceeding 1000V ac or 1500V dc between conductors, or 600V ac or 900V dc between conductors and earth, as defined in BS 7671.

Extra Low Voltage – Voltages not exceeding 50V ac or 120V ripple free dc whether between conductors or to earth, as defined in BS 7671.

Where systems are specified as being maintained "under fire conditions" ensure wiring selected is suitable for the temperatures to be encountered.

Any electrical equipment supplied shall comply with the requirements of the Local Electricity Supplier and the limits for harmonics shall not exceed the limits stated in Engineering Recommendation G 5/4.

250.000 PLANT OPERATING CONDITIONS

Ensure all plant items are suitable for operation in the environment in which they are to be located.

Ensure all plant, motors, starters and ancillary equipment etc. are suitable for operation at full capacity under the following conditions

- Height above sea level not exceeding 1000m.
- Air cooling at an average temperature over 24 hours not exceeding 35^{o}C dry bulb.

- Maximum conditions of 40°C dry bulb and 50 per cent relative humidity.
- Supply voltage approximately sinusoidal

Protect equipment to BS EN 60529:1992+A2:2013.

260.000 ROOM TERMINAL LOCATIONS

The positions of all connection points, accessories, apparatus, equipment and other room terminals shown on the tender drawings are approximate and for guidance in the preparation of the tender.

Agree, with ER, which terminals are subject to final positioning onsite.

Allow for the movement of all such terminals up to a radius of 2.0m from the positions shown on the drawings.

Mounting heights indicated in tender documents are for tender purposes only. Confirm mounting heights with the ER before commencing work on site.

270.000 ELECTROMAGNETIC COMPATIBILITY

Ensure all equipment and systems are installed to provide electromagnetic compatibility within the system and with any other systems installed in the same area.
Ensure all systems and buildings are assessed for protection to, and that such protection meets the requirements of BS EN 62305-1:2006, BS EN 62305-4:2006, BS EN 62305-2:2006, BS EN 62305-3:2006. Ensure all equipment meets the requirements of the appropriate electromagnetic compatibility standard.

Standard
Particular Scientific and Medical
- BS EN 61000-6-4
- BS EN 55011

Fluorescent lamps and Luminaires
- BS EN 55015:2013+A1:2015

Information and technology equipment
- BS EN 55032:2012

Broadcast receivers and associated equipment
- BS EN 55013 and BS EN 55020

Industrial process measurement and control
- BS EN 60801-2

Other equipment to generic standards
Emissions
Domestic, commercial and light industrial

- BS EN 61000-6-3
- BS EN 55014-1

Immunity

Domestic, commercial and light industrial

- BS EN 61000-6-1
- BS EN 55014-2

Ensure all apparatus covered by the Wireless Telegraphy Act meets regulations issued by the Radio communications Agency.

Ensure all equipment and systems meet the requirements of BS 6701 and BS EN 41003.

Ensure that all cable installations meet the minimum guidance separation in Recommended cable Separations to Achieve Electromagnetic Compatibility (EMC) in Buildings, current editions, published by the EPM.

280.000 PERFORMANCE CHARACTERISTIC DETAILS

Details of the equipment as selected for inclusion into the Works and shall include, in a format to be agreed, the following information:

- Plant item description, reference identification and serial number.
- Electrical input rating - kVA, Volts, Phase.
- Operating mode - duty, standby, generator etc.
- Starting characteristics - starter type, current, start/hour and starting time.
- Performance characteristics - (full load current and power factor).
- Noise level.
- Weight.

290.000 SOFTWARE

Obtain on behalf of the end user all appropriate licenses, permissions, copyright waivers, rights of use and the like from the owners of the software rights.

Ensure that the end user is properly registered with the software supplier for support and appropriate updating. Ensure that application software is written in compliance with BS 7649:1993.

A20 THE CONTRACT

100.000 CONTRACT

Refer to Main Contract Site Specific Works Information NEC.

110.000 DESIGN

The Sub- Contractor is required to undertake the design of the following part or parts of the Works:

- Preparation of builder's work drawings applicable to the services being installed.
- Design, selection, drawing and fabrication of brackets, supports, fixings, casings, enclosures, cabinets, cupboards, etc. associated with the services installation.
- Preparation of working and fabrication drawings, etc. associated with the services installation.
- The co-ordination of detailed services elements within the building fabric.
- The routing and sizing of conduits, trunking, etc. associated to the services installation.
- Provisions to prevent damage due to expansion of pipework and/or conduit.
- Selection of items specified by performance.

250.000 PRODUCT GUARANTEES AND WARRANTIES

Product guaranties and warranties provided by manufacturers, shall be valid or be extended up to the end of the Defects Liability Period.

Any product guaranteed or warranted by a manufacturer for a period of time which extends beyond the end of the defects Liability Period shall remain under guarantee or warranty up to the end of the extended period.

Copies of all guarantees or warranties include in each Operation and Maintenance Manual and hand over one additional set on or before Practical Completion.

A30 TENDERING/ SUBLETTING/ SUPPLY

280.000 SUB-CONTRACT SPECIFICATION WITHOUT QUANTITIES

Where and to the extent that quantities are not included in the specification, tenders must include for all work shown or described in the tender documents as a whole or clearly apparent as being necessary for the complete and proper execution of the Works.

332.000 A SCHEDULE OF RATES

A schedule of rates must be submitted:

- Within the tender return.
- It must include all items and materials included in the tender, together with their rates, extended and totalled. Price Preliminaries separately. Such totals shall agree with the Contract Sum and subtotals shall agree with the priced breakdown of the tender.
- Correction of errors in the quantification will not lead to adjustment of the Contract Sum.

360.000 PROGRAMME

To be agreed with the Main Contractor

370.000 TENDER STAGE METHOD STATEMENTS

Method statements must be submitted before the execution of the contract describing health and safety considerations and how and when the Sub-Contractor proposes and undertakes to carry out the following:

- Builders work
- Craning
- Testing and commissioning
- Temporary works
- Shut downs for changeover of plant

390.000 ALTERNATIVE MANUFACTURERS/SUPPLIERS

In addition to and at the same time as the tender for the Subcontract Works as defined in the tender documents, the Sub-Contractor may, at his discretion, submit alternative manufacturers or suppliers for consideration. Alternatives which would involve significant changes to other work will not be considered.

Such alternative(s) must include all additional costs arising from necessary changes to the details of the installation, including changes to the design and drawings, as well as any associated ancillary equipment items.

Such alternative(s) is/are deemed to be alternative tender(s) and each must include a complete and precise statement of the effects on cost and programme.

Full technical data for each such alternative must be submitted with the Tender together with details of any consequential amendments to the design and/or construction/installation of other parts of the Works.

505.000 SUB SUB-CONTRACTS

Where the Sub-Contractor proposes to sublet any portion(s) of the Sub-contract Works a list must be submitted with the Tender. The list will define such portion(s) and give, for each, the name and address of the proposed Sub Sub-Contractor.

A31 PROVISION, CONTENT AND USE OF DOCUMENTS

100.000 DEFINITIONS AND INTERPRETATIONS

120.000 DEFINITIONS

Meaning: Terms, derived terms and synonyms used in the preliminaries/ general conditions and specification are as stated therein or in the appropriate British Standard or British Standard glossary.

125.000 TERMS USED IN SPECIFICATION

Remove: Isolate, drain, make safe, disconnect, dismantle as necessary and take out the designated products or work and associated accessories, fastenings, supports, linings and bedding materials. Dispose of unwanted materials.

Fix: Unload, handle, store, place and fasten in position including all labours and use of site equipment.

Supply and fix: Includes all labour and site equipment for unloading, handling, storing and execution. All products to be supplied and fixed unless stated otherwise.

Keep for reuse: Do not damage designated products or work. Clean off bedding and jointing materials. Stack neatly, adequately protect and store until required by the Employer or for use in the Works as instructed.

Make good: Execute local remedial work to designated work. Make secure, sound and neat. Includes local redecoration and/ or replacement.

Replace: Supply and fix new products matching those removed. Execute work to match original new state of that removed.

Repair: Execute remedial work to designated products. Make secure, sound and neat. Excludes redecoration and/ or replacement.

Refix: Fix removed products.

Replace: Supply and fix new products matching those removed. Execute work to match original new state of that removed.

Ease: Adjust moving parts of designated products or work to achieve free movement and good fit in open and closed positions.

Match existing: Provide products and work of the same appearance and features as the original, excluding ageing and weathering. Make joints between existing and new work as inconspicuous as possible.

System: Equipment, accessories, controls, supports and ancillary items, including installation, necessary for that section of the work to function.

140.000 MANUFACTURE AND REFERENCE

Definition: When used in this combination:

- Manufacturer: The firm under whose name the particular product is marketed.
- Reference: The proprietary brand name and/ or reference by which the particular product is identified.
- Currency: References are to the particular product as specified in the manufacture's technical literature current on the date of the invitation to tender.

146.000 CURRENCY OF DOCUMENTS

Currency: References to published documents are to the editions, including amendments and revisions, current on the date of the Invitation to tender.

232.000 THE SPECIFICATION

Specification: All sections must be read in conjunction with Main Contract Preliminaries/General conditions.

240.000 DRAWINGS BY THE ENGINEER

The drawings show the general arrangement of the works and design intent but do not necessarily show the exact runs of the pipes, ducts, cables or conduits nor the exact number of fittings required. The Installation Sub-Contractor shall visit site prior to tender to assess the full extent of the work and shall include in his tender for every service and fitting necessary for the proper execution of the work. Dimensions are to be checked on site.

This Specification is to be read in conjunction with the Contract Drawings, one elucidation the other.

In the event of any discrepancy arising between the Drawings and the Specification the Engineer shall decide which is to be followed. Such discrepancies must be pointed out at the time of tendering and will not be accepted as a claim for extra works or materials costs.

315.000 INSTALLATION DRAWINGS BY THE SUB-CONTRACTOR

The Sub-Contractor shall provide co-ordinated installation drawings, builder's work details and comprehensive wiring diagrams in good time for perusal and comment by the Engineer before any installation work is commenced.

The Sub-Contractor shall bear any costs he may incur as a result of delay in providing such drawings, samples, patterns, models or information or as a result of

errors, omissions or discrepancies therein, for which the Sub-Contractor is responsible.

The Sub-Contractor shall at his own expenses carry out, or bear the reasonable cost of, any alterations or remedial work necessary for such errors, omissions or discrepancies for which he is responsible and modify the drawings, samples, patterns, models or information accordingly.

The Sub-Contractor shall at no extra cost to the Employer, amend Working Drawings during the course of the works to show the proposed works whether occasioned by additional works, omitted works, omitted works or for clarity.

Setting out of all works must be approved by the Engineer before final fixing.

Obtain all the information which Sub Sub-Contractors are required to provide in time to meet the programme. Thoroughly check, on the basis of the information available, that dimensions are correct, that account is taken of all related work and that construction is practicable. Note any comments on one copy of the design/production information then submit to the ER with the required number of additional unmarked copies. Such checking will not relieve the ER or the Sub Sub-Contractor(s) of their respective responsibilities for design, co-ordination and documentation.

The Employers Representative (ER) will note any comments on one copy, then return to the Sub-Contractor. Inspection and any comments made by the ER will not relieve the Sub Sub-Contractor(s) of responsibility for design and documentation.

A32 MANAGEMENT OF THE WORKS

140.000 MONITORING

- Progress: Record on a copy of the programme kept on site.
- Avoiding delays: If any circumstances arise which may affect the progress of the Works submit proposals or take other action as appropriate to minimize any delay and to recover any lost time.

The Sub-Contractor shall monitor the progress of the works by "marking up" at no more than monthly intervals a copy of the final agreed master programme to indicate the actual progress of all activities shown thereon. The "marked up" programme shall be kept on site.

160.000 COVERING-UP

Ensure no section of the Works are covered, concealed or insulated until completion of a witnessed satisfactory test.

Give notice when Works which are to be covered or concealed are ready for examination and/or measurement, not less than 7 days.

Give notice to ER.

A33 QUALITY STANDARDS/ CONTROL

110.000 GOOD PRACTICE

Where and to the extent that products or work are not fully documented, they are to be:

- of a kind and standard appropriate to the nature and character of that part of the Works where they will be used.
- suitable for the purposes stated or reasonably to be inferred from the project documents.

In accordance with good engineering practice.

111.000 WORKMANSHIP SKILLS

Operatives: Appropriately skilled and experienced for the type and quality of work.

Registration: With Construction Skills Certification Scheme.

Evidence: Operatives must produce evidence of skills/ qualifications when requested.

112.000 SUSTAINABLE RESOURCES

Materials to be used from sustainable resources where practicable.

113.000 QUALITY OF PRODUCTS

Generally: New.

Supply of each product: From the same source or manufacturer.

Whole quantity of each product required to complete the Works: Consistent in kind, size, quality and overall appearance.

Tolerances: Where critical, measure a sufficient quantity to determine compliance.

Deterioration: Prevent. Order in suitable quantities to a programme and use in appropriate sequence.

170.000 DELETERIOUS MATERIALS

No material generally known to be deleterious are to be used in, or incorporated into, any temporary or permanent Works forming part of the Project.

In particular none of the following items are to be used:

- Asbestos or asbestos based products
- Urea formaldehyde or materials which may release formaldehyde in quantities which may be hazardous with reference to the limits set by the HSE
- Material containing fibres less than three microns diameter or 200 microns long
- Lead or any material or product containing lead which may be ingested, inhaled or absorbed
- Polychlorinated biphenyl
- Fibres not sealed or otherwise stabilised to ensure that migration is prevented
- Vermiculite containing fibrous dust
- Polytetrafluoroethylene (IPTFE) except for pipework jointing
- calcium silicate bricks or materials

Any other products or materials which are generally known within the Building Industry to be deleterious or hazardous to health or safety or to the durability of the property in the circumstances in which they are used including:

- High alumina cement and/or concrete
- Woodwool slabs used as permanent shuttering
- Calcium chloride in admixtures for use in reinforced concrete
- Sea-dredged aggregates for use in reinforced concrete which do not comply with current British Standards
- Aggregates for use in concrete which do not comply with current British Standards
- Alkali reactive aggregates

The Sub-Contractor shall check with the manufacturers and/or suppliers of products and materials that any specified product contains such material. If any specified product contains such material, the Sub-Contractor shall request and alternative specification of product or manufacturer.

171.000 STANDARDS AND REGULATIONS

Provide all materials and works in accordance with the appropriate British Standard or Code of Practice and where no BS or CP is applicable the Agreement Certificate for the particular item.
Comply with all statutory instruments and regulations, relating to the area of the site current at

- the date of tender.

Comply with the requirements of the Local Authority Building Inspector.
Comply with all Statutory Obligations arising from current legislation and regulations, together with other requirements, including, but not limited to, the following:-

- Statutory Obligations
- Health and Safety at Work
- Management of Health & Safety at Work Regulations
- The Working Time Regulations
- Gas Safety, Management Regulations
- Gas Safety (Installation and Use) Regulations
- Building Regulations
- London Building Act and/or Building (Inner London) Regulations
- Public Health Acts
- Electricity Acts
- Electricity, Safety, Quality and Continuity Regulations Electricity at Work Regulations
- The Factories Act
- Clean Air Act
- Clean air (Arrestment Plant) (exemption) Regulations
- The Control of Pollution Act
- Control of Pollution (Amendment) Act
- Workplace (Health, Safety and Welfare) Regulations
- The Construction (Design and Management) Regulations
- Health and Safety (Display Screen Equipment) Regulations
- Control of Substances Hazardous to Health (COSHH) Regulations
- Control of Asbestos at work regulations
- Control of Asbestos at work Amendment, regulations
- Provision and Use of Work Equipment Regulations
- Personal Protective Equipment at Work Regulations
- The Construction (General Provisions) Regulations
- The Construction (Lifting Operations) Regulations
- The Docks Regulations
- Other relevant Safety Regulations
- Liquid Petroleum Regulations
- Public Utility Company and/or Statutory Authority regulations, specifications, and requirements.
- British Standards and Codes of Practice.
- BS 7671 - Requirements for Electrical Installations (IEE Wiring Regulations).
- Insurance Company Requirements.
- LDSA Fire Safety Code.
- IEC Standards.
- Notify all authorities in accordance with their regulations and obtain any required approvals for the installation.
- Where no specific design, performance or installation standards are quoted the following shall apply.
- C.I.B.S.E Guide Books
- Institute of Plumbing - Plumbing Engineering services design guide.
- C.I.B.S.E Technical Memoranda.

- Ensure all equipment and systems are designed and installed in accordance with the relevant standards and that operational compatibility exists between the systems and any other system installed at the same location.
- Supply plant and equipment to achieve the specified design conditions and to provide stable control.

172.000 SERVICES REGULATIONS

New or existing services: Comply with the Bye Laws or Regulations of the relevant Statutory Authority.

173.000 WATER REGULATIONS/ BYELAWS NOTIFICATION

Requirements: Notify Water Undertaker of any work carried out to or which affects new or existing services and submit any required plans, diagrams and details.

Consent: Allow adequate time to receive Undertaker's consent before starting work. Inform immediately if consent is withheld or is granted subject to significant conditions.

174.000 WATER REGULATIONS/ BYELAWS SUB-CONTRACTOR'S CERTIFICATE

On completion of the work: Submit (copy where also required to the Water Undertaker) a certificate including:

- The address of the premises.
- A brief description of the new installation and/or work carried out to an existing installation.
- The Sub-Contractor's name and address.
- A statement that the installation complies with the relevant Water Regulations or Bylaws.
- The name and signature of the individual responsible for checking compliance.
- The date on which the installation was checked.

190.000 TEST CERTIFICATES

Where testing specific to the project is required, ensure test certificates include:

Project title.
Details and date of test.
Instruments used, serial numbers, calibration dates.
Signature of those witnessing test.
Sub-Contractor's name.
Specific location of the item in the Works.

191.000 GAS INSTALLATION CERTIFICATE

Before the completion date stated in the contract: Submit a certificate stating:

- The address of the premises.
- A brief description of the new installation and/or work carried out to an existing installation.
- Any special recommendations or instructions for the safe use and operation of gas appliances and flues.
- The Sub-Contractor's name and address.
- A statement that the installation complies with the Gas Safety (Installation and Use) Regulations.
- The name and signature of the Gas Safe (previously CORGI) registered individual responsible for checking compliance.
- The date on which the installation was checked.

220.000 TESTING AND COMMISSIONING OF SERVICES

Agree a programme for pre-commissioning checks, setting to work, commissioning and performance testing, and allow for all costs incurred.
Where required, provide formal method statements supported by risk assessments detailing all commissioning procedures.

Give notice to the ER and state any requirements for the attendance and co-operation of others.

- Not less than fourteen working days.

Provide all necessary facilities to enable tests to be witnessed and inspections carried out either on site or at manufacturer's works.

The ER will only witness test proceedings, confirm recorded results and determine if the specified requirements have been satisfied.

If following test or inspection any plant or part thereof is shown to be defective or not conforming to the specification the ER will reject such defective parts by written notice, within reasonable time, indicating area of dispute.

- Appoint an 'approved engineer', to supervise the whole of the testing, commissioning, performance testing and instruction of client's staff.

Provide all specialized personnel (including manufacturer's representatives) and co-ordinate their activities.

Test all equipment, material and systems as detailed in Sections. If an inspection or test fails, repeat the procedure, until satisfactory results are obtained.

- Complete all tests before any paint, cladding or similar materials are applied or before services are concealed.

- Ensure all requirements such as cleanliness, protection from harmful external and internal elements etc. are provided prior to commencement of commissioning.

- Following satisfactory completion of testing and when the installations are in a safe and satisfactory condition, set to work, regulate and adjust, as necessary, to meet the specified design requirements.

- Provide all necessary instruments and recorders to monitor systems during commissioning and performance testing.

- Provide test equipment subject to a quality assurance procedure complying with BS EN ISO 10012.

- Do not start performance testing, including system demonstration, system proving or environmental and capacity testing, until commissioning of the system is completed to the satisfaction of the ER.

Maintain on site full records of all commissioning and performance testing, cross referenced to system components and on completion of the Works include a copy in each Operating and Maintenance Manual.

Provide all certification documents for approval by the ER before any system is offered for final acceptance.

- Gas, fuel oil, electricity and water for testing and commissioning will be provided by the client

300.000 OPERATION OF SYSTEMS BEFORE THE PRODUCTION OF DRAWINGS AND/OR OPERATION AND MAINTENANCE MANUALS

Provide attendance, at no expense to the Employer, to put into service, operate 24 hours a day and maintain the systems to the Employer's requirements, including the provision of suitable competent labour, in the event that the Record Drawings and/or Maintenance Manuals are not available when the Works would, in the opinion of the ER, otherwise qualify for Practical Completion.

In the event of the Sub-Contractor failing to provide this service satisfactorily the Employer shall be entitled to make his own arrangements and recover the full cost through the Contract.

A34 SECURITY/ SAFETY/ PROTECTION

111.000 PRE-CONSTRUCTION INFORMATION

'The Pre-Construction information' is integral with the Project Preliminaries including, but not restricted, to the following sections:

- Description of project: Sections A10 and A11.
- Client's consideration and management requirements: Sections A12 and A13.
- Environmental restrictions and on-site risks: Section A12 and A34.
- Significant design and construction hazards: Section A34.
- The health and safety file: Section A37.

154.000 OCCUPIER'S RULES AND REGULATIONS

Comply with the occupier's rules and regulations affecting the site.

Copies: "Safety Rules for Sub-Contractors Employed on UCL Premises"

- Location: from Richard Lukos, Safety Adviser (Construction and Maintenance) Safety Services, UCL Estates.
- Arrangements for inspection: Telephone Richard Lukos on 020 3108 8627.

180.000 MAINTENANCE OF EXISTING SERVICES

- Fully maintain all existing services to existing premises during the progress of the Works.
- Fully maintain the following services to existing premises during the progress of the Works.
- Gas
- Water
- Electricity
- Telephones
- Soil and Waste
- Rainwater
- Fire Alarms

Provide any additional work and materials necessary to maintain these services at all times during the duration of the Contract. Any existing services disturbed by the Works are to be reinstated fully in accordance with the standards of quality defined in the specification and to the satisfaction of the ER.

Make all connections to existing services out of normal working hours.

200.000 MOBILE TELEPHONES

Use: Not permitted in the following areas:

- All occupied areas and corridors.

220.000 NOISE

Standard: Comply generally with the recommendations of BS 5228 – 1, clause 9.3 to minimize noise levels during the execution of the Works.

Noise levels from the works: Maximum level:*70*dB(A) when measured from outside a window of any occupied building.

Equipment: Fit compressors, percussion tools and vehicles with effective silencers of a type recommended by manufacturers of the compressors, tools or vehicles.

Restrictions: Do not use:

- Pneumatic drills and other noisy appliances without consent during the hours of 00.00 to 16.00 Mondays to Fridays or Saturdays without prior permission.

- Radios or other audio equipment or permit employees to use in ways or at times that may cause nuisance.

260.000 FIRE PREVENTION

Duty: Prevent personal injury, death, and damage to the Works or other property from fire.

Standard: Comply with Joint Code of Practice 'Fire Prevention on Construction Sites', published by the Construction Confederation and The Fire Protection Association (The 'Joint Fire Code').

Remove rubbish from all areas of work as it arises.

The use of oil and gas heaters for anti-frost measures and drying out is only permitted away from combustible materials.

All fire exits and means of escape routes, including routes through the areas in the possession of the Sub-Contractor are to be kept clear and unobstructed at all times.

All fire fighting equipment is to be kept in a proper working order.

Plastic sheeting used in temporary screens is to be flame retardant.

The Sub-Contractor is to comply with UCL's Fire Safety requirements as displayed in the building or advised by UCL's Fire Officer and to make site operatives aware of these requirements.

Comply with UCL's hot work permit system.

270.000 SMOKING ON SITE

Smoking will not be permitted on site or in any UCL buildings.

A37 OPERATION/ MAINTENANCE OF THE FINISHED INSTALLATIONS

101.000 SUBMISSION OF RECORD DOCUMENTS

To satisfy the provisions of the Health and Safety at Work Act the Employer will not accept handover of the installations until full and adequate information concerning the installations is in the possession of his operating and maintenance staff.

Provide Record Documents - being part of the Works - prior, and as a prerequisite, to Practical Completion to the satisfaction of the ER.

Prepare manuals in draft as the Works progress and make suitable arrangements where the Works are subject to Partial Possession or Sectional Completion.

Submit draft Record Documents to the ER for comment prior to commissioning.

Prepare two temporary Manuals with provisional record drawings and preliminary performance data available at commencement of commissioning to enable Employer's staff to familiarize themselves with the installation. These should be of the same format as the final Manuals with temporary insertions for items which cannot be finalized until the installations are commissioned and performance tested.

Provide the ER with copies of the final Manual TWO WEEKS prior to Practical Completion.

102.000 SUBMISSION OF DOCUMENTS FOR HEALTH AND SAFETY FILE

To satisfy the provisions of the Health and Safety at Work Act the Employer will not accept handover of the installations until full and adequate information concerning the installations is in the possession of his operating and maintenance staff.

Provide Record Documents - being part of the Works - prior, and as a prerequisite, to Practical Completion to the satisfaction of the ER.

Prepare manuals in draft as the Works progress and make suitable arrangements where the Works are subject to Partial Possession or Sectional Completion.

Submit draft Record Documents to the ER for comment prior to commissioning.
Prepare two temporary Manuals with provisional record drawings and preliminary performance data available at commencement of commissioning to enable Employer's staff to familiarize themselves with the installation. These should be of the same format as the final Manuals with temporary insertions for items which cannot be finalized until the installations are commissioned and performance tested.

Provide the ER with copies of the final Manual TWO WEEKS prior to Practical Completion.

Prepare electrical record drawings in accordance with BS EN 61082.

Prepare Operation and Maintenance Manuals for heating systems requiring a trained operator in accordance with BS EN 12170.

Prepare Operation and Maintenance Manuals for heating systems not requiring a trained operator in accordance with BS EN 12171.

110.000 RECORD DOCUMENTS

Provide:

- Record Drawings and Schedules
- Plant Room and Switch Room drawings, schedules and schematics
- Operation and Maintenance Manuals
- Blank Maintenance Logs
- Log book

Ensure record documents clearly record the arrangements of the various sections of the Works as actually installed and identify and locate all component parts.

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

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

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

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

Demonstrate as required throughout the execution of the Works that complete and accurate records are being maintained and that the record documents are being progressively compiled as the work on site proceeds.
Ensure the Building Log Book contains the information outlined in Section 3.2 of the Building Regulations Part L2, Conservation of Fuel and Power 2000.

120.000 RECORD DRAWINGS AND SCHEDULES

Prepare Record Drawings and Schedules to a scale not less than 1:50 from the 'As Installed' drawings maintained on site as the Works progress. Endorse all such documents 'RECORD DRAWINGS'. Where agreed with the ER certain detailed information may be provided in schedule form. Prepare electrical drawings in accordance with BS EN 61082.

Provide reduced scale copies for inclusion in the operating and maintenance manuals as detailed in clause A37.150.000

Record Drawings and Schedules must include, but are not limited to:

- Location, including level if buried, of Utility Service connections, including those provided by the appropriate Authority, indicating points of origin and termination, size and material of service, pressure and/or other relevant information.
- Disposition and depth of all underground systems.
- Schematic drawings of each system indicating principal items of plant, equipment, zoning, means of isolation, etc. in sufficient detail to make it possible to comprehend the system operation and the inter-connections between various systems.
- Details of the principles of application of automatic controls and instrumentation.
- Diagrammatic dimensioned plans and sections of each system or service showing sizes and locations of all ancillaries, plant, equipment controls, test points, and means of isolation etc. including any items forming an integral part of the engineering systems provided by others (such as plenum ceilings, builders' work shafts, chimneys etc.).
- Identification of all terminals/cables etc. by size/type and duty/rating as recorded from the approved commissioning results.
- Detailed wiring drawings/diagrams/schedules for all systems, including controls, showing origin, route, cable/conduit size, type, number of conductors, length, termination size and identification, and measured conductor and earth continuity resistance of each circuit.
- Ensure routes indicate if cable/conduit is surface mounted, concealed in wall chase, in floor screed, cast in-situ, above false ceiling etc.
- Details of co-ordination of wiring and connections with cable core identification, notation of fire alarm, security, control and instrumentation and similar systems provided as part of the Works.
- Details to show inter-connections between the Works and equipment or systems provided by others to which wiring and connections are carried out as part of the Works.
- Location and identity of each room or space housing plant, machinery or apparatus.
- Dimensioned plans and sections at a scale of 1:20 of plantrooms, service subways, trenches, ducts and other congested areas where in the opinion of the ER smaller scale drawings cannot provide an adequate record. Indicate the location, identity, size and details of each piece of apparatus.
- Manufacturers' drawings of equipment indicting general arrangement and assembly of component parts which may require servicing.
- Internal wiring diagrams together with sufficient physical arrangement details to locate and identify component parts.
- Schedules as required to locate, reference and provide details of ratings and duty of all items incorporated into the Works together with all fixed and variable equipment settings established during commissioning.

- For each programmable control item, schedules indicating for each input and output point connected, full data in respect of that point including reference, type of input/output, connected equipment reference, set values of temperature or pressure etc., set values of start/stop/speed change times, alarm priority, control specification reference and any other such parameters as are applicable.
- Each spare input and output point including reference, type of input/output and space for future entry of appropriate parameters as listed above.
- Logic flow diagrams for each individual control or monitoring specification and for each building services engineering system to illustrate the logical basis of the software design.
- Schedules setting out details of all initial values of user-defined variables, text statements for alarm messages etc.

130.000 PLANT ROOM AND SWITCH ROOM DRAWINGS, SCHEDULES AND SCHEMATIC DIAGRAMS

Provide good quality plant and switch room drawings, schedules and schematics.

Hang the following in each plant room and switch room, any other appropriate location or where directed by the ER.

- Schematic drawings of circuit layouts showing identification and duties of equipment, numbers and locations, controls and circuits.
- Schedules in the form of printed sheets showing the number, type, location, application /service and symbol, and normal operating position of each means of isolation.
- Control schematics.
- Location of all plant and equipment items including plans and elevations of main switchgear showing physical disposition of switches.
- First aid instructions for treatment of persons after electrical shock.
- All other items required under Statutory or other regulations.
- Location of all incoming service isolating and metering facilities.
- Emergency operating procedures and telephone numbers for emergency call out service applicable to any system or item of plant and equipment.
- Prepare electrical drawings in accordance with BS EN 61082.
- Protect surface of drawings by pressure lamination framing under glass or other rigid, transparent, cleanable and protective surface.

150.000 OPERATION AND MAINTENANCE MANUALS

The 'Operation and Maintenance Manuals' must include:

- A full description of each of the systems installed, written to ensure that the all members of the Employer's staff fully understand the scope and facilities provided.

- A description of the mode of operation of all systems including services capacity and restrictions.
- Diagrammatic drawings of each system indicating principal items of plant, equipment, valves etc.
- Details of how to re-commission so that complex plant services within the building can be re-commissioned by an engineer without any historic knowledge of the systems.
- A photo-reduction of all record drawings together with an index reduced size
- Legend of all colour-coded services.
- Schedules (system by system) of plant, equipment, valves, etc., stating their locations, duties and performance figures. Each item must have a unique number cross-referenced to the record and diagrammatic drawings and schedules.
- The name, address and telephone number of the manufacturer of every item of plant and equipment together with catalogue list numbers.
- Manufacturer's technical literature for all items of plant and equipment, assembled specifically for the project, excluding irrelevant matter and including detailed drawings, electrical circuit details and operating and maintenance instructions.
- A copy of the Risk Assessment and Method Statement for the maintenance requirements to control/eliminate legionella bacteria.
- A copy of all Test Certificates, Inspection and Test Records, Commissioning and Performance Test Records (including, but not limited to, electrical circuit tests, corrosion tests, type tests, start and commissioning tests) for the installations and plant, equipment, valves, etc., used in the installations.
- A copy of all manufacturers' guarantees or warranties, together with maintenance agreements offered by Specialist Sub-Contractors and manufacturers.
- Copies of Insurance & Inspecting Authority Certificates and Reports.
- Starting up, operating and shutting down instructions for all equipment and systems installed.
- Control sequences for all systems installed.
- Schedules of all fixed and variable equipment settings established during commissioning.
- Procedures for seasonal change-overs and/or precautions necessary for the care of apparatus subject to seasonal disuse.
- Detailed recommendations for the preventative maintenance frequency and procedures which should be adopted by the Employer to ensure the most efficient operation of the systems.
- Details of lubrication systems and lubrication schedules for all lubricated items.
- Details of regular tests to be carried out (e.g. water cooling towers etc.)
- Details of procedures to maintain plant in safe working conditions.
- Details of the disposal requirements for all items in the works.
- A list of normal consumable items.
- A list of recommended spares to be kept in stock by the Employer, being those items subject to wear or deterioration and which may involve the Employer in extended deliveries when replacements are required at some future date.

- A list of any special tools needed for maintenance cross referenced to the particular item for which required.
- Procedures for fault finding.
- Emergency procedures, including telephone numbers for emergency services.
- Back-up copies of any system software.
- Documentation of the procedures for updating and/or modifying software operating systems and control programmes.
- Instructions for the creation of control procedure routines and graphic diagrams.
- Details of the software revision for all programmes provided.
- Two back-up copies of all software items, as commissioned.
- Copies of relevant HSE/CIBSE/IEE Guidance notes etc.
- Contractual and legal information including but not limited to details of local and public authority consents; details of design team, consultants, installation Sub-Contractors and associated Specialist Sub-Contractors; start date for installation, date of practical completion and expiry date for the defects liability period; details of warranties for plant and systems including expiry dates, addresses and telephone numbers.
- Water hygiene risk assessment method statement

152.000 BMS OPERATION AND MAINTENANCE MANUALS

Confirm that an initial draft of the 'Operation and Maintenance Manual' has been submitted for approval prior to commissioning. Ensure that the operation and maintenance (O&M) documentation is produced as the work proceeds and is updated when necessary. Ensure that this work commences at the start of the contract and is added to/updated as the contract progresses. Confirm that approved final copies of the O&M manuals are provided at handover. Ensure that the O&M manual is properly indexed. Ensure that terminology and references are consistent with the physical identification of component parts.

Confirm that the O&M manual includes the following and is included in the site health and safety file:

- A written description of plant operation.
- Control strategy/logic diagrams recording the final version of configuration software installed at handover.
- Details of system application software configuration.
- A points list including hard and soft-points (all points should have a unique mnemonic)
- A description of user adjustable points.
- Commissioning record details.
- Detailed data sheets for all control components and equipment.
- Wiring circuit details including origin, route and destination of each cable.
- Basic security access to the system.
- Comprehensive instructions for switching on, operation, switching off, isolation, fault finding and procedures for dealing with emergency conditions.
- Instructions for any precautionary measures necessary.

- Instructions for the routine operation of the control system including simple day-to-day guidance for those operating the control system with limited technical skill.
- Instructions for servicing and system upkeep.
- A provision for update and modification.

Confirm that the O&M manual includes comprehensive system operating instructions.

155.000 PRESSURE REGULATIONS

Where plant and equipment provided under this Contract falls in the scope of the 'Pressure Systems and Transportable Gas Containers Regulations 1989' then the following shall apply:

Regulation 5 states that "any person who.....supplies.....any pressure system or any such article shall provide sufficient written information concerning its design, construction, examination, operation and maintenance as may reasonably and foreseeably be needed to enable the provisions of these Regulations to be complied with".

A schedule of articles which shall be provided by the Sub-Contractor and returned to the Engineer at least 6 weeks before Practical Completion of the Contract.

Relevant articles include items such as steam traps, pressure reducing and safety valves, compressed air equipment, pressure vessels, chilling plant over 25kW, bottled gas systems, etc.

156.000 ASSET REGISTER

The appendices of this specification detail an asset register form on which the mechanical/electrical Sub-Contractor shall enter the full details of items of plant, its position and estimated cost of replacement. This form shall be returned to the Estates at least six weeks before practical completion of the contract to enable an asset number to be allocated. A copy of this form shall then be returned to the Sub-Contractor quoting the asset number, which shall be used on record drawings and in maintenance manuals.

UCL maintenance section will produce labels and affix them to the plant.

An item of plant as defined as any item of equipment that will require routine maintenance or is permanently connected to the electrical supply. The location of any item shall accord with the finally allocated room numbers shown on the Architects drawings or a brief description if no such number is allocated (e.g. plant room or roof area). The cost of replacement should be at current prices.

160.000 PRESENTATION OF THE OPERATING AND MAINTENANCE MANUALS

Agree format and contents with the ER.

Encase the Manuals in A4 size, plastic-covered, loose leaf, four ring binders with hard covers, each indexed, divided and appropriately cover- titled. Fold drawings larger than A4 and include in the binder so that they may be unfolded without being detached from the rings.

Final copies of the Manual:

- Number of copies: Provide two hard copies and one electronic copy typed in Word and saved in Adobe Acrobat PDF on a Compact Disk.

As-built drawings:

- Number of copies: Provide two hard copies and electronic AutoCAD copies in PDF and DWG format (to supplied as Compact Disks).

170.000 RECOMMENDED SPARE PARTS

Before practical completion submit to the ER a schedule of spare parts as called for in individual sections and any others that the Sub-Contractor recommends should be obtained and kept in stock by the Employer for maintenance of the services installations. Time scale: 2 weeks before Practical Completion
State against each item the manufacturer's current price, including packaging and delivery to site. Identify those items which are additional to those specified for inclusion in individual Sections.

180.000 TOOLS

General: Provide tools and portable indicating instruments for the operation and maintenance of all services plant and together with suitable means of identifying, storing and securing.

Quantity: Two complete sets.

Time of submission: At Completion.

190.000 TRAINING

Before Completion, explain and demonstrate to the Employer's maintenance staff the purpose, function and operation of the installations including items and procedures listed in the Services Manual.

211.000 PLANT MAINTENANCE

The first year maintenance of “primary plant” within the defects liability period shall be included within the contract. This is particularly relevant to plant where the guarantee is dependent upon a prescriptive maintenance schedule such as chillers, boilers, burners, compressors, pressurisation units, heat exchangers, water softeners, controls, etc.

C14 BUILDING SERVICES SURVEY

PART 1 SYSTEM OBJECTIVES

100.010 PERFORMANCE OBJECTIVES

- Obtain and verify currency of existing survey information.
- Determine the location, nature and condition of existing services which are to be adapted or removed.

100.030 SYSTEM DESCRIPTION

Services to be surveyed shall include:

(i) LV Distribution Systems
(ii) Service risers
(iii) Fire Alarm System
(iv) Full installation with Building 125

100.060 DRAWINGS

The following documents are provided within the tender documentation and are for information purposes only.

Electrotest Test Certificates - Refer to Appendix F

C90 SPOT ITEMS

PART 1 SYSTEM OBJECTIVES

100.010 SYSTEM OBJECTIVES

This section covers the adaptations to the existing installation and other items not detailed elsewhere.

100.030 SYSTEM DESCRIPTION

The following provisions shall be allowed for:

- Installation of temporary fire alarm heat 'by programming', detectors to replace smoke detectors and change back after works.
- Allowance to be included to connect all hobs, ovens, cooker hoods and fans, with associated cabling for controls and for installation of free issue PIRs/timers/controllers.
- Cooker hoods to be modified to deactivate controls. Hood to be set to high speed and slider deactivated. Lighting control to remain user operated.
- The Installation Contractor shall allow to alter, extend and adapt all existing items within riser cupboards, which are to be retained.
- Allow 20 No. additional twin socket outlets installed.
- Allow 10 No. additional fused connection units with separate flex outlets plates installed.
- Allow 5 No. additional 'A' type luminaires installed.
- Allow 5 No. additional 'A+' type luminaires installed.
- Allow 5 No. additional 'B' type luminaries installed.
- Allow 5 No. additional 'C' type luminaires installed.
- Allow 5 No. additional 'C+' type luminaires installed.
- Allow 5 No. additional 'D' type luminaires installed.
- Allow 5 No. additional 'E1' type luminaires installed.
- Allow 5 No. additional 'EX1' type luminaires installed.
- Allow 5 No. additional 'M' type luminaires installed.

- Allow 10 No. additional ‘G’ type luminaires installed.
- Allow 5 No. additional ‘P’ type luminaires installed.
- Allow 5 No. additional ‘T’ type luminaires installed.
- First Year’s Maintenance on all electrical systems.
- Recommissioning of all systems at 6 months after completion and again at the 12 months End of Defects.

V20 LV DISTRIBUTION

PART 1 SYSTEM OBJECTIVES

100.010 PERFORMANCE OBJECTIVES

The Installation Contractor shall include in his tender for the supply, installation, commissioning, testing and setting to work a complete and fully functioning LV distribution system in accordance with the Contract drawings and details contained within this Specification.

100.020 DESIGN PARAMETERS

The LV distribution system shall meet the requirements of BS 7671.

100.030 SYSTEM DESCRIPTION

The works to the LV distribution system shall include the replacement of the existing distribution boards and installation of a new switch panel.

A description of works is as follows:

- New Carville Switchgear main switch panel
- New Merlin Gerin distribution boards are to be provided.
- New submains for connection to new distribution boards.
- New outgoing circuits.

The proposal is to retain the existing in coming supply and utility meter with cables to be retained and re-terminated and/or extended into the new switch panel.

New trunking and cabling to be allowed within intake/main switch panel cupboard.

All local distribution boards, within the areas of refurbishment, will be replaced with their associated sub-main cables. Distribution boards are to be fed via XLPE/LSF/SWA/LSF cables supported by a cable basket.

For the Fire Alarm System a supply shall be taken from the main switch panel and a new 2.5mm 2c + CPC Prysmian FP200 Gold cable shall be installed to the Fire Alarm panel position.

The electrical supply to the Emergency Lighting System Testing and Monitoring Panel shall be taken from the main switch panel also.

All emergency luminaires shall be fed via local lighting circuits. The Installation Contractor shall make due allowance for new circuits to accept the new emergency luminaires.

New distribution boards shall be installed as indicated on the Tender Drawings.

Each new or existing distribution board shall be provided with a typed distribution board circuit schedule mounted adjacent to the board. Where sub-mains have been diverted and altered, all distribution charts, schematic etc., affected shall be revised to indicate the new layout.

New distribution boards are to be provided throughout, which will be manufactured by Merlin Gerin.

All outgoing circuits within distribution boards shall be RCBO, unless stated otherwise.

The Installation Contractor must ensure that the existing building supplies remain operational as far as practically possible. If supplies require temporary isolation, agreement must be obtained from the Project Manager before works commence.

PART 2 SELECTION SCHEDULE FOR REFERENCE SPECIFICATIONS

260.000 CONDUIT AND TRUNKING

Refer to Works Section V25.

261.000 HV/LV CABLES WIRING

Refer to Works section V25.

262.000 BUSBAR TRUNKING

Refer to Works section V25.

263.000 SUPPORTED COMPONENTS – CABLES

Refer to Works section V25.

271.000 LV SWITCHGEAR AND DISTRIBUTION BOARDS

271.010 GENERAL:

- Supply switchboard as indicated on drawings detailed within Appendix A.

271.030 SWITCHBOARD:

- Electrical supply
  - Three phase - reference Y71.1020A
- LV switchgear and control gear assembly
  - Cubicle switchboard - reference Y71.2010A
  - Multi-box switchboard - reference Y71.2010C
  - Details of equipment
    - As shown on drawing/schedules as detailed in Appendix A
    - Rated current and rated prospective short - circuit withstand current for indicated seconds 50kA/1 Sec
    - Provide facilities to allow future extension of switchboard 25%
- Assembly construction
  - Floor mounted - reference Y71.2020A
  - Access for cabling – Top entry / top exit
- Enclosures finish
  - Reference Y71.2030A
- Type tests
  - Reference Y71.2040A
- Site built assemblies - reference Y71.2060
- Site modification - reference Y71.2070

271.050 CIRCUIT BREAKERS, TRANSFER SWITCHES AND CONTROL AND PROTECTIVE SWITCHES:

- Manufacturer and reference Merlin Gerin
- Characteristics of circuit breakers, transfer switches and control and protective switches:
  - As shown on drawings/schedules

271.060 SWITCHES, DISCONNECTORS AND FUSE COMBINATION UNITS:

- Manufacturer and reference Merlin Gerin
- Switch-disconnector - reference Y71.2100A
- Fuse combination unit - reference Y71.2100B
- Details of equipment
  - As shown on drawings/schedules

271.080 VOLTAGE SENSING RELAYS:

- Reference Y71.2120

271.090 TRIP/CLOSE SWITCHES AND CONTROL SELECTOR SWITCHES:

- Reference Y71.2130

271.100 CURRENT TRANSFORMERS:

- Reference Y71.2140

271.110 INSTRUMENTS AND METERS:

- Reference Y71.2150A
- Details as shown on drawings/schedules

271.120 ELECTRICAL RECORDING INSTRUMENTS:

- Reference Y71.2160A
- Details
  - As shown on drawings/schedules

271.130 INDICATOR LIGHTS:

- Reference Y71.2170A

271.140 LOW VOLTAGE COILS RATING:

Reference Y71.2180

271.160 FUSES:

- Reference Y71.2200A

271.171 DISTRIBUTION BOARDS:

- Manufacturer: Merlin Gerin
  - Single phase - reference Y71.1020B
- Reference Y71.2210A
- Provide spare ways
  - As shown on drawings/schedules

271.190 MINIATURE CIRCUIT BREAKERS:

- Manufacturer and reference Merlin Gerin
- Reference Y71.2230A
- As shown on drawings/schedules

271.200 RESIDUAL CURRENT DEVICE:

- Manufacturer and reference Merlin Gerin
  - Or approved equivalent
- Residual current monitors - reference Y71.2242
- RCBO's - reference Y71.2245

271.210 CABLE TERMINATIONS:

Reference Y71.2250

271.260 SWITCHGEAR AND CONTROL GEAR ACCESSORIES:

- As shown on drawings/schedules

271.270 WORKMANSHIP

- Fixing - reference Y71.3010
- Mounting height - reference Y71.3020
- Access - reference Y71.3030

- Marking and drawing
  - Reference Y71.3040A
- Cable terminations - reference Y71.3050
- Installation and commissioning
  - Reference Y71.3060A

272.000 CONTACTORS AND STARTERS

272.010 GENERAL:

Comply with work section general clauses reference Y72.1000 and those detailed below.

272.040 CONTROL CIRCUIT DEVICES:

Not applicable

272.050 ISOLATING SWITCHES:

- Manufacturer and reference Merlin Gerin
  - Or approved equivalent
- Electrical supply
  - 3 phase - reference Y72.1010A
- Reference Y72.2070A
  - Isolation as shown on drawings/schedules
- Reference Y72.2070#

272.080 INDICATOR LIGHTS:

- Type LED
- Manufacturer and reference Merlin Gerin
- Electrical supply
  - Single phase - reference Y72.1010B
- Reference Y72.2100A

272.200 CONTROL SYSTEM FUNCTION CHARTS:

Mains to Generator changer
- Reference Y72.2280A

272.210 WORKMANSHIP:

Reference Y72.3010

274.000 ACCESSORIES FOR ELECTRICAL SWITCHGEAR

Refer to Works section V25.

280.000 EARTHING AND BONDING COMPONENTS

280.010 GENERAL:

Comply with work section general clauses reference Y80.1000 and those detailed below.

280.040 EQUIPOTENTIAL BONDS:

- Main equipotential bonds
  - Reference Y80.2090A
- Supplementary equipotential bonds
  - Reference Y80.2100A

280.050 EARTHING:

- Circuit protective conductors
  - Reference Y80.2110A
- Earthing clamps - reference Y80.2120
- Earth busbars
  - Reference Y80.2130A
- Test links - reference Y80.2140
- Lugs/tags - reference Y80.2150
- Protective cable terminations - reference Y80.2160
- Protective conductor warning notices/labels Reference Y80.2170
- Main earth conductor - reference Y80.2180
- Earth bar label - reference Y80.2190

280.060 WORKMANSHIP:

- Clean earth distribution - reference Y80.3010
- Dissimilar metals - reference Y80.3020
- Stranded conductor joints - reference Y80.3040
- Protective cable terminations

- Reference Y80.3050A
- Reference Y80.3050#

281.000 TESTING AND COMMISSIONING OF ELECTRICAL SERVICES:

281.010 GENERAL:

Comply with work section general clauses reference Y81.1000 and those detailed below.

- Carry out testing and commissioning of electrical services as section

281.020 TESTING AND COMMISSIONING:

- Incorporated equipment characteristics
  - Reference Y81.2010A
- Prospective short circuit current (I_P)
  - Reference Y81.2020A
- Initial verification
  - Reference Y81.2030A
- Test equipment and consumables
  - Reference Y81.2040A
- Testing
  - Reference Y81.2050A
- Continuity of protective conductors
  - ac or dc - reference Y81.2060A
- Earth fault loop impedance (ZS)
  - Reference Y81.2070A
- Settings and adjustments - reference Y81.2080
- Standby generators
  - Reference Y81.2090A
- HV and LV switchgear
  - Reference Y81.2100A
- HV power transformers
  - Reference Y81.2110A
- Specialist installations
  - Fire detection and alarm systems. Reference Y81.2120A
  - Emergency lighting installations Reference Y81.2120E
- Calibration - reference Y81.2130
- Certification and reporting
  - Reference Y81.2140A
- Completion certificates
  - Reference Y81.2150A
- Records - reference Y81.2160

281.030 WORKMANSHIP:

- Conductive parts - reference Y81.3010
- Phase sequence - reference Y81.3020
- High voltage tests
  - Reference Y81.3030A
- Cables
- Conduit, trunking and ducting - reference Y81.3050

282.000 IDENTIFICATION - ELECTRICAL

282.010 GENERAL:

Refer to Works section V25.

290.000 FIXING TO BUILDING FABRIC

Refer to Works section V25.

PART 3 SPECIFICATION CLAUSES SPECIFIC TO V20

300.000 PRODUCTS/MATERIALS

Any material, component or piece of apparatus described in this Specification by a brand name, manufacturer's name or figure number, has been assigned by the Engineer and comply with the requirements of the design intent. These items must be included in the bid.

If the Tenderer considers that a cost reduction may be realised by the use of an alternative equivalent product he is at liberty to identify the product and the cost reduction in a separate letter attached to the bid. The acceptance of any such alternative will be subject to the Engineer's written approval after submission of full details.

Any reference to a supplier's quotation means that there has been discussion and an exchange of information. The Tenderer must ensure that the equipment priced, ordered and installed complies fully with the Specification which may not be as the supplier's quotation.

V21 GENERAL LIGHTING

PART 1 SYSTEM OBJECTIVES

100.010 PERFORMANCE OBJECTIVES

The Installation Contractor shall include in his tender for the supply, installation, commissioning, testing and setting to work a complete and fully functioning general lighting system in accordance with the Contract drawings and details contained within this Specification.

100.020 DESIGN PARAMETERS

- Ensure the maintained illuminance levels meet but do not significantly exceed the CIBSE Code for Interior Lighting.
- Ensure the initial circuit luminous efficacy is in excess of 48 luminaire-lumens/watt for fixed lighting installations.
- Ensure lighting scheme complies with the Building Regulations L1 and L2 as appropriate.

100.030 SYSTEM DESCRIPTION

The lighting installation will be replaced as part of these works.

The lighting system shall generally comprise LED luminaires controlled by local lighting switches/lighting control and wired from the associated distribution boards all as indicated on the drawings.

The lighting system shall be wired in a minimum of 1.5mm^2 Prysmian FP200 Gold (white) cables enclosed in conduits and flush within the building fabric, with metal mechanical protection within walls.

All accessories are to be from the MK Logic Plus range with white plates.

Elements of the lighting systems will comprise of light controls (as detailed on the Contract Drawings). Those shall be provided by Exor, with all units having the capability of movement and lux level sensing.

All circuits shall be installed with protective devices, cable sizes, etc., as indicated on the Contract Drawings.

All circuits are to be wired in a minimum of 1.5mm^2 LSF cables, with all switches rated at 20Amperes and mounted at 1100mm above finished floor level.

At no occasion will the Installation Contractor ‘wire through’ any light fitting.

Luminaires installed on non-demountable ceilings shall be fixed to two standard BESA boxes for linear, and a single for pendants. The fixed wiring is to be carried out on a 'loop-in' basis and terminate in fixed base porcelain connectors, with 3 core or 4 core heat resistant flex used to connect the luminaire.

Luminaires installed on demountable ceilings shall be fed via a MK Ltd Link plug in ceiling roses, 3 or 4 pin dependant on the type of light fitting to be supplied.

All light fittings are to be as detailed within the lighting schedule enclosed on the Tender Drawings.

PART 2 SELECTION SCHEDULES FOR REFERENCE SPECIFICATIONS

260.000 CONDUIT AND TRUNKING

260.010 GENERAL:

Comply with work section general clauses reference Y60.1000 and those detailed below.

- Supply conduit and cable trunking as specified in Works Section V22

261.000 HV/LV CABLES AND WIRING

261.010 GENERAL:

Comply with work section general clauses reference Y61.1000 and those detailed below.

261.020 STANDARD FLEXIBLE CORDS AND INDUSTRIAL CABLES:

- Manufacturer and reference: Prysmian
  - Or approved equivalent
- Standard ordinary flexible cords - multi copper cores - reference Y61.2010D

261.050 STANDARD WIRING AND POWER CABLES:

- Manufacturer and reference: Prysmian
  - Or approved equivalent
- Standard power supply cables
  - Thermosetting insulation and copper conductors
- Standard wires for conduit and trunking
  - LSF insulated, with copper conductors - reference Y61.2020G
  - Standard power supply cables, LSF insulation, sheathed - reference Y61.2020K

261.130 CABLE GLANDS:

- Manufacturer and reference: To match cable manufacturer and type
  - Or approved equivalent
- Unarmoured cables, indoors - reference Y61.3010A
- Armoured cables, outdoors - reference Y61.3010E

261.260 WORKMANSHIP

- Cable installation - general - reference Y61.4010

- Cable installation in low temperatures - reference Y61.4020
- Installation of LSF cable - reference Y61.4030
- Installation of unarmoured cables - reference Y61.4040
- Cable installation in conduit and trunking.
  - Reference Y61.4090A
- Cable installation - flexible cords - reference Y61.4140
- Cable jointing and terminating generally.
  - Reference Y61.4150A
- Cable sleeves - reference Y61.4210

273.000 LUMINAIRES AND LAMPS

273.010 GENERAL:

Comply with work section general clauses reference Y73.1000 and those detailed below.

- Supply luminaires and lamps as detailed on the Contract Drawings

273.020 LUMINAIRES:

- Manufacturer and reference: As detailed on the Contract Drawings
- Lamp efficacy - reference Y73.2005
- General purposes - reference Y73.2010A
- General purposes, with safety glass - reference Y73.2010B

273.040 CONTROL GEAR AND COMPONENTS:

- Compatibility
  - Reference Y73.2090A
- Circuit losses - reference Y73.2095
- Fluorescent lamp ballasts and starters
  - Reference Y73.2100A
- Discharge lamp ballasts and starters
  - Reference Y73.2110A
- Capacitors
  - Reference Y73.2120A
- Supply terminals - reference Y73.2130
- Fuse - reference Y73.2140
- Interference - reference Y73.2150
- Remote gear - reference Y73.2160

273.050 LAMPS:

- Manufacturer and reference: As light fitting manufacturer

- Types of high efficiency lamp for non-daylight areas
  - Reference Y73.2165
- Fluorescent lamps
  - Reference Y73.2180A

273.090 LUMINAIRES AND LAMPS WORKMANSHIP - GENERAL:

- Orientation - reference Y73.4010
- Cleanliness - reference Y73.4020
- Material of supporting surface - reference Y73.4060
- Support - reference Y73.4110
- Support by direct fixing
  - Reference Y73.4140A
- Support in suspended ceiling
  - Reference Y73.4150A
- Connections to luminaires - reference Y73.4220
  - MICS cable - reference Y73.4290
- Lighting switches on different phases
  - Separate - reference Y73.4300A
  - Phase barrier - reference Y73.4300B

273.110 LUMINAIRES AND LAMPS WORKMANSHIP

- Support - reference Y73.4110
- Support from trunking - reference Y73.4130
- Connections to luminaires - reference Y73.4220

274.000 ACCESSORIES FOR ELECTRICAL SERVICES

274.010 GENERAL:

Comply with work section general clauses reference Y74.1000 and those detailed below.

- Supply accessories for electrical services as Work Section V22 and as detailed on the Contract Drawings

274.040 INTERIOR LIGHTING SWITCHES:

- Manufacturer and reference: Legrand Ltd
- General purpose moulded plastic - reference Y74.2020A
- Grid moulded plastic - reference Y74.2020B
- Pull cord - reference Y74.2020C
- General purpose secret key - reference Y74.2020D
- Grid secret key - reference Y74.2020F

- Switch details
  - As indicated on drawings/schedules

274.240 WORKMANSHIP:

- Earthing - reference Y74.3010
- Protection - reference Y74.3020
- Fixing - reference Y74.3030
- Measuring mounting heights - reference Y74.3040
- Accessories mounting heights
  - For the disabled - reference Y74.3070

280.000 EARTHING AND BONDING COMPONENTS

280.010 GENERAL:

Comply with work section general clauses reference Y80.1000 and those detailed below.

- Supply earthing and bonding components as specified in works section W51

281.000 TESTING AND COMMISSIONING OF ELECTRICAL SERVICES:

281.010 GENERAL:

Comply with work section general clauses reference Y81.1000 and those detailed below.

281.020 TESTING AND COMMISSIONING:

- Incorporated equipment characteristics
  - Reference Y81.2010A
- Prospective short circuit current (I_P)
  - Reference Y81.2020A
- Initial verification
  - Reference Y81.2030A
- Test equipment and consumables
  - Reference Y81.2040A
- Testing
  - Reference Y81.2050A
- Continuity of protective conductors
  - ac or dc - reference Y81.2060A
- Earth fault loop impedance (ZS)
  - Reference Y81.2070A
- Settings and adjustments - reference Y81.2080

- Calibration - reference Y81.2130
- Certification and reporting
  - Reference Y81.2140A
- Completion certificates
  - Reference Y81.2150A
- Records - reference Y81.2160

281.030 WORKMANSHIP:

- Conductive parts - reference Y81.3010
- Phase sequence - reference Y81.3020
- Conduit, trunking and ducting - reference Y81.3050

282.000 IDENTIFICATION - ELECTRICAL

282.010 GENERAL:

Comply with work section general clauses reference Y82.1000 and those detailed below.

282.020 LABELS AND NOTICES:

- Reference Y82.2010A
- Fit labels and notices as shown on contract drawings.

282.030 LABELS AND NOTICES MATERIALS:

- Material
  - Reference Y82.2020A
- Fixing
  - Reference Y82.2030A
- Arrangement
  - Reference Y82.2040A
- Lettering and size of labels and notices
  - Reference Y82.2050A

282.040 CONDUCTOR ARRANGEMENT:

- Reference Y82.2060A

282.050 EQUIPMENT SIGNS AND LABELS:

- Safety signs
  - Reference Y82.2070A
- Plant and equipment labels
  - Reference Y82.2080A
- Maintenance notices - reference Y82.2090
- Equipment
- Engraved accessory plates
  - Reference Y82.2120A

282.100 CABLE IDENTIFICATION:

- Cable identification
  - Reference Y82.2190A
- Terminal marking and conductor identification
  - Reference Y82.2200A
- Cable conductor colour coding
  - Reference Y82.2220A
- Cable jointing and termination - reference Y82.2230
- Cable sheath identification - internal

290.000 FIXING TO BUILDING FABRIC

290.010 GENERAL:

Comply with work section general clauses reference Y90.1000 and those detailed below.

290.020 FIXINGS:

- Standards - reference Y90.2010
- Plugs - reference Y90.2020
- Screws - reference Y90.2030

290.030 WORKMANSHIP:

- Drilling - reference Y90.3010
- Proprietary fixings - reference Y90.3020
- Fixing to reinforced concrete - reference Y90.3030
- Fixing to brickwork - reference Y90.3040
- Fixing to timber rails - reference Y90.3050
- Fixing to hollow stud/tile/block wall
  - Reference Y90.3060A

- Fixing to concrete, brickwork or blockwork
  - Reference Y90.3070A
- Fixing to metalwork
  - Reference Y90.3080A
- Fixing to structural steelwork and concrete structures
  - Reference Y90.3090A

PART 3 SPECIFICATION CLAUSES SPECIFIC TO V21

300.000 GENERAL

300.010 SYSTEM REQUIREMENTS:

Select lighting control equipment suitable to meet system objectives requirements.

300.030 ELECTROMAGNETIC COMPATIBILITY:

Ensure all equipment and systems are installed to provide electromagnetic compatibility within the systems and with any other systems installed in the same location.

310.000 PRODUCTS/MATERIALS

320.000 WORKMANSHIP

320.010 WORK ON SITE:

Ensure that all building works are completed and service connections are provided,

320.020 INSTALLATION:

Install, commission and set to work lighting control equipment in accordance with manufacturer's recommendations and BS 7671. Install infra-red transmission systems and co-ordinate the installation of infra-red systems in the same area in accordance with BS 7693.

320.030 QUALITY CONTROL:

Handle, store and install equipment and components of the lighting control system in accordance with the manufacturer's recommendations.

Obtain all equipment and components from a single source.
Inspect all equipment and components on delivery, before fixing and after installation, and reject and replace any that are defective.
Record all commissioning, measurements and tests.

V22 GENERAL LV POWER

PART 1 SYSTEM OBJECTIVES

100.010 PERFORMANCE OBJECTIVES

The Installation Contractor shall include in his tender for the supply, installation, commissioning, testing and setting to work a complete and fully functioning general LV power system in accordance with the Contract drawings and details contained within this Specification.

100.020 DESIGN PARAMETERS

The general LV power system has been designed to meet the requirements of BS 7671 and UCL standards.

100.030 SYSTEM DESCRIPTION

The small power installation is to be replaced and rewired as part of these works.

The Installation Contractor shall include for the provision of power systems in accordance with the drawings and details contained in this Specification.

The power systems to be provided include:

(i) Small power systems
(ii) Supplies to specialist systems
(iii) Supplies to mechanical plant and fans

The small power systems comprise of steel basket and steel conduits with circuits wired in a minimum of 2.5mm^2 Prysmian FP200 Gold (white) in either rings or radial format from the respective distribution board/way as noted on the Contract Drawings.

The installation shall be flush installed with the exception of Plantrooms and Stores.

Parts of the installation are to be fed for supplying power to desk top PC's. The Installation Contractor shall use switch sockets outlets fitted with twin earthing terminals.

All circuits to be fed via MCB/RCD's (RCBO).

Accessories for all areas shall be from the MK Limited Logic Plus Range. An RCD fused connection unit is to be provided within each bedroom

The Installation Contractor shall allow to install XLPE/LSF/SWA/LSF cables to all items of mechanical plant, with the exception of all fan types. These supplies shall emanate from the mechanical circuit as detailed on the Contract Drawings.

The Installation Contractor shall allow to install spurs from the local ring circuits to feed the mechanical fans. The systems of wiring shall take the same format as the small power installations.

All fans are to be installed by others and the Installation Contractor shall install all fan controllers (free issue) complete with all interconnecting wiring.

Where fans are to be installed with over run timers the supply shall be controlled by 3 pole isolators, as detailed on the drawings, with the control circuit connected to the local lighting switch.

Where indicated on the Contract Drawings, 13Amp switched RCD socket outlets, switched/unswitched fused connection units, flex outlets or 45Amp double pole switches shall be installed to feed the equipment detailed above.

Each fan is to be supplied on a separate circuit. The Electrical Sub-Contractor shall also allow to supply and install cooker hoods and to de-activate the controls.

All other fans will be installed by the Mechanical Sub-Contractor, however, allowance shall be made to supply these fans and wire/fit all 'PIR' sensors/controls.

The Electrical Sub-Contractor shall also allow to connect all items of equipment, fans, etc. provided as part of this Contract.

PART 2 SELECTION SCHEDULES FOR REFERENCE SPECIFICATIONS

260.000 CONDUIT AND TRUNKING

260.010 GENERAL:

Comply with work section general clauses reference Y60.1000 and those detailed below.

210.015 APPROVED MATERIALS

Any material, component or piece of apparatus described in this Specification by a brand name, manufacturer's name or figure number, has been assigned by the Engineer and complies with the requirements of the design intent. These items must be included in the bid. If the Tenderer considers that a cost reduction may be realized by the use of an alternative equivalent product he is at liberty to identify the product and the cost reduction in a separate letter attached to the bid. The acceptance of any such alternative will be subject to the Engineer's written approval after submission of full details.

Any reference to a supplier's quotation means that there has been discussion and an exchange of information. The Tenderer must ensure that the equipment priced, ordered and installed complies fully with the Specification which may not be as the supplier's quotation.

260.020 CONDUIT SYSTEMS:

Metal rigid conduit systems shall be installed for fixed LV wiring and control wiring.

- 20mm up to 32mm dia. Complete with fittings.
- Galvanised steel
- Class 2/Class 4

Refer to Clause Y60.2010A, Y60.2010B and Y690.2020A

260.030A STEEL TRUNKING:

Single/Multi-compartment trunking system shall be installed for fixed LV wiring and control wiring.

Sizes as detailed on the Contract Drawings.

- Galvanised steel – refer to Clause Y60.2090B.

260.050 GENERAL WORKMANSHIP:

- General
- Reference Y60.3010A

- Layout - reference Y60.3020
- Spacing - reference Y60.3030
- Condensation prevention - reference Y60.3040
- Protection and repair of steel components - reference Y60.3050A
- Equipment connections - reference Y60.3060
- Cleaning before wiring - reference Y60.3070
- Wiring - reference Y60.3080A
- Builders work - reference Y60.3090

260.070 WORKMANSHIP FOR CONDUIT:

- Draw-in boxes - reference Y60.4010
- Installation of cast in or buried conduit - reference Y60.4020
- Conduit boxes - reference Y60.4030
- Fixing conduit - reference Y60.4040
- Flexible and pliable conduit - reference Y60.4050
- Screwed steel conduit - reference Y60.4060

260.080 WORKMANSHIP FOR TRUNKING:

- Manufacture of trunking - reference Y60.5010
- Access - reference Y60.5020
- Fixing trunking
  - Reference Y60.5030A
- Steel trunking
  - Reference Y60.5040A

261.000 HV/LV CABLES AND WIRING

261.010 GENERAL:

Comply with work section general clauses reference Y61.1000 and those detailed below.

261.020 STANDARD FLEXIBLE CORDS AND INDUSTRIAL CABLES:

- Manufacturer and reference: Prysmian Ltd
  - Or approved equivalent
- Standard ordinary flexible cords - multi copper cores - reference Y61.2010D

261.050 STANDARD WIRING AND POWER CABLES:

- Manufacturer and reference: Prysmian Ltd
  - Or approved equivalent
- Standard power supply cables
  - Thermosetting insulation and copper conductors
  - LSF sheathed and armoured - reference Y61.2020E
- Standard flat cables 2-core or 3-core, with copper conductors; with or without CPC
  - LSF insulated, sheathed - reference Y61.2020J
  - Standard power supply cables, LSF insulation, sheathed - reference Y61.2020K

261.130 CABLE GLANDS:

- Manufacture and ref: As cable manufacture
  - Or approved equivalent

261.260 WORKMANSHIP

- Cable installation - general - reference Y61.4010
- Cable installation in low temperatures - reference Y61.4020
- Installation of LSF cable - reference Y61.4030
- Installation of unarmoured cables - reference Y61.4040
- Cable installation in conduit and trunking.
  - Reference Y61.4090A
- Cable surface installation.
- Cable installation - flexible cords - reference Y61.4140
- Cable jointing and terminating generally.
  - Reference Y61.4150A
- Cable sleeves - reference Y61.4210

263.000 SUPPORT COMPONENTS - CABLES

263.010 GENERAL:

Comply with work section general clauses reference Y63.1000 and those detailed below.

263.040 WORKMANSHIP

- Cable tray installation - reference Y63.3010
- Cable cleats, ties, saddles and clips installation
  - Reference Y63.3020A

274.000 ACCESSORIES FOR ELECTRICAL SERVICES

274.010 GENERAL:

Comply with work section general clauses reference Y74.1000 and those detailed below.

- Supply accessories for electrical services as detailed on the Contract Drawings

274.030 ACCESSORIES COMMON REQUIREMENTS:

- Manufacturer and reference: MK Ltd
  - Or approved equivalent
  - As shown on Contract Drawings

274.090 ISOLATING SWITCHES:

- Manufacturer and reference: Legrand Ltd
  - Or approved equivalent
- BS EN 60669-1 - reference Y74.2070A
- BS EN 60947-3 - reference Y74.2070B
- Details
  - As indicated on Contract Drawings

274.100 FUSE CONNECTION UNITS:

- Manufacturer and reference: MK Ltd
  - Or approved equivalent
- Switched - reference Y74.2080A
- Unswitched - reference Y74.2080B
- Details
  - As indicated on Contract Drawings

274.110 SOCKET-OUTLETS:

- Manufacturer and reference: Legrand Ltd
  - Or approved equivalent
- Single, switched - reference Y74.2090A
- Double, switched - reference Y74.2090C
- Details
  - As indicated on Contract Drawings

274.130 CORD OUTLETS:

- Manufacturer and reference: MK Ltd
  - Or approved equivalent

274.240 WORKMANSHIP:

- Earthing - reference Y74.3010
- Protection - reference Y74.3020
- Fixing - reference Y74.3030
- Measuring mounting heights - reference Y74.3040
- Accessories mounting heights
- For the disabled - reference Y74.3070

280.000 EARTHING AND BONDING COMPONENTS

280.010 GENERAL:

Comply with work section general clauses reference Y80.1000 and those detailed below.

- Supply earthing and bonding components as specified in Works Section W51

281.000 TESTING AND COMMISSIONING OF ELECTRICAL SERVICES:

281.010 GENERAL:

Comply with work section general clauses reference Y81.1000 and those detailed below.

- Carry out testing and commissioning of electrical services as Works Section V20

282.000 IDENTIFICATION - ELECTRICAL

282.010 GENERAL:

Comply with work section general clauses reference Y82.1000 and those detailed below.

282.020 LABELS AND NOTICES:

- Reference Y82.2010A
- Fit labels and notices as shown on
- contract drawings.

282.030 LABELS AND NOTICES MATERIALS:

- Material
  - Reference Y82.2020A
- Fixing
  - Reference Y82.2030A
- Arrangement
  - Reference Y82.2040A
- Lettering and size of labels and notices
  - Reference Y82.2050A

282.040 CONDUCTOR ARRANGEMENT:

- Reference Y82.2060A

282.050 EQUIPMENT SIGNS AND LABELS:

- Safety signs
  - Reference Y82.2070A
- Plant and equipment labels
  - Reference Y82.2080A
- Maintenance notices - reference Y82.2090
  Equipment
- Engraved accessory plates
  - Reference Y82.2120A

282.070 SPECIAL PURPOSE EARTHING:

- Reference Y82.2160A

282.100 CABLE IDENTIFICATION:

- Cable identification
  - Reference Y82.2190A
- Terminal marking and conductor identification
  - Reference Y82.2200A
- Cable conductor colour coding
  - Reference Y82.2220A
- Cable jointing and termination - reference Y82.2230
- Cable sheath identification - internal

290.000 FIXING TO BUILDING FABRIC

290.010 GENERAL:

Comply with work section general clauses reference Y90.1000 and those detailed below.

290.020 FIXINGS:

- Standards - reference Y90.2010
- Plugs - reference Y90.2020
- Screws - reference Y90.2030

290.030 WORKMANSHIP:

- Drilling - reference Y90.3010
- Proprietary fixings - reference Y90.3020
- Fixing to reinforced concrete - reference Y90.3030
- Fixing to brickwork - reference Y90.3040
- Fixing to timber rails - reference Y90.3050
- Fixing to hollow stud/tile/block wall
  - Reference Y90.3060A
- Fixing to concrete, brickwork or blockwork
  - Reference Y90.3070A
- Fixing to metalwork
  - Reference Y90.3080A
- Fixing to structural steelwork and concrete structures
  - Reference Y90.3090A

V25 WIRING SYSTEMS

100.010 PERFORMANCE OBJECTIVES

The Installation Contractor shall include in his tender for the supply, installation, commissioning, testing and setting to work a complete and fully functioning Wiring systems in accordance with the Contract drawings and details contained within this Specification.

100.020 DESIGN PARAMETERS

Detailed containment design by Installation Contractor for approval.

100.030 SYSTEM DESCRIPTION

The systems shall be as detailed on the contract drawings and those detailed below.

260.000 CONDUIT AND TRUNKING

260.010 GENERAL:

Comply with work section general clauses reference Y60.1000 and those detailed below.

260.020 CONDUIT SYSTEMS:

- Metal
  - Rigid
    - Class 2 - reference Y60.2010A
      - Fittings
        - Reference Y60.2020A
    - Class 4 - reference Y60.2010B
      - Fittings
        - Reference Y60.2020A
    - Stainless steel - reference Y60.2010C
      - Fittings - reference Y60.2020C
  - Flexible, LSF sheathed - reference Y60.2010D
    - Fittings - reference Y60.2040A
- Support and fixing - reference Y60.2170

260.030 METAL TRUNKING:

- Drawing reference 986-ES-605
- Cable trunking and fittings
  - Reference Y60.2080A
- Trunking Type
  - Standard cable trunking.
  - Lighting trunking.
  - With Compartments.
- Installation
  - Surface.
- Trunking
  - Class 2 - reference Y60.2090A
  - Class 1/3 - reference Y60.2090B
  - Lighting trunking cover - reference Y60.2090C
- Separate or multi-compartment trunking
  - Reference Y60.2150A
- Support and fixing - reference Y60.2170

260.050 GENERAL WORKMANSHIP:

- General
  - Reference Y60.3010A
- Layout - reference Y60.3020
- Spacing - reference Y60.3030
- Condensation prevention - reference Y60.3040
- Protection and repair of steel components
  - Reference Y60.3050A
- Equipment connections - reference Y60.3060
- Cleaning before wiring - reference Y60.3070
- Wiring
  - Reference Y60.3080A
- Builders work - reference Y60.3090

260.070 WORKMANSHIP FOR CONDUIT:

- Draw-in boxes - reference Y60.4010
- Installation of cast in or buried conduit - reference Y60.4020
- Conduit boxes - reference Y60.4030
- Fixing conduit - reference Y60.4040
- Flexible and pliable conduit - reference Y60.4050
- Screwed steel conduit - reference Y60.4060

260.080 WORKMANSHIP FOR TRUNKING:

- Manufacture of trunking - reference Y60.5010
- Access - reference Y60.5020
- Fixing trunking
  - Reference Y60.5030A
- Steel trunking
  - Reference Y60.5040A
- Trunking of insulating material - reference Y60.5060

HV/LV CABLES AND WIRING

261.010 GENERAL:

Comply with work section general clauses reference Y61.1000 and those detailed below.

- Supply HV/LV cables and wiring as drawing schedules.

261.020 STANDARD FLEXIBLE CORDS AND INDUSTRIAL CABLES:

- Manufacturer and reference Prysmian
  - Or approved equivalent
- LSOH sheathing - reference Y61.2005
- Standard ordinary flexible wires - single copper core - reference Y61.2010A
- Standard LSF flexible wires - single copper core - reference Y61.2010B
- Standard heat resisting (95^{o}C or more) flexible wires - single copper core - reference Y61.2010C
- Standard ordinary flexible cords - multi copper cores - reference Y61.2010D
- Standard HOFR flexible cords - multi copper cores - reference Y61.2010E

261.040 MINERAL INSULATED WIRING AND POWER CABLES:

- Manufacture and reference Prysmian
  - Or approved equivalent
- LSOH sheathing - reference Y61.2005
- Light duty mineral insulated cables
  - Thermoplastic outer covering - reference Y61.2040A
  - LSF outer covering - reference Y61.2040B
- Heavy duty mineral insulated cables
  - Thermoplastic outer covering - reference Y61.2040C
  - LSF outer covering, standard fire performance - reference Y61.2040D
  - LSF outer covering, enhanced fire performance - reference Y61.2040E

261.050 STANDARD WIRING AND POWER CABLES:

- Manufacturer and reference Prysmian
  - Or approved equivalent
- LSOH sheathing - reference Y61.2005
- Standard power supply cables
  - Thermosetting insulation and copper conductors
    - Sheathed - reference Y61.2020A
    - Sheathed and armoured - reference Y61.2020B
  - LSF sheathed and armoured - reference Y61.2020E
- Standard wires for conduit and trunking
  - LSF insulated, with copper conductors - reference Y61.2020G

261.060 CONTROL AND AUXILIARY CABLES:

- Manufacturer and reference Prysmian
  - Or approved equivalent
- LSOH sheathing - reference Y61.2005
- Paired UTP unarmoured control cables - reference Y61.2050A
- Paired UTP armoured control cables - reference Y61.2050B
- Paired STP unarmoured control cables - reference Y61.2050C
- Paired STP armoured control cables - reference Y61.2050D
- Multi-core unarmoured auxiliary cables - reference Y61.2050E
- Multi-core armoured auxiliary cables - reference Y61.2050F
- Multi-core unarmoured LSF sheathed auxiliary cables - reference Y61.2050G
- Multi-core armoured LSF sheathed auxiliary cables - reference Y61.2050H
- Control and auxiliary cables with definite fire performance - reference Y61.2050I
- Fire Alarm cables - reference Y61.2050K

261.080 STANDARD COMMUNICATIONS CABLES:

- Manufacturer and reference Belden
  - Or approved equivalent
- LSOH sheathing - reference Y61.2005
- Standard filled communications cables, for outdoor and underground - reference Y61.2070A
- Standard communications cables, for indoor use - reference Y61.2070B

261.110 INFORMATION TECHNOLOGY CABLES:

- Manufacturer and reference Belden
  - Or approved equivalent
- Structured wiring - reference Y61.2100A

261.130 CABLE GLANDS:

- Manufacturer and reference as recommended by cable manufacture
- Unarmoured cables, indoors - reference Y61.3010A
- Unarmoured cables, outdoors - reference Y61.3010B
- Armoured cables, dry indoors - reference Y61.3010C
- Armoured cables, indoors - reference Y61.3010D
- Armoured cables, outdoors - reference Y61.3010E

261.140 CABLE SEALS AND GLANDS - MINERAL INSULATED CABLES:

- Manufacturer and reference as recommended by cable manufacture
- Heavy duty mineral insulated cables - protected 'd', 'i', or 'n' for hazardous areas - reference Y61.3020A
- Heavy and light duty mineral insulated cables - protected 'e' for hazardous areas - reference Y61.3020B
- Heavy or light duty mineral insulated cables - temperatures up to 105^{o}C - reference Y61.3020C
- Light duty mineral insulated cables - temperatures up to 105^{o}C - reference Y61.3020D

261.160 CABLE TERMINATING AND JOINTING SOCKETS:

- Manufacturer and reference as recommended by cable manufacture
  - Or approved equivalent
- Reference Y61.3040A
  - Connection type
    - As shown on drawings/schedules

261.170 INSULATING TAPE:

- Type
- Application
- Manufacturer and reference as recommended by cable manufacture
  - Or approved equivalent
- LSF insulating tape - reference Y61.3050A
- PIB insulating tape - reference Y61.3050B
- PVC insulating tape - reference Y61.3050C

261.180 CABLE JOINTS AND TERMINATIONS:

- Manufacturer and reference as recommended by cable manufacture
  - Or approved equivalent
- Reference Y61.3060A

261.230 CABLE DUCTS:

- Reference Y61.3110A

261.240 CABLE SLEEVES:

- Reference Y61.3120A

261.250 CABLE COVERS AND MARKERS:

- Reference Y61.3130A

261.260 WORKMANSHIP

- Cable installation - general - reference Y61.4010
- Cable installation in low temperatures - reference Y61.4020
- Installation of LSF cable - reference Y61.4030
- Installation of unarmoured cables - reference Y61.4040
- Cable trenches.
  - Reference Y61.4050A
- Cable installation in trenches - reference Y61.4060
- Cable ducts.
  - Reference Y61.4070A
- Cable installation into ducts - reference Y61.4080
- Cable installation in conduit and trunking.
  - Reference Y61.4090A
- Cable installation on tray and rack - reference Y61.4100
- Cable surface installation.
  - Reference Y61.4110A
- Cable installation - mineral insulated cables
  - Reference Y61.4130A
- Cable installation - flexible cords - reference Y61.4140
- Cable jointing and terminating generally.
  - Reference Y61.4150A
- Terminating - mineral insulated cables.
  - Reference Y61.4180A
- Cable joints - mineral insulated cables.
  - Reference Y61.4190A
- Cable sleeves - reference Y61.4210

SUPPORT COMPONENTS - CABLES

263.010 GENERAL:

Comply with work section general clauses reference Y63.1000 and those detailed below.

263.020 CABLE SUPPORT AND FINISHES:

- Cable supports and finishes
  - Reference Y63.2010A

263.030 CABLE SUPPORT SYSTEM:

- Perforated tray - reference Y63.2020A
- Cable rack - reference Y63.2020B
- Cable cleats - reference Y63.2020C
- Proprietary cable ties - reference Y63.2025A
- Cable clips - reference Y63.2025B
- Two way saddles - reference Y63.2025C
- Cable basket - reference Y63.2025D

263.040 WORKMANSHIP

- Cable tray installation - reference Y63.3010
- Cable cleats, ties, saddles and clips installation
  - Reference Y63.3020A

IDENTIFICATION - ELECTRICAL

282.010 GENERAL:

Comply with work section general clauses reference Y82.1000 and those detailed below.

282.020 LABELS AND NOTICES:

- Reference Y82.2010A
- Fit labels and notices as shown on
  - UCL design brief

282.030 LABELS AND NOTICES MATERIALS:

- Material
  - Reference Y82.2020A
- Fixing
  - Reference Y82.2030A
- Arrangement
  - Reference Y82.2040A
- Lettering and size of labels and notices
  - Reference Y82.2050A

282.040 CONDUCTOR ARRANGEMENT:

- Reference Y82.2060A

282.045 GRAPHICAL SYMBOLS FOR USE ON EQUIPMENT IN ACCORDANCE WITH BS EN 80416:

- Reference Y82.2085

282.050 EQUIPMENT SIGNS AND LABELS:

- Safety signs
  - Reference Y82.2070A
- Plant and equipment labels
  - Reference Y82.2080A
- Maintenance notices - reference Y82.2090
- Colour corrected light fittings - reference Y82.2100
- Motors and starters labels
  - Reference Y82.2110A
- Engraved accessory plates
  - Reference Y82.2120A
- Switchgear
  - Reference Y82.2130A
- Distribution boards - reference Y82.2140

282.055 GRAPHICAL SYMBOLS FOR USE ON EQUIPMENT IN ACCORDANCE WITH BS EN 80416:

Reference Y82.2085

282.060 SCHEMATIC DIAGRAMS:

- Reference Y82.2150A

282.070 SPECIAL PURPOSE EARTHING:

- Type
- Application
- Reference Y82.2160A

282.080 INDICATOR LAMPS AND PUSH BUTTONS FOR POWER SYSTEMS:

- Reference Y82.2170A

282.090 CONDUIT AND TRUNKING COLOUR CODING:

- Reference Y82.2180A

282.100 CABLE IDENTIFICATION:

- Cable identification
  - Reference Y82.2190A
- Terminal marking and conductor identification
  - Reference Y82.2200A
- Underground cable identification
  - Reference Y82.2210A
- Cable conductor colour coding
  - Reference Y82.2220A
- Cable jointing and termination - reference Y82.2230
- Cable sheath identification - internal
  - Reference Y82.2240A
- Cable sheath identification - external
  - Reference Y82.2250A

282.110 ADDITIONAL SAFETY SIGNS:

- Reference Y82.2260A

FIXING TO BUILDING FABRIC

290.010 GENERAL:

Comply with work section general clauses reference Y90.1000 and those detailed below.

290.020 FIXINGS:

- Standards - reference Y90.2010
- Plugs - reference Y90.2020
- Screws - reference Y90.2030
- Cast-in fixings - reference Y90.2040
- Shot fired fixings - reference Y90.2050
- Self adhesive fixings - reference Y90.2060
- Proprietary channel inserts - reference Y90.2070
- Non-penetrative support systems - reference Y90.2080

290.030 WORKMANSHIP:

- Drilling - reference Y90.3010
- Proprietary fixings - reference Y90.3020
- Fixing to reinforced concrete - reference Y90.3030
- Fixing to brickwork - reference Y90.3040
- Fixing to timber rails - reference Y90.3050
- Fixing to hollow stud/tile/block wall
  - Reference Y90.3060A
- Fixing to concrete, brickwork or blockwork
  - Reference Y90.3070A
- Fixing to metalwork
  - Reference Y90.3080A
- Fixing to structural steelwork and concrete structures
  - Reference Y90.3090A

V40 EMERGENCY LIGHTING

PART 1 SYSTEM OBJECTIVES

100.010 PERFORMANCE OBJECTIVES

The Installation Contractor shall include in his tender for the supply, installation, commissioning, testing and setting to work a complete and fully functioning emergency lighting system in accordance with the Contract drawings and details contained within this Specification.

100.020 DESIGN PARAMETERS

The emergency lighting system shall meet the requirements of BS 5266-1 as amended.

100.030 SYSTEM DESCRIPTION

The Installation Contractor shall include for the following elements of the work within his tender:

a) Removal of any redundant luminaires and wiring.

b) Installation of a new Advanced Electronics Addressable Emergency Lighting Control Panel complete with associated line driver modules.

c) Installation of a new Emergency Lighting System to comply with BS 5266-1.

d) Install containment and wiring to incorporate the new emergency lighting luminaires.

e) To install signalling cables between all luminaires and the Control Panel.

f) Commissioning by the Manufacturer.

The new emergency lighting system shall incorporate, maintained and non-maintained luminaires supplied with integral emergency packs all as detailed on the tender drawings.

All wiring to be as General Lighting Clauses.

The emergency luminaires will be surface or recessed installed and be complete with equipment to power a lamp for a minimum of 3 hours on mains/circuit failure.

The luminaries and equipment shall be supplied and commissioned by:

Advanced Electronics Limited
Morley House
West Chirton
Tyne & Wear
NE29 7TY

PART 2 SELECTION SCHEDULES FOR REFERENCE SPECIFICATIONS

260.000 CONDUIT AND TRUNKING

260.010 GENERAL:

Refer to Works section V25.

261.000 HV/LV CABLES AND WIRING

261.010 GENERAL:

Refer to Works section V25.

274.000 ACCESSORIES FOR ELECTRICAL SERVICES

274.010 GENERAL:

Refer to Works section V22.

282.000 IDENTIFICATION - ELECTRICAL

282.010 GENERAL:

Refer to Works section V25.

290.000 FIXING TO BUILDING FABRIC

290.010 GENERAL:

Refer to Works section V25.

PART 3 SPECIFICATION CLAUSES SPECIFIC TO V40

300.000 GENERAL

Any material, component or piece of apparatus described in this Specification by a brand name, manufacturer's name or figure number, has been assigned by the Engineer and comply with the requirements of the design intent. These items must be included in the bid.

If the Tenderer considers that a cost reduction may be realised by the use of an alternative equivalent product he is at liberty to identify the product and the cost reduction in a separate letter attached to the bid. The acceptance of any such alternative will be subject to the Engineer's written approval after submission of full details.

Any reference to a supplier's quotation means that there has been discussion and an exchange of information. The Tenderer must ensure that the equipment priced, ordered and installed complies fully with the Specification which may not be as the supplier's quotation.

300.010 EMERGENCY LIGHTING SYSTEM:

The luminaires and equipment shall be supplied by the manufacturers detailed on the Tender Drawings.

300.020 ILLUMINATION OF SIGNS:

- Application: As indicated on Contract Drawings
- Illuminate exit, emergency exit and escape route signs so that they are legible at all times, by
    - luminaires external to sign.
    - lamps contained within sign.

310.000 PRODUCTS/MATERIALS

310.010 LAMPS FOR EMERGENCY LIGHTING:

- Manufacturer and reference: To match Luminaire supplier
- Or approved equivalent

310.020 SELF-CONTAINED EMERGENCY LIGHTING LUMINAIRE SYSTEM AND EQUIPMENT:

- Application: As detailed on Contract Drawings
- Manufacturer and reference: As detailed on Tender Drawings

- Standard - BS EN 60598-2-22.
- Categories
  - Non-maintained.
- Batteries for self-contained luminaires
- Sealed nickel-cadmium cells.
- Type
- Self-contained luminaire.
- Self-contained illuminated sign.
- Ancillaries
- Green LED luminaire healthy indicator.

310.060 ANCILLARIES:

Provide ancillaries in accordance with the appropriate standards and regulatory authority requirements.

- Controlled test and maintenance system.
  - For luminaire groups

320.000 WORKMANSHIP

320.010 INSTALLATION:

Install, test and commission emergency lighting system in accordance with BS 5266-1, BS EN 50172 and ICEL 1003.

320.020 SELF-CONTAINED LUMINAIRES:

Ensure self-contained luminaires are not installed where temperatures are likely to exceed manufacturers recommended maximum.
Ensure fluorescent luminaires are not used at temperatures below that specified by manufacturer.

320.030 EQUIPMENT:

Install equipment in accordance with manufacturer's recommendations.

W50 FIRE DETECTION AND ALARM

PART 1 SYSTEM OBJECTIVES

100.010 PERFORMANCE OBJECTIVES

The Installation Contractor shall include in his tender for the supply, installation, commissioning, testing and setting to work a complete and fully functioning fire detection and alarm system in accordance with the Contract drawings and details contained within this Specification.

100.020 DESIGN PARAMETERS

The fire alarm system has been designed to meet the requirements of BS 5839-1:2002.

100.030 SYSTEM DESCRIPTION

The works to be carried out under this Contract shall comprise:

- All isolation, stripping out and adaptations of the existing fire alarm systems within the building, necessary for the execution of the works.
- Provision of temporary and permanent modifications to the existing fire alarm system to maintain operation and continuous functioning of the systems within areas of the building not forming part of the site.
- The temporary installation of Heat Detectors (by programming) in adjacent areas which may be affected by the works. On completion of the works the original detectors must be reinstated.
- The installation of new fire alarm system devices as indicated on the Contract Drawings and details contained within the Specification.
- Testing and Commissioning of the system.

The Installation Contractor shall appoint the following specialist fire alarm installation contactor to undertake the supply, second fix, testing and commissioning of the system modifications.

Fisk Fire Protection Ltd
Orchard House
34-35 Orchard Street
Chelmsford
Essex
CM2 0HD

Tel: 01245 244399
Fax: 01245 244398

The Installation Contractor shall allow for all necessary attendance in connection with the specialist fire alarm contractor for the installation.

All costs associated with the specialist fire alarm contractor shall be borne by the Installation Contractor.

The Installation of the system shall meet the requirements of BS 5839.

100.100 ISOLATION OF EXISTING SYSTEMS

The existing systems shall not be turned off, isolated or disconnected in any way without the express written permission of the PM. Written permission will only be granted once full details of the necessary disconnection, including services affected with duration of interruption, have been established.

After permission has been granted, care shall be taken to ensure that the disconnection of any existing circuits, which may be interconnected with circuits in areas outside the boundary of the contract area, is carried out in a safe manner. The existing fire alarm installation, outside the boundary of the site, shall be left operational at all times and shall not be removed.

100.110 SURVEY OF EXISTING SYSTEMS

The Contractor shall be responsible for carrying out a thorough survey of the existing fire alarm system prior to the commencement of the works.

Any faults found on the system shall be reported to the PM, in writing, on the day they are found.

The survey must establish the extent of each system, and the demarcation/cross over point where the Contract area finishes.

The Contractor shall inform the Engineer of:

- Any fire alarm circuit from outside the contract area, which may be affected by the works

- Any fire alarm within the contract area, which serves an area outside the contact area.

- Any existing circuits which will be affected by the works in the contract area.

100.130 FIRE ALARM CABLING

The cable shall be MICS sheathed 2 core 500v grade with a minimum size of 1.5mm^2. All cables are to be sheathed with a red cover throughout, with standard BESA Boxes, glands, earth tag pots and shrouds used.

Where three or more cables are to be installed together or within voids a suitable sized cable basket shall used.

All fire alarm cables shall be separated from all other cables by a minimum of 300mm.

100.140 FIRE ALARM SYSTEM

The Contractor shall include for the following elements of work within his tender:

1. All necessary attendances in connection with the Specialist Fire Alarm Contractor.

2. All costs associated with the Specialist Fire Alarm Contractor.

3. Temporary installation of heat detectors to replace the existing smoke detectors within all working areas. On completion of the works in each area the smoke detectors are to be replaced.

4. Installation of a new fire alarm system to meet the requirements of BS 5839-1:2000.

5. All associated electrical supplies.

100.150 EXISTING FIRE ALARM SYSTEM

The Contractor shall allow to test the existing system before the commencement of any works.

The existing fire alarm system is to be kept fully operational until the new system has been installed, tested, commissioned and after the 'Soak Period'.

The Contractor will be responsible for all maintenance and repairs to the existing system during the works.

The existing system can only be removed once approval has been given by the PM.

100.160 TEMPORARY FIRE ALARM WORKS

The Contractor shall include for the provision of adaptations to the existing system to remove any part supplied by adjacent areas.

Allowance shall be made to employ the Specialist Fire Alarm Contractor to carry out these modifications and recommission the system within adjacent systems.

They shall also be employed to carry out any other temporary connection or modification to allow the works to proceed.

At the completion of any temporary fire alarm adaptations or permanent modifications, the systems shall be recommissioned and an appropriate Commissioning Certificate issued.

Any temporary modifications to the systems shall be carried out outside of normal hours and completed before any other works are carried out within this area.

100.170 SYSTEM EQUIPMENT

The new fire alarm system shall comprise of equipment as detailed on the contract drawings.

100.180 SOAK TEST PERIOD

The Contractor shall Soak Test the new system for a minimum of one week.

In the event of a fault occurring during this period, the duration will be extended by a week from the fault date.

Until the system has covered a 7-day period without a fault occurring, it will not be deemed completed.

100.190 COMMISSIONING

The fire alarm systems shall be fully commissioned by Fisk Fire Protection Limited, at the completion of any temporary/permanent modifications, and at the completion of the overall works.

Each time the system is commissioned a satisfactory fire alarm system commissioning certificate shall be produced by Fisk Fire Protection Limited and issued to the PM.

100.200 FIRE ALARM LOG BOOK

The Contractor shall record details of all the modifications (temporary and final) to the fire alarm system in the Clients fire alarm system log book.

The Contractor shall note that great importance will be placed on the quality and accuracy of the information incorporated in the log book which shall include the provision of drawings for the new system.

100.210 TESTING

In addition to the commissioning to be carried out by the fire alarm specialist, the Contractor shall conduct test prior to, during and at the completion of each area of the installation works and finally at the completion of the maintenance period. Before any cable is concealed the Contractor shall offer the PM completed test sheets for each area. Testing shall be carried out to meet the requirement of BS 7671, and at the completion of the project, as a pre-requisite of Practical Completion, an appropriate completed NICEIC Certificate.

PART 2 SELECTION SCHEDULES FOR REFERENCE SPECIFICATIONS

261.000 HV/LV CABLES AND WIRING

261.010 GENERAL:

Comply with work section general clauses reference Y61.1000 and those detailed below.

261.050 STANDARD WIRING AND POWER CABLES:

- Manufacturer and reference: MICS
- Or approved equivalent
- Standard power supply cables
- Thermosetting insulation and copper conductors
- LSF sheathed and armoured - reference Y61.2020E
- LSF insulated, sheathed - reference Y61.2020J
- Standard power supply cables, LSF insulation, sheathed - reference Y61.2020K
- Standard cables with definite fire performance - reference Y61.2020M
- Standard cables where penetration by sharp objects is a high risk - reference Y61.2020N

261.130 CABLE GLANDS:

- Manufacturer and reference: To match cable type and manufacturer
- Unarmoured cables, indoors - reference Y61.3010A
- Unarmoured cables, outdoors - reference Y61.3010B
- Armoured cables, dry indoors - reference Y61.3010C
- Armoured cables, indoors - reference Y61.3010D
- Armoured cables, outdoors - reference Y61.3010E

261.260 WORKMANSHIP

- Cable installation - general - reference Y61.4010
- Cable installation in low temperatures - reference Y61.4020
- Installation of LSF cable - reference Y61.4030
- Installation of unarmoured cables - reference Y61.4040
- Cable surface installation.
- Cable jointing and terminating generally.
- Reference Y61.4150A
- Cable sleeves - reference Y61.4210

263.000 SUPPORT COMPONENTS - CABLES

263.010 GENERAL:

Comply with work section general clauses reference Y63.1000 and those detailed below.

263.020 CABLE SUPPORT AND FINISHES:

- Application: All
- Cable supports and finishes
- Reference Y63.2010A

263.030 CABLE SUPPORT SYSTEM:

- Manufacturer and reference: Uni-Trunk Limited
- Or approved equivalent
- Perforated tray - reference Y63.2020A
- Proprietary cable ties - reference Y63.2025A
- Cable basket - reference Y63.2025D

263.040 WORKMANSHIP

- Cable tray installation - reference Y63.3010
- Cable cleats, ties, saddles and clips installation
- Reference Y63.3020A

274.000 ACCESSORIES FOR ELECTRICAL SERVICES

274.010 GENERAL:

Comply with work section general clauses reference Y74.1000 and those detailed below.

- Supply accessories for electrical services as Works Section V22.

274.020 SAMPLES:

Provide samples of the following items: All accessory types to be used.

280.000 EARTHING AND BONDING COMPONENTS

280.010 GENERAL:

Comply with work section general clauses reference Y80.1000 and those detailed below.

- Supply earthing and bonding components as specified in Works Section W51.

281.000 TESTING AND COMMISSIONING OF ELECTRICAL SERVICES:

281.010 GENERAL:

Comply with work section general clauses reference Y81.1000 and those detailed below.

281.020 TESTING AND COMMISSIONING:

- Incorporated equipment characteristics
- Reference Y81.2010A
- Prospective short circuit current (I_P)
- Reference Y81.2020A
- Initial verification
- Reference Y81.2030A
- Test equipment and consumables
- Reference Y81.2040A
- Testing
- Reference Y81.2050A
- Continuity of protective conductors
- ac or dc - reference Y81.2060A
- Earth fault loop impedance (ZS)
- Reference Y81.2070A
- Settings and adjustments - reference Y81.2080
- Specialist installations
- Fire detection and alarm systems - BS 5839. Reference Y81.2120A
- Calibration - reference Y81.2130
- Certification and reporting
- Reference Y81.2140A
- Completion certificates
- Reference Y81.2150A
- Records - reference Y81.2160

281.030 WORKMANSHIP:

- Conductive parts - reference Y81.3010
- Phase sequence - reference Y81.3020

282.000 IDENTIFICATION - ELECTRICAL

282.010 GENERAL:

Comply with work section general clauses reference Y82.1000 and those detailed below.

282.040 CONDUCTOR ARRANGEMENT:

- Reference Y82.2060A

282.050 EQUIPMENT SIGNS AND LABELS:

- Safety signs
- Reference Y82.2070A
- Plant and equipment labels
- Reference Y82.2080A
- Maintenance notices - reference Y82.2090 Equipment
- Engraved accessory plates
- Reference Y82.2120A

282.100 CABLE IDENTIFICATION:

- Cable identification
- Reference Y82.2190A
- Terminal marking and conductor identification
- Reference Y82.2200A
- Cable conductor colour coding
- Reference Y82.2220A
- Cable jointing and termination - reference Y82.2230
- Cable sheath identification - internal

290.000 FIXING TO BUILDING FABRIC

290.010 GENERAL:

Comply with work section general clauses reference Y90.1000 and those detailed