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Agar Grove Estate Redevelopment

Electrical Installations Employer's Requirements

Stage E Tender Issue

05 June 2014

London Borough of Camden

Rev A

ISSUE HISTORY

Rev	Date	Description
A	05/06/14	Stage E Tender – further clarification + V41 section
*	28/05/14	Stage E Tender

Max Fordham LLP
42-43 Gloucester Crescent
London
NW1 7PE

T +44 (0)20 7267 5161
F +44 (0)20 7482 0329

maxfordham.com

Max Fordham LLP is a Limited Liability Partnership.

Registered in England and Wales
Number OC300026.

Registered office:
42–43 Gloucester Crescent
London NW1 7PE

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V10 ELECTRICAL GENERATION

PERFORMANCE OBJECTIVES

Provide an on-site renewable electricity generation system to generate electricity from the sun, and reduce the carbon footprint of the building.

To ensure benefits from Feed-in Tariffs can be gained, the installer must be fully MCS certified.

PERFORMANCE PARAMETERS

- The Building Regulations
- IET Wiring Regulations 17th Edition, as amended (BS7671:2008+AMD1:2011+AMD2:2013)
- All relevant British Standards.
- UKPN and Local Electricity Utility supplier requirements (incl. PME Requirements).
- Local Authority and other statutory requirements
- Electricity at Work Act
- Health and Safety
- Plant/equipment life - a minimum of 20 years without major replacement. System life - in excess of 25 years.
- BS EN 61194 Characteristic parameters of stand-alone photovoltaic (PV) systems
- BS EN 61215 Crystalline silicon terrestrial photovoltaic (PV) modules. Design qualification and type approval
- BS EN 61727 Photovoltaic (PV) systems. Characteristics of the utility interface
- BS EN 61000 Electromagnetic compatibility (EMC). Testing and measurement techniques
- Photovoltaics in Buildings - Testing Commissioning and Monitoring Guide
- Photovoltaics in Buildings - Safety and the CDM regulations
- Photovoltaics in Buildings - Guide to the Installation of PV systems
- Engineering recommendation G771/1 is to be consulted.

Phase	Block	Gross Area m^2	Rated Power kW	Azimuth from south	Inclination from horizontal	Annual output kWhrs/year	CO_2 offset kgCO2/year	Improvement on TER
1	A	83.1	16.8	9^0 or 6^0	10^0	14923	6648	9.9%
2	F	0.0	0.0	67^0	10^0	0	0	0.0%
	G	61.9	12.5	67^0	10^0	10627	4734	13.9%
	H	97.8	19.8	23^0	10^0	17486	7790	21.5%

SYSTEM DESCRIPTIONS

The information prepared for the tender has been developed to a RIBA stage E level to establish; the scope of works for MEP installations for this phase, the design strategies, space requirements and distribution routes.

The Contractor is to design, supply, install, test and commission the new installation in line with the intent described in this specification, U-series drawings, schematics and schedules. All design responsibility for the

correct operation and compliance with the performance objectives and design parameters within the specification rests with the contractor.

Any information relating to the size and duty of equipment that has been included within the tender information, has been included to indicate the assumptions used to establish the space requirements and distribution routes, and should not be relied upon for the purposes of the contractors design.

Engage a PV specialist to design, supply, install and commission a complete photovoltaic system. To ensure benefits from Feed-in Tariffs can be gained, the installer must be fully MCS certified

Phase 1

Block A: Shall have approximately 83 m2 of photovoltaic panels located on the roof. Panels shall be mounted on free standing non penetrative 'big foot' ballasted galvanised steel universal frame. Panels shall be near to south facing, orthogonal with the roof parapet, with an approximate incline of 10^{o}; as shown in the MFllp Dwg No 4726-MF-A-07-V20-P-Bldg and No 4726-MF-A-06-V20-P-Bldg drawings. The panels shall have an efficiency of at least 20.3% with a minimum peak array output of 16.8 kWp, at least 14923 kWh/year. The design of the PV system must account for sun path, overshadowing, cable lengths and power losses in cables, etc. The generation shall feed into the landlord's distribution boards DB\A\PV1 and DB\A\PV2.

Phase 2

Block F: None, roof used for solar thermal collection.

Block G: Shall have approximately 62m2 of photovoltaic panels located on the roof. Panels shall be mounted on free standing non penetrative 'big foot' ballasted galvanised steel universal frame. Panels shall be near to south facing, orthogonal with the roof parapet, with an approximate incline of 10^{o}; as shown in the MFllp Dwg No 4726-MF-G-06-V20-P-Bldg drawing. The panels shall have an efficiency of at least 20.3% with a minimum peak array output of 12.5 kWp, at least 10627 kWh/year. The design of the PV system must account for sun path, overshadowing, cable lengths and power losses in cables, etc. The generation shall feed into the landlords distribution board DB\G\PV1.

Block H: Block G: Block G: Shall have approximately 98 m2 of photovoltaic panels located on the roof in arrays of 12. Panels shall be mounted on free standing non penetrative 'big foot' ballasted galvanised steel universal frame. Panels shall be near to south facing, orthogonal with the roof parapet, with an approximate incline of 10^{o}; as shown in the MFllp Dwg No 4726-MF-H-05-V20-P-Bldg drawing. The panels shall have an efficiency of at least 20.3% with a minimum peak output of 19.8 kWp per, at least 17486 kWh/year. The design of the PV system must account for sun path, overshadowing, cable lengths and power losses in cables, etc. The generation shall feed into the landlords distribution boards DB\H\PV1 and DB\H\PV2.

Each roof shall have several groups of PV strings. Each group of PV strings shall be fitted with a DC disconnect, inverter, and AC isolator. Inverters shall be chosen to match the PV array. Cables etc. shall also be chosen to match the PV array's output. These groups will then connect to a PV distribution board located within the services riser at the highest floor. The PV distribution board shall be separated from the landlord's distribution board associated with that core by a G59 relay, isolator and meter. An exporting long term parallel connection shall be provided. Cables shall be armoured cables to BS6724 and run externally within a galvanised steel tray or where approved clipped neatly direct to building and internally within the services riser.

The contractor shall ensure that all Feed In Tariff (FIT) requirements are fulfilled. This will include ensuring that a Micro-generation Certification Scheme (MCS) certified installer and products are used. A FIT certificate must be obtained from the installer by the contractor. The contractor shall ensure the energy supplier is notified and provided with a FIT Eligibility Certificate once the system has been installed, and before handover.

The scope of works covered by this contract includes, but is not limited to, the following principle elements of construction:

- PV module system complete with associated accessories such as inverters, cables, cable conduits, carriers, fixings, DC switchgear, AC isolators, G59 relays etc.
- Support system
- All necessary provision of earthing for the installation.
- All necessary expansion/movement joints
- All necessary provision of brackets / cut-outs for fixings and connections
- All necessary gaskets and sealants
- Preparation of cleaning and maintenance report
- Registration & application, to successful certification, of eligibility of OfGem Feed in Tariffs.

PHOTOVOLTAIC MODULES AND PANELS

Provide photovoltaic system in accordance with BS EN 61194.

SunForte PM096B00 330W Mono-Crystalline, or equivalent.

If Crystalline units selected: must comply with IEC 61215

If Thin Film units are selected: must comply with IEC 61646

Rows spaced to avoid self-shading

Inverters

The inverters shall be selected upon consultation with DNO representative. Selected inverter must bear a current Engineering Recommendation G77/1 type test certificate and comply with all other parts of ER G77 /1 unless specifically agreed by an engineer employed and appointed by the DNO for this purpose. Statement should be made in writing. Inverter shall be selected to comply with BS EN 61000. Inverter must be capable of withstanding maximum array voltage and current. This should include any initial over voltage period, which may be a feature of some module types. Inverter must be selected such that "islanding" does not occur when the mains grid fails.

Inverters should also feature separation between DC and AC by means of an isolating transformer. Inverters selected shall have a maximum efficiency greater than 95%

Inverters shall be mounted in a position where there is adequate natural cooling at all times. The inverter shall be connected via a dedicated circuit to a spare way in a distribution board. AC cables are to be selected and installed in accordance with BS 7671 and work section V20.

Switch disconnectors

Two AC switch disconnectors are to be provided to BS EN 60947-3 Category AC-22B - between the inverters and point of connection to the supply. One unit shall be placed adjacent to the inverter and the second adjacent to the PV distribution board. If inverter and distribution board are to be in same room only device next to the distribution board is required. Unit should be selected to for on-load operation with independent manual operation for maintenance purposes.

The device will be required to switch all live and neutral cables DPDT and shall have clearly marked ON and OFF positions as well as " PV SYSTEM - POINT OF EMERGENCY SWITCHING.

The switch shall be lockable in the "OFF" position only and be readily accessible.

Meters

Specialist will be required to source and install import, export and generator meter that complies with DNO's requirements and feed in tariff requirements. Advice shall be given to the client by the specialist contractor with regard to taking a separate metering contract. The data produced by meters must be validated and be able to be retrieved. The meters installed shall have the capacity to provide pulsed outputs to the BMS system.

Junction boxes and connectors

Junction boxes may contain string fuses to permit string isolation and test points. The short circuit protection afforded by the cable installation throughout the rest of the DC circuit needs to be maintained in the construction and makeup of the DC junction box. (See IEC 60536 and IEC 61140). The DC junction boxes shall clearly be labelled "PV array junction box" and also with "danger, contains live parts during daylight." All labels shall be clear, visible and constructed and affixed to last. DC connectors, where used shall be of class II designs, shrouded and of a design totally dissimilar in appearance to any other connectors used in the AC installation.

Blocking diodes

Blocking diodes shall be utilised in grid connected systems to prevent any reverse current flowing through parallel connected strings. The blocking diode must have a minimum reverse voltage of 2 x Voc x number of modules in the string. Modules shall be interconnected using "plug and play" in-line connectors which are fully weather proof.

Automatic voltage regulator:

Type Maximum Power Point Tracker (MPPT) to be utilised in conjunction with inverters.

Provide solid state type automatic voltage regulator with manual adjustment to set alternator output within indicated percentage of rated voltage. Provide enclosure for regulator components isolated from generator using anti-vibration mountings.

Acceptance test - photovoltaic array:

Carry out acceptance and performance test in accordance with BS EN 61194

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DC WIRING

DC Wiring, String Configuration

Modules shall be connected to inverters such that double pole fuses are utilised, inverters cannot be overloaded, combination of wiring or insulation errors may not give rise to harmful fault currents in the wiring or modules.

Supplementary protective devices shall be added where necessary.

Wiring shall be selected to carry both normal and fault currents at ambient temperatures up 80deg C. the wiring must also be UV and weather resistant.

Wiring must be correctly supported throughout its length. Positive and negative loops to be run together from point of origin so as to avoid inductive loops being formed.

Where conducting materials are to be retained, provide electrical continuity along its length by mean of links or other effective means.

Wiring should be designed such that modules maybe removed by disconnecting its connectors from adjacent modules without the need to disconnect any other modules.

DC wiring which is run in roof voids shall need to be placed within a trunking system if single insulated.

Provision of enclosures for additional terminals connectors and devices which may be required should be catered for.

Losses

Losses are not to exceed 1.5% volt drop in the DC wiring under the JRC Standard test conditions.

DC isolation

Isolation to individual strings shall be provided by means of string fuse assemblies within the DC junction box or by other removable links that can be operated safely when live. Isolation should not be carried out with the system under load. String fuses shall be provided for all arrays formed of four or more strings. Fuses must be fitted in both positive and negative string cables for all strings. The string fuse must be rated for DC operation at the fault energies present. The string fuse must have a tripping current which is less than 2 x Isc (stc) and the string cable current carrying capability, whichever is the lower value. The use of MCBs is permissible provided they meet the criteria set out above and are rated for use in an inductive circuit and will operate for currents flowing in both directions. Installation of string fuses can provide protection against fault currents in all other cases. In order to provide full protection of all cables and modules - string fuses are required in both the positive and negative legs of the string cabling.

Earthing

DC conductors are not to be connected to earth.

AC wiring

Current IEE regulations shall be complied with.

Provision of a bonding conductor from the metal support frame of each array to the protective conductor of the AC wiring if the inverter is using a 50mm^2 Cu/LS0H cable on the same route as the DC wiring. The same type of conductor should be utilised for bonding from the inverter to the distribution board and to the point of connection with the metered supply.

Surge protection devices shall be supplied at the first distribution board to which each inverter is connected. Device rating in accordance with BS 6651 Annex C by specialist manufacturer.

Connection to switchboards

Connect the PV AC output to the switchgear at designated point within cupboard. Where the electrical installation includes a PV power supply system without at least simple separation (separation between circuits or between circuit and earth by means of basic insulation) between the AC side and the DC side, an RCD will be installed to provide fault protection by automatic disconnection of supply. RCD shall be of type B to IEC 60755 amendment 2. Where PV power supply inverter by construction is not able to feed DC fault currents in to the electrical installation, and RCD of type B to IEC 60755 amendment 2 is not required.

Connection to grid

Contractor is to communicate with Distribution Network Operator (DNO) and make all necessary arrangements with it for connection of PV system in parallel with and export to system. DNO requirements including G59/1 and other relevant documents must be adhered to. Provide where necessary relevant calculations, information, hardware and equipment, tests, measurements, documents, attendance, etc to permit the PV system to be connected and operated.

DNO and client's witness testing requirements must be complied with. Production of certificate and approval documents, and control and protection arrangements, schedule for grid connection, as well as other relevant documents should be allowed for.

Lightning protection

Surge protection shall be provided on the DC wiring. Surge suppression devices are to be electrically safe and pose no electrical fire hazard.

Control requirements

The contractor is to provide all relevant controls for the operation - generation and export of electricity. Also provided shall be a system which permits interface with the BMS and a means of displaying the current status of system characteristics - such as amount of electricity being produced. Inverter must contain controls that prevent "islanding" occurring when mains grid fails. Isolation to individual strings shall also be provided by means of string fuse assemblies within the DC junction box or by removable links that can be operated safely when live.

GENERAL

Provide fire stopping to the inside of all trunking, containment and cable trays, etc, passing through fire barriers. Locations of fire barriers are indicated on the architects' drawings. Cabling and containment is to be fire stopped through the fire compartment boundaries described in the Architect's documentation. CONTRACTOR to supply and install fire stopping material to the inside of all trunking and containment, supply and install all fire stopping materials on the outside of trunking and containment.

All cables and containment to be concealed except where written agreement has been obtained from the CA/Employers Agent. Where written agreement has been obtained wiring should be contained in hot dip galvanised steel conduit.

CONTRACTOR to supply and install labels to all primary distribution cables and final circuits at their origin, destination and at regular intervals.

Ensure references on plant coordinates with references on RECORD DRAWINGS. All labelling shall coordinate with the record drawings so that the location, function of each item of plant can be determined.

All labelling shall coordinate with the record drawings so that the location, function of each item of plant can be determined.

The entire installation shall be tested, commissioned and demonstrated in accordance with the MFllp testing, commissioning & handover schedule 4726/A64-500.

DOCUMENTATION AND RECORDS

Provide accurate documentation and records of all cabling and equipment provided as part of the installation. These should include the following:

Full as finished floor plans showing locations of all plant and equipment.

Full sets of Documentation and Records will be required on disc. All diagrams to be presented in a computerised format compatible with and transferable to the Auto CAD system 2008.

Supply full sets of documentation and record information in accordance with and as described in this specification. Comply with the requirements of Table E "Production of Handover Information" in Appendix A, "Testing & Commissioning Schedule" (dwg no. A64.500), and other clauses given in Section A64 of the Prelims A64-700.

OPERATION & MAINTENANCE MANUALS

Provide full O&M manuals. These shall include record drawings, a full description of this particular system, set-up, operation and modifications. Provide full and clear instructions for the building staff (who shall not be trained technicians) on how to operate the systems.

CODE FOR SUSTAINABLE HOMES

Provide an on-site renewable electricity generation system to generate electricity from the sun, and reduce the carbon footprint of the building. The PV array for Plot A should be sized such that it achieves a 9.9% reduction on the SAP Target Emissions Rate (TER). The combined PV array for Plots FGH should be sized such that it achieves a 13.1% reduction on the SAP Target Emissions Rate (TER).

Engage a PV specialist to design, supply, install and commission a complete photovoltaic system. To ensure benefits from Feed-in Tariffs can be gained, the installer must be fully MCS certified.

PASSIVHAUS

Cables entering through the airtightness line shall be pulled through tight fitting neoprene grommets.

Cables passing through thermal lights shall be suitably sized and debated

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V20 LV DISTRIBUTION

PERFORMANCE OBJECTIVES

To provide a complete 400V and 230V 50Hz AC electrical supply to the Phase 1 & 2 of the Agar Grove Estate regeneration project.

To provide safe disconnection of existing LV services within the construction site.

To facilitate the future installation of the central backed up landlord's LV service.

PERFORMANCE PARAMETERS

The Building Regulations
IET Wiring Regulations 17th Edition, as amended (BS7671:2008+AMD1:2011+AMD2:2013)
All relevant British Standards.
UKPN and Local Electricity Utility supplier requirements (incl. PME Requirements).
Electricity Association Engineering Recommendations G12/3 and G87
Local Authority and other statutory requirements
Electricity at Work Act
Health and Safety
Plant/equipment life - a minimum of 20 years without major replacement. System life - in excess of 25 years.

NETWORK OPERATORS

Distribution Network Operator (DNO) – UK Power Networks, Metropolitan House, Darkes Lane, Potters Bar, Hertfordshire, EN6 1AG.

Building Network Operator (BNO) – In the absence of any instruction to the contrary, the Contractor is to undertake the role of BNO until completion of the works, when the client will take over this role. The contractor is to ensure that the design and installation of the BNO network complies with the requirements of IET Wiring Regulations 17th edition (as amended), Engineering Recommendation G87, UKPN Design Standard EDS 08-0118, and the requirements of the nominated electricity supplier and meter operator. The Contractor is to be responsible for obtaining MPAN numbers from UKPN for each Metering Point.

NOMINATED ELECTRICITY SUPPLIER

TBC by Client

SYSTEM DESCRIPTIONS

The information prepared for the tender has been developed to a RIBA stage E level to establish; the scope of works for MEP installations for this phase, the design strategies, space requirements and distribution routes.

The Contractor is to design, supply, install, test and commission the new installation in line with the intent described in this specification, A-series and V-series drawings, schematics and schedules. All design responsibility for the correct operation and compliance with the performance objectives and design parameters within the specification rest with the contractor.

Any information relating to the size and duty of equipment that has been included within the tender information, has been included to indicate the assumptions used to establish the space requirements and distribution routes, and should not be relied upon for the purposes of the contractors design.

Design, supply, install, test and commission a complete low voltage electrical distribution system comprising utility installation, main switch, BNO & landlord's distribution boards, BNO rising & lateral mains, landlord's submains, and final connections to tenant consumer units and landlord's equipment isolators.

This specification section describes the LV supply infrastructure from utility company supply connection up to the domestic consumer unit serving the dwelling or in the case of landlord's supplies, the appliance or piece of mechanical plant being served.

Disconnections of existing supplies

Phase 1: as part of the demolition and enabling works that precede this contract, electrical supplies to the Broadstone properties 1-4, will have been disconnected beyond the site boundary by Thames Water.

Phase 2: The contractor shall engage UKPN to disconnect the supplies entering site to Manston House & Sherborne House, from Agar Grove.

New Connection

The Contractor shall engage UK to extend their electrical infrastructure onto the site from the existing transformer in basement of Lulworth House, and provide connections to the new buildings.

Phase 1:

A 200A or 300A (as appropriate) TP&N incoming supply is to be provided to each stair core in block A. Ground floor dwellings will each be fed by individually metered 100A SP&N service from this LV service. Earthing arrangements shall be TNC-S (PME) Protective Multiple Earth.

Phase 2:

A 200A or 300A (as appropriate) TP&N incoming supply is to be provided to each stair core in blocks F, G & H. Ground floor dwellings in block G will each be fed by individually metered 100A SP&N service from this LV service. Earthing arrangements shall be TNC-S (PME) Protective Multiple Earth.

A 100 A TP&N incoming supply is to be provided to be provided to the commercial unit, terminated at internal service head. To be adapted later as part of the commercial fit-out.

Incoming service ducts shall be installed by the Contractor from the street main to the intake positions within ⌀125 mm black rigid ducts, cast through the buildings foundations with long radius bends such that UKPN can pull through cables.

Contractor to provide all necessary trenching, reinstatement, below ground ducting and builders work from the site boundary to each intake position.

An application has been sent out to UKPN and we are awaiting their response regarding a quotation. We expect a quotation to be issued within the next month. At this stage, work by UKPN should be covered by a

provisional sum within the contract. This information will be passed onto the CONTRACTOR and design team when it arrives.

The client would be open to the contractor approaching an approved network designer should this prove advantageous, reduce risk and/or benefit the cost of the project.

A BS88 Ryfield Board will be located at ground floor and shall be used as an inline series fuse board to split the supply into 1No. 100 A TP&N Landlord's supply and SP&N supplies to each dwelling. The landlord's meter shall be installed adjacent to the incoming head within the service cupboard. The CONTRACTOR shall supply and install the galvanised metal trunking with cut outs as prescribed by the network operator UKPN and by the meter operator of the nominated electrical supplier.

Service heads, Ryfield fuse boards, landlords meter, source change over devices / auto transfer switches and landlord's distribution boards shall be within locked areas / services not accessible to residents

Residents require access to read meters. Meters, isolators and cut trunking shall be mounted on marine plywood board, cables shall be run behind and to accessible to the residents.

A 1.2 m clearance shall be maintained in front of the incoming service head, and the group meter positions.

The CONTRACTOR shall supply and install labels to all primary distribution cables at their origin, destination and at regular intervals.

Block A & G

Meter shall be installed within a dedicated services riser within the common parts on each level served. The CONTRACTOR shall provide heavy duty galvanised steel tray for the rising service to each floor. The installation of the cables, and containment shall be by the contractor (to be adopted by UKPN later). The cable tray must be for the exclusive use of the network operator and under no circumstance shall any private equipment or cables be attached. The meter shall be installed by the meter operator. Cables shall be run in LSF/SWA/XLPE/CU.

The installation of the cables between the meter/isolator and the consumer units shall be by the contractor. Lateral distribution shall be on cable tray through the, Block A common parts ceiling void, Block G soffit above the external walkway. Containment must be for the exclusive use of the network operator and under no circumstance shall any private equipment or cables be attached.

Blocks F & H

Meters shall be grouped within a dedicated area at ground floor.

The Contractor shall supply and install HDPE cable ducts 'black' in colour run, from the common metering point, below the slab, to riser positions adjacent to the party wall in each unit. The ducts shall be coordinated with the structural engineer, where necessary cast through the buildings foundations with long radius bends, to allow cables to be drawn through. The raising cables shall be run on galvanised steel tray through the common services riser, with a second galvanised tray mounted in front for additional mechanical protections. Cables shall be run in LSF/SWA/XLPE/CU.

Cables entering through the airtightness line shall be pulled through tight fitting neoprene grommets. Cables passing through thermal lines shall be suitably sized and debated. Within each dwelling each cable shall be run within the ceiling void to the consumer unit. Consumer units shall be mounted at an accessible height, 1200 Above Finished Floor level, in an accessible location.

The Employer's Requirements state 'Smart Meters' should be fitted. The contractor shall design the incoming service so that a smart meter can be installed by the nominated electrical supplier. Smart meters shall be located within the dwellings and readily accessible to the tenants.

Landlord services

A landlords MCCB distribution board shall be located in a secured landlords area, cupboard or services riser. Final circuits shall be run as per the distribution schedule.

Sockets shall be isolated by means of a key switch adjacent to the distribution board, mounted 450 AFFL. All equipment shall be provided with an appropriate means of isolation.

- Common parts electrical accessories, flush mounted metal plates MK Metalclad plus white / MK Albany Plus ranges
- Back of house electrical accessories, surface mounted MK Metalclad plus / MK Commando / MK Masterseal ranges
- External electrical accessories, MK Masterseal range

After the completion of a later phase (not part of this contract) all landlords services will be served from a central backed up LV service. To facilitate an additional LV draw duct shall be provided adjacent to each incoming LV service. This service will ultimately be provided as the alternative source to the robust bower supplies to all major life safety plant (firefighting lifts, sprinklers, mechanical smoke extract).

The unused ducts shall be bunged to maintain air tightness, and to prevent ingress of debris.

A fire rated sub mains cable from landlords distribution board in the west core in Block A shall be run into east core an alternative supply for the firefighting lift, see section X10. A sources change over device / auto transfer switch shall be provided to change sources in the event of disruption to the normal supply, to the alternative supply, and restore to the normal source when reinstated and stable.

All wiring beyond the source change over device shall be run in fire rated sub mains cables.

Lift Requirements

Permanent and continuous mains supply as detailed by the manufacturer. The supply cable for the controller cabinet shall be pulled in by the CONTRACTOR terminating in a three phase +N +E (5 pin) socket

GENERAL

Provide fire stopping of the inside of all trunking, containment and cable trays, etc, passing through fire barriers. Locations of fire barriers are indicated on the Architect's drawings. Cabling and containment is to be fire stopped through the fire compartment boundaries described in the Architect's documentation.

CONTRACTOR to supply and install fire stopping material to the inside of all trunking and containment, supply and install all fire stopping materials on the outside of trunking and containment.

All cables and containment to be concealed except where written agreement has been obtained from the CA/Employers Agent. Where written agreement has been obtained wiring should be contained in hot dip galvanised steel conduit.

CONTRACTOR to supply and install labels to all primary distribution cables and final circuits at their origin, destination and at regular intervals.

Ensure references on plant coordinates with references on RECORD DRAWINGS. All labelling shall coordinate with the record drawings so that the location, function of each item of plant can be determined.

All labelling shall coordinate with the record drawings so that the location, function of each item of plant can be determined.

The entire installation shall be tested, commissioned and demonstrated in accordance with the MFllp testing, commissioning & handover schedule 4726/A64-500.

DOCUMENTATION AND RECORDS

Provide accurate documentation and records of all cabling and equipment provided as part of the installation. These should include the following:

Full as finished floor plans showing locations of all plant and equipment.

Full sets of Documentation and Records will be required on disc. All diagrams to be presented in a computerised format compatible with and transferable to the Auto CAD system 2008.

Supply full sets of documentation and record information in accordance with and as described in this specification. Comply with the requirements of Table E "Production of Handover Information" in Appendix A, "Testing & Commissioning Schedule" (dwg no. A64-500), and other clauses given in Section A64 of the Prelims A64-700.

OPERATION & MAINTENANCE MANUALS

Provide full O&M manuals. These shall include record drawings, a full description of this particular system, set-up, operation and modifications. Provide full and clear instructions for the building staff (who shall not be trained technicians) on how to operate the systems.

CODE FOR SUSTAINABLE HOMES

The Contractor shall consider the targeted Code for Sustainable Homes (CfSH) credits in the development of their design and subsequent installation. The Contractor shall provide evidence to the CfSH Assessor to support the following credits claimed:

ENE3 – Energy Display Devices: An energy display device is required in each home to indicate current electricity and heat consumption of the home.

Energy Display Device

Within each home provide a combined energy display that shall display current heat energy consumption and electrical consumption, coordinate this provision with the installed metering.

In line with Code for Sustainable Homes requirements the system should comprise of self-charging sensor(s) fixed to the incoming mains supply/supplies in order to measure and transmit energy consumption data to a visual display unit.

As a minimum the visual display unit must be capable of displaying the following information:

- Local time
- Current mains energy consumption (kilowatts and kilowatt hours)
- Current emissions (g/kg CO 2)
- Current tariff
- Current cost (in pound and pence). For pre-payment customers this should be 'real time' data and for 'credit' paying customers cost should be displayed on monthly basis
- Display accurate account balance information (amount in credit or debit)
- Visual presentation of data (i.e. non-numeric) to allow consumers to easily identify high and low level of usage
- Historical consumption data so that consumers can compare their current and previous usage in a meaningful way. This should include cumulative consumption data in any of the following forms day/week/month/billing period.

PASSIVHAUS

Cables entering through the airtightness line shall be pulled through tight fitting neoprene grommets.

Cables passing through thermal lines shall be suitably sized and derated.

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V21 GENERAL LIGHTING

PERFORMANCE OBJECTIVES

Provide a complete internal lighting and lighting control scheme for the project

To be energy efficient, controllable, safe and to comply with statutory and local authority regulations

Lighting scheme designed and installed to the highest standards of aesthetics and workmanship.

Provide lighting in the plant-rooms and utility areas for safe access and working conditions for occupants. Installation is to be attractive, highly efficient, and provide safe levels of illumination.

To meet requirements of the relevant targeted Code for Sustainable Homes (CfSH) credits.

PERFORMANCE PARAMETERS

BS EN 12464-1
BS EN 12464-2
IET Wiring Regulations 17th Edition, as amended (BS7671:2008+AMD1:2011+AMD2:2013)
Local Supplier Requirements. (incl PME Requirements).
Electricity at Work Act
Health and Safety
BS EN 50085 Cable trunking and cable ducting systems for electrical Power requirements
NHBC Standards Part 8 - services and internal finishes
CIBSE LG9: 1997 Lighting for Communal Residential Buildings
PHPP requirements

Illuminance levels

Ensure the maintained illuminance levels meet but do not significantly exceed the CIBSE Code for Lighting.
Ensure minimum colour rendering (Ra) is as CIBSE Code for Lighting.
Ensure limiting glare rating is as CIBSE Code for Lighting.
Ensure luminance limits as Table 2.4 of CIBSE Code for Lighting are not exceeded on DSE.
Install in dwellings light fittings which can only accept lamps of luminous efficacy more than 40 lumens per circuit-Watt.
Ensure that the installed lighting has an average initial (100 hour) lamp plus ballast efficacy of not less than 50 lamp lumens per circuit-Watt.
Ensure the installed load for lighting does not exceed 12 W/m2.
Ensure lighting scheme complies with the Building Regulations Approved Document as L1A.
Use the recommendations in BRE Digest 498.

Room	**Lux**	**Proposed fittings***
Bathrooms	150	LED down lights
Bedrooms	100	CFL pendants / LED down lights
Hall/ landings	100	CFL pendants / LED down lights

Kitchen	250	CFL pendants / LED down lights
Living room	100	CFL pendants / LED down lights
Balconies	50	LED wall mounted fittings
Entrance lobbies	200	LED down lights / Architectural LED pendants / LED wall mounted fittings
Common parts	100	LED down lights / Architectural LED pendants / LED wall mounted fittings
Protected Stair	100	LED down lights / Architectural LED pendants / LED wall mounted fittings
Plant rooms	200	IP rated enclosed fluorescent strips
Storage / bins / bikes	200	IP rated enclosed fluorescent strips

* proposed fittings are shown on MFllp lighting schedule 4726/V[21]500, and described within the architects room data sheets.

Plant/equipment life - a minimum of 20 years without major replacement. System life - in excess of 25 years.

SYSTEM DESCRIPTIONS

The information prepared for the tender has been developed to a RIBA stage E level to establish; the scope of works for MEP installations for this phase, the design strategies, space requirements and distribution routes.

The Contractor is to design, supply, install, test and commission the new installation in line with the intent described in this specification, V-series drawings, schematics and schedules. All design responsibility for the correct operation and compliance with the performance objectives and design parameters within the specification rest with the contractor.

Any information relating to the size and duty of equipment that has been included within the tender information, has been included to indicate the assumptions used to establish the space requirements and distribution routes, and should not be relied upon for the purposes of the contractors design.

The CONTRACTOR shall design, supply, install test and commission a complete internal lighting system to meet the performance objectives and design parameters. Provide lighting design in line with the intent shown on the Max Fordham LLP V(21)- tender layouts, and V(21)500 lighting schedule. The entire lighting systems in accordance with the IET wiring regulations 17th Edition, NIC/EIC technical guidance BS EN 12464 (where applicable to common parts and commercial areas), Building regulations Part L1A

Fittings should have a minimum colour temperature of around 3,000 Kelvin and colour rendering index (CRI) of over 80. Lights should come on instantaneously in line with RNIB recommendations.

Dwellings

Each room shall have at least one fixed lighting outlet. Bedrooms and living rooms shall typically be fitted with pendant lamps cantered to the rooms switched from a single wall light switch. Pendant lamps shall be dedicated energy efficient fitting.

Kitchens shall typically be fitted with minimum 4 No. recessed LED down light. Wall hung kitchen units shall be fitted with LED pelmet lighting switched separately from the main ceiling lights.

Light switches shall be mounted 1100 mm above the finished floor level, centred 100 mm away from the door architrave on the latched side. Light switches for WCs and bathrooms shall be on the outside of the room.

Bathroom lights (minimum 4 No.) shall be suitably IP rated, LED downlights, LV halogen lamps will not be accepted. A separately switched over sink light shall be provided within the main bathroom of each dwelling. All bathroom lights shall be SELV (Safety Extra Low Voltage) as applicable where installed within the zones defined within the IEE Wiring Regulations 17th Edition - guidance note 6 specialist installations.

Within maisonettes two way switching should be provided for staircases.

Private residential external balconies shall have a IP rated wall mounted fitting, with (integral or separate) photocell override manually switched from inside the dwelling. BS 8536 cables and RCD protection shall be used for external lighting. See section V20.

Residential common parts

Fittings in common areas should be vandal resistant using polycarbonate diffusers and vandal resistant screws. These will be controlled by a photo cell and PIR switched with timer overrun, within the ceiling void fittings shall be connected with a length of flex back to click roses facilitating lamp changing and maintenance of the fittings. Common parts shall have minimum illuminance of 100 lux at floor level, excepting in entrance areas which shall have minimum illuminance of 200lux at floor level.

Lighting in common parts is to be feed from the landlord's distribution board in each stair core.

Stair cases shall be fitted with robust architectural LED fittings. These will be controlled by a photo cell and PIR switched at each landing with timer overrun. Lighting circuits should be run in BS 8463 cables through the walls. They shall have minimum illuminance of 100 lux at landings and the middle tread between landings.

At each landing the landlords permanent lighting installation must provide a minimum luminance of 200 lux adjacent to the lift controller at floor level, lux levels shall be measured with the lift door closed at as EN81-1 clause 7.6.1. The lighting within the lift car and within the lift shaft will be by the lift contractor, from supplies within their own equipment.

The entrance area and stair cores shall be fitted with IP rated architectural lighting. These lights shall be switched via time clock and photo cell from the residential landlords distribution board. The minimum luminance of 100 lux at floor level.

The landlords back of house areas- plant areas shall be fitted with IP rated enclosed linear fluorescent fittings (T5) typically surface mounted to the underside of concrete soffits. These shall be manually switched. Lighting circuits in back of house areas should be run in either, LSF insulated single core cables to BS 7211 in surface run screwed metal conduit containment or, BS 8436 cables neatly surface clipped, where installed below 2.5m AFFL cables should be sleeved through metal conduit containment for additional mechanical protection. Final flex tails and click roses should be installed where lights are suspended.

External lighting cables shall be run in SWA with all conduit concealed and shall be designed to achieve CfSH credit Ene 6 External Lighting, this requires dedicated energy efficient fittings with appropriate control system. BS 8536 cables and RCD protection shall be used for external lighting. See section V20.

Low level lighting to external landscaping and stairs shall be provided by IP rated external lights controlled by a photo cell and PIR.

Architectural accent lighting to exterior of the building, including recessed stair lights. This should also use dedicated energy efficient fittings with an appropriate control system.

Other external spaces such as the bike store and rear gardens shall be fitted with IP rated enclosed linear fluorescent fittings (T5) or LED external lights controlled by PIR and photocells. Low level lights should be provided for external stairs and ramp access, these shall be controlled by photocell and time clock control.

External Lighting See section V41

Emergency Lighting see section V40

GENERAL

Provide fire stopping of the inside of all trunking, containment and cable trays, etc, passing through fire barriers. Locations of fire barriers are indicated on the Architect's drawings. Cabling and containment is to be fire stopped through the fire compartment boundaries described in the Architect's documentation. CONTRACTOR to supply and install fire stopping material to the inside of all trunking and containment, supply and install all fire stopping materials on the outside of trunking and containment.

All cables and containment to be concealed except where written agreement has been obtained from the CA/Employers Agent. Where written agreement has been obtained wiring should be contained in hot dip galvanised steel conduit.

CONTRACTOR to supply and install labels to all primary distribution cables and final circuits at their origin, destination and at regular intervals.

Ensure references on plant coordinates with references on RECORD DRAWINGS. All labelling shall coordinate with the record drawings so that the location, function of each item of plant can be determined.

All labelling shall coordinate with the record drawings so that the location, function of each item of plant can be determined.

The entire installation shall be tested, commissioned and demonstrated in accordance with the MFllp testing, commissioning & handover schedule 4726/A64-500.

DOCUMENTATION AND RECORDS

Provide accurate documentation and records of all cabling and equipment provided as part of the installation. These should include the following:

Full as finished floor plans showing locations of all plant and equipment.

Full sets of Documentation and Records will be required on disc. All diagrams to be presented in a computerised format compatible with and transferable to the Auto CAD system 2008.

Supply full sets of documentation and record information in accordance with and as described in this specification. Comply with the requirements of Table E "Production of Handover Information" in Appendix A,

"Testing & Commissioning Schedule" (dwg no. A64.500), and other clauses given in Section A64 of the Prelims A64-700.

OPERATION & MAINTENANCE MANUALS

Provide full O&M manuals. These shall include record drawings, a full description of this particular system, set-up, operation and modifications. Provide full and clear instructions for the building staff (who shall not be trained technicians) on how to operate the systems.

CODE FOR SUSTAINABLE HOMES

Credit **ENE6** External Lighting – 2 credits targeted - all external space lighting, including lighting in the common areas, is provided by dedicated energy efficient fittings with appropriate control systems, including PIRs, daylight cut-off sensors and time switches.

The fitting must be dedicated in that it must be capable of only accepting lamps having a luminous efficacy greater than 40 lumens per circuit watt. A light fitting may contain one or more lamps. Tubular fluorescent and compact fluorescent light fittings would typically meet this requirement.

All security light fittings are designed for energy efficiency and are adequately controlled such that: All burglar security lights have: A maximum wattage of 150 W, Movement detecting control devices (PIR) and Daylight cut-off sensors

All other security lighting: Is provided by dedicated energy efficient fittings AND Is fitted with daylight cut-off sensors OR a time switch.

Credit **ENE 8** Cycle stores

Cycle storage facilities must adequately lit in line with the Ene 6 requirements.

PASSIVHAUS

Cables entering through the airtightness line shall be pulled through tight fitting neoprene grommets.

Cables passing through thermal lines shall be suitably sized and debated

The lighting installation directly impacts the Passivhaus maximum annual consumption of primary energy and the lighting installation should be designed in accordance with the Max Fordham Passivhaus Guidelines.

V22 GENERAL LV POWER

PERFORMANCE PARAMETERS

The Building Regulations.
IET Wiring Regulations 17th Edition, as amended (BS7671:2008+AMD1:2011+AMD2:2013)
All relevant British Standards.
Electricity at Work Act.
Health and Safety.
British Standards and Codes of Practice,
NIC/EIC technical guidance
NHBC Standards Part 8 – services and internal finishes

Plant/equipment life - a minimum of 20 years without major replacement. System life - in excess of 25 years.

SYSTEM DESCRIPTIONS

Quantities of electrical sockets, telephone points and TV sockets are scheduled in the architectural room data sheets, and shall be at least the minimum prescribed by HBC Section 8.1 and Code for Sustainable Homes credit Ene 9- Home Office. The CONTRACTOR shall allow for the supply installation and testing of these electrical accessories and others described below and on the drawings.

Where appliances are intended to be installed within kitchens unswitched sockets are to be installed below the work top level, switched from a multi-grid switch plate above the work top level in the kitchen..

Unswitched fuse spurs with neon indicators on dedicated circuits shall be provided for the MVHR unit, Heating controls system. All electrical spurs shall be engraved.

30A fuse connectors and switch isolators shall be provided for cooking hobs and separate ovens.

Unswitched fuse spurs on dedicated circuits shall be provided for the doorbell and for the future installation of a security alarm (not to be provided as part of the contract works).

All electrical accessories within the dwellings shall be White plastic accessories MK or approved alternative. Electrical accessories shall be centred above finished floor level, 450 mm at low level, 1100 mm for light switches, 2200 mm at high level, 550 mm when below worktops, and 150 mm above worktops.

The drawings show a typical electrical services layout within a sample of maisonettes and flats. The CONTRACTOR is responsible for the coordination of all services and routing of all cables through ceiling voids and partition walls. No services shall distribute through the floor voids. The CONTRACTOR shall be responsible for setting out of all electrical accessories on installation drawings for comment by the Architect.

Semi recessed consumer units shall be located within each dwelling, either at high level within the hallway, or within an accessible cupboard. Final circuits should be run in BS 8463 cables, through stud partitions, ceiling voids. Protective metal sheaths shall be terminated, earthed and gladded at accessories and the consumer unit in accordance with the manufacturer's requirements. Kitchen electrical appliances shall be connected to fused spurs which are isolated by a multi-grid switch. All circuits, including light circuits within special areas (kitchens, bathrooms and external power & lighting) shall be protected with 30mA RCD circuit protective devices.

General small power ring main

Kitchen small power ring main
Cooker
Fridge/freezer
MVHR/heating
Smoke alarm (not RCD)
Door bell
Lighting

GENERAL

Provide fire stopping of the inside of all trunking, containment and cable trays, etc, passing through fire barriers. Locations of fire barriers are indicated on the architects' drawings. Cabling and containment is to be fire stopped through the fire compartment boundaries described in the Architect's documentation. CONTRACTOR to supply and install fire stopping material to the inside of all trunking and containment, supply and install all fire stopping materials on the outside of trunking and containment.

All cables and containment to be concealed except where written agreement has been obtained from the CA/Employers Agent. Where written agreement has been obtained wiring should be contained in hot dip galvanised steel conduit.

CONTRACTOR to supply and install labels to all primary distribution cables and final circuits at their origin, destination and at regular intervals.

Ensure references on plant coordinates with references on RECORD DRAWINGS. All labelling shall coordinate with the record drawings so that the location, function of each item of plant can be determined.

All labelling shall coordinate with the record drawings so that the location, function of each item of plant can be determined.

The entire installation shall be tested, commissioned and demonstrated in accordance with the MFllp testing, commissioning & handover schedule 4726/A64-500.

DOCUMENTATION AND RECORDS

Provide accurate documentation and records of all cabling and equipment provided as part of the installation. These should include the following:

Full as finished floor plans showing locations of all plant and equipment.

Full sets of Documentation and Records will be required on disc. All diagrams to be presented in a computerised format compatible with and transferable to the Auto CAD system 2008.

Supply full sets of documentation and record information in accordance with and as described in this specification. Comply with the requirements of Table E "Production of Handover Information" in Appendix A, "Testing & Commissioning Schedule" (dwg no. A64.500), and other clauses given in Section A64 of the Prelims A64-700.

OPERATION & MAINTENANCE MANUALS

Provide full O&M manuals. These shall include record drawings, a full description of this particular system, set-up, operation and modifications. Provide full and clear instructions for the building staff (who shall not be trained technicians) on how to operate the systems.

CODE FOR SUSTAINABLE HOMES

Credit Ene9 Home office: power points shall be provided in appropriate quantities and location to support the securing of the credit.

PASSIVHAUS

Cables entering through the airtightness line shall be pulled through tight fitting neoprene grommets.

Cables passing through thermal lines shall be suitably sized and debated

Unlike building regulations, SAP calculations, and CfSHH all small power regulated and un regulated is accounted for in the passivhaus maximum annual consumption of primary energy 120W/m2/year

V40 EMERGENCY LIGHTING

PERFORMANCE OBJECTIVES

To provide emergency lighting throughout the building to allow residents to escape from the building, through the common parts, to a place of safety outside the building in the event of a mains or lighting sub-mains failure.

PERFORMANCE PARAMETERS

Building Regulations England & Wales
Local Fire Brigade requirements and recommendations
Local Authority Building Control Requirements
BS 5266:Pt 1 Code of practice for emergency lighting for premises other than cinemas and certain other premises used for public entertainment. (N.B for minimum lighting levels of public areas refer to other documents listed.)
BS EN 1838 Lighting applications - Emergency Lighting
BS 7671 Requirements for electrical installations (IEE Wiring Regulations)
BS EN 60598-2-2-2 Luminaires. Particular requirements. Recessed luminaires
BS EN 60598-2-22 Particular requirements - Luminaires for emergency lighting
BS 5499 - Specification for exit signs
ICEL 1001:1999 Industry Committee for Emergency Lighting; Scheme of Product and Authenticate photometric data Registration for Emergency Luminaires and Conversion Modules.
ICEL 1004:2003 The use of Emergency Lighting Modification Units
ICEL 1006:1999 Emergency Lighting Guide
IET Wiring Regulations 17th Edition, as amended (BS7671:2008+AMD1:2011+AMD2:2013)
BS 5588 Fire precautions in the design, construction and use of buildings. Access and facilities for fire-fighting
BS EN 9999 Code of practice for fire safety in the design, management and use of buildings
CIBSE LG9: 1997 Lighting for Communal Residential Buildings

SYSTEM DESCRIPTIONS

The information prepared for the tender has been developed to a RIBA stage E level to establish; the scope of works for MEP installations for this phase, the design strategies, space requirements and distribution routes.

The Contractor is to design, supply, install, test and commission the new installation in line with the intent described in this specification, V-series drawings, schematics and schedules. All design responsibility for the correct operation and compliance with the performance objectives and design parameters within the specification rest with the contractor.

Any information relating to the size and duty of equipment that has been included within the tender information, has been included to indicate the assumptions used to establish the space requirements and distribution routes, and should not be relied upon for the purposes of the contractors design.

Provide all necessary adaptors, connections, offsets, fixings, mounting brackets and sundry items to provide a complete installation.

Produce design information as detailed in Appendix A of this specification. Issue design drawings and calculations for comment to the Employer

Issue drawings and provide completed testing and commissioning certificates –see Max Fordham LLP testing and commissioning schedule A64-500

The installation's design certificates and test certificates shall be filled out and signed by the Contractors designer and electrical test engineer and submitted to the Client for approval.

Carry out tests and issue certificates. Issue record drawings and O&M manual - See section A64.

MFLLP V(21)-series drawings give example typical lighting layouts within communal cores including emergency

The CONTRACTOR shall design, supply, install and tests the entire emergency lighting system in accordance with the IET wiring regulations 17th Edition, NIC/EIC technical guidance BS 5266 Part 1, Building Regulations Part B, BS 5588 Part 11 and the requirements of Building Control and the Fire Officer. To provide emergency lighting throughout the building to allow residents to escape from the building, through the common parts, to a place of safety outside the building in the event of a mains or lighting sub-mains failure.

Emergency lighting shall be installed and maintained in the common areas in accordance with BS 5266: Part 1 code of practice for emergency lighting for premises other than cinemas and certain other premises used for public entertainment. No emergency lighting is required within the dwellings.

Generally emergency lighting shall be self-contain combined emergency fittings, of the same type as the landlords lighting, used as part of the normal lighting scheme with automatic changeover (on failure of the main supply or un switched live local circuit) with either integral or remote battery packs. Test key switches shall be provided within each stair core with metal clad faceplates mounted within a secured landlord's service cupboard or riser. Remote battery packs shall be within one meter cable length of the luminaire.

Use of MCB as means for testing emergency lighting systems will not be accepted.

The emergency lighting must be able to support Emergency Lighting (lux levels) in accordance with the relevant British Standards to all areas.

Provide a minimum of 1 lux illuminance along the centre line at floor level on unobstructed escape routes no more than 2m; 1 lux illuminance along the centre line at floor level on all other escape routes, and no less than 0.5lux illuminance elsewhere in the escape route. Typically maintained communal LED fittings.

Achieve a minimum of 0.5 lux to open areas greater than 60m2.

Plant and switch rooms to achieve a minimum 15lux.

Bike stores to achieve a minimum 5lux.

A dedicated emergency combined emergency fitting shall be provided above all landlord distribution boards, and source change over devices / auto transfer switches

Plant / equipment life - a minimum of 20 years without major replacement. System life - in excess of 25 years. This excludes the emergency lighting battery packs which have a shorter design life (of the order of 10 years provided the manufacturer's environmental conditions are met).

An external emergency fittings, shall provide illumination for safe egress at all final exits

Illuminated emergency signage shall be installed and maintained in the common areas in accordance with BS 5499: Part 1 (ETAP/K5) flush wall recessed luminaries, fluorescent self-contained maintained fittings, with pictogram, RAL 9003 White flat steel frame.

Emergency lighting within the lift car and lift shaft shall be provided by the SPECIALIST LIFT CONTRACTOR.

Install equipment in accordance with manufacturer's recommendations.

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.

GENERAL

Provide fire stopping to the inside of all trunking, containment and cable trays, etc, passing through fire barriers. Locations of fire barriers are indicated on the architects' drawings. Cabling and containment is to be fire stopped through the fire compartment boundaries described in the Architect's documentation. CONTRACTOR to supply and install fire stopping material to the inside of all trunking and containment, supply and install all fire stopping materials on the outside of trunking and containment.

All cables and containment to be concealed except where written agreement has been obtained from the CA/Employers Agent. Where written agreement has been obtained wiring should be contained in hot dip galvanised steel conduit.

CONTRACTOR to supply and install labels to all primary distribution cables and final circuits at their origin, destination and at regular intervals.

Ensure references on plant coordinates with references on RECORD DRAWINGS. All labelling shall coordinate with the record drawings so that the location, function of each item of plant can be determined.

All labelling shall coordinate with the record drawings so that the location, function of each item of plant can be determined.

The entire installation shall be tested, commissioned and demonstrated in accordance with the MFllp testing, commissioning & handover schedule 4726/A64-500

CODE FOR SUSTAINABLE HOMES

Credit **ENE6** External Lighting – 2 credits targeted - all external space lighting, including lighting in the common areas, is provided by dedicated energy efficient fittings with appropriate control systems, including PIRs, daylight cut-off sensors and time switches.

The fitting must be dedicated in that it must be capable of only accepting lamps having a luminous efficacy greater than 40 lumens per circuit watt. A light fitting may contain one or more lamps. Tubular fluorescent and compact fluorescent light fittings would typically meet this requirement.

All security light fittings are designed for energy efficiency and are adequately controlled such that: All burglar security lights have: A maximum wattage of 150 W, Movement detecting control devices (PIR) and Daylight cut-off sensors

All other security lighting: Is provided by dedicated energy efficient fittings AND Is fitted with daylight cut-off sensors OR a time switch.

Credit **ENE 8** Cycle stores – Cycle storage facilities must adequately lit in line with the Ene 6 requirements

PASSIVHAUS

Cables entering through the airtightness line shall be pulled through tight fitting neoprene grommets.

Cables passing through thermal lines shall be suitably sized and debated

MAX FORDHAM

V41 EXTERNAL LIGHTING

PERFORMANCE OBJECTIVES

Provide a complete external lighting and lighting control scheme for the project

To be energy efficient, controllable, safe and to comply with statutory and local authority regulations

Lighting scheme designed and installed to the highest standards of aesthetics and workmanship.

To meet requirements of the relevant targeted Code for Sustainable Homes (CfSH) credits.

PERFORMANCE PARAMETERS

- Local Authority requirements
- All relevant British Standards
- BS EN 13201-2:2003 Road Lighting, Part 2: Performance Requirements
- BS 5489-1:2003 Code of Practice for the Design of Road Lighting- Part 1: Lighting of Roads and Public Amenity Area
- IET Wiring Regulations 17th Edition, as amended (BS7671:2008+AMD1:2011+AMD2:2013)
- Local Supplier Requirements. (incl PME Requirements).
- Electricity at Work Act
- Health and Safety
- BS EN 50085 Cable trunking and cable ducting systems for electrical Power requirements
- CIBSE LG9: 1997 Lighting for Communal Residential Buildings
- 'Guidance Notes for the Reduction of Obtrusive Light', The Institution of Lighting Professionals (ILP), 2011, www.ilp.org.uk
- 'Lighting and the Environment - A Guide to Good Urban Lighting', ILP/CIBSE
- CIBSE Guidelines in Code for Exterior Lighting
- The Building Regulations Part L
- Secured by Design - New Homes Section 2 Physical Security

Illuminance levels:

Zone	**Lux**	**Proposed fittings***
External pathways	10	Bollards and pole-mounted down lights
Car parking spaces	10	Pole-mounted down lights
Roads	10	Pole-mounted down lights
Steps and obstructions	50	Bollards and wall mounted lights
Main entrances	50	Down lights and wall mounted lights
MUGA	200	Pole mounted floodlighting

* where fittings are in areas designed to adoptable standards (irrespective if they are to be formally adopted or not) fittings shall meet Camden Council adoptable standards.

Plant/equipment life - a minimum of 20 years without major replacement. System life - in excess of 25 years.

SYSTEM DESCRIPTIONS

The information prepared for the tender has been developed to a RIBA stage E level to establish; the scope of works for MEP installations for this phase, the design strategies, space requirements and distribution routes.

The Contractor is to design, supply, install, test and commission the new installation in line with the intent described in this specification, V-series drawings, schematics and schedules. All design responsibility for the correct operation and compliance with the performance objectives and design parameters within the specification rest with the contractor.

Any information relating to the size and duty of equipment that has been included within the tender information, has been included to indicate the assumptions used to establish the space requirements and distribution routes, and should not be relied upon for the purposes of the contractors design.

External lighting shall be provided to ensure safe pedestrian and vehicular routes through the development. All on-site access roads, footpaths and cycleways shall be lit to CIBSE recommended levels. All access routes to plant areas shall be lit to provide safe access for maintenance. Adequate lighting shall be provided to the bicycle racks/shed in accordance with BS5489 Part 1.

External lighting must also provide sufficient ambient light for the CCTV system and enhance the architecture of the building and landscaping. Lighting shall be compatible with CCTV systems but shall not be over specified in other areas.

In accordance with planning requirements and CfSH criteria, the external lighting scheme must be designed to ensure that external lighting is concentrated in the appropriate areas and that upward light spill is minimised, avoiding unnecessary light pollution, energy consumption and nuisance to neighbouring properties. Light pollution of the night sky shall be avoided by following the recommendations of the ILP Lighting guidance 'Guidance Notes for the Reduction of Obtrusive Light' 2011 which gives the following four sets of recommendations:

- Limits to the average upward light ratio of the luminaires, to restrict sky glow.
- Limiting illuminances at the windows of nearby properties for which light trespass might be an issue.
- Limiting the intensity of each light source in potentially obtrusive directions beyond the site boundaries.
- Limiting the average luminance of the building, if it is floodlit.

Low level path lighting and street lamps that direct light downwards shall both be used to reduce general light pollution.

Luminaires shall be selected to be resistant to vandalism, and maximise energy efficiency. All wall mounted luminaires shall be fed by back entry. The lighting shall satisfy the requirements of BS 5489.

All luminaires shall be wired on multiple circuits to avoid loss of light to whole areas in the event of a mains/circuit failure.

External lights shall be fitted with timeclock control and daylight level sensing so that they are only on when required.

To achieve CfSH Credit Man4, an Architectural Liaison Officer (ALO) or Crime Prevention Design Advisor (CPDA) from the local police force shall be consulted at the design stage regarding the external lighting of the development and their recommendations are incorporated into the design of the dwelling. Section 2 – Physical Security from ‘Secured by Design – New Homes’ shall also be complied with.

Provide all necessary adaptors, connections, offsets, fixings, mounting brackets and sundry items to provide a complete installation.

Produce design information as detailed in Appendix A of this specification. Issue design drawings and calculations for comment to the Employer

Issue drawings and provide completed testing and commissioning certificates –see Max Fordham LLP testing and commissioning schedule A64-500

The installation's design certificates and test certificates shall be filled out and signed by the Contractors designer and electrical test engineer and submitted to the Client for approval.

Carry out tests and issue certificates. Issue record drawings and O&M manual - See section A64.

The CONTRACTOR shall design, supply, install and tests the entire external lighting system in accordance with the IET wiring regulations 17th Edition and Building Regulations Part L.

Plant / equipment life - a minimum of 20 years without major replacement. System life - in excess of 25 years. This excludes the emergency lighting battery packs which have a shorter design life (of the order of 10 years provided the manufacturer's environmental conditions are met).

An external emergency fittings, shall provide illumination for safe egress at all final exits

Install equipment in accordance with manufacturer's recommendations.

GENERAL

Provide fire stopping to the inside of all trunking, containment and cable trays, etc, passing through fire barriers. Locations of fire barriers are indicated on the architects' drawings. Cabling and containment is to be fire stopped through the fire compartment boundaries described in the Architect's documentation. CONTRACTOR to supply and install fire stopping material to the inside of all trunking and containment, supply and install all fire stopping materials on the outside of trunking and containment.

All cables and containment to be concealed except where written agreement has been obtained from the CA/Employers Agent. Where written agreement has been obtained wiring should be contained in hot dip galvanised steel conduit.

CONTRACTOR to supply and install labels to all primary distribution cables and final circuits at their origin, destination and at regular intervals.

Ensure references on plant coordinates with references on RECORD DRAWINGS. All labelling shall coordinate with the record drawings so that the location, function of each item of plant can be determined.

All labelling shall coordinate with the record drawings so that the location, function of each item of plant can be determined.

The entire installation shall be tested, commissioned and demonstrated in accordance with the MFllp testing, commissioning & handover schedule 4726/A64-500

CODE FOR SUSTAINABLE HOMES

Credit **ENE6** External Lighting – 2 credits targeted - all external space lighting, including lighting in the common areas, is provided by dedicated energy efficient fittings with appropriate control systems, including PIRs, daylight cut-off sensors and time switches.

The fitting must be dedicated in that it must be capable of only accepting lamps having a luminous efficacy greater than 40 lumens per circuit watt. A light fitting may contain one or more lamps. Tubular fluorescent and compact fluorescent light fittings would typically meet this requirement.

All security light fittings are designed for energy efficiency and are adequately controlled such that: All burglar security lights have: A maximum wattage of 150 W, Movement detecting control devices (PIR) and Daylight cut-off sensors

All other security lighting: Is provided by dedicated energy efficient fittings AND Is fitted with daylight cut-off sensors OR a time switch.

Credit **ENE 8** Cycle stores – Cycle storage facilities must adequately lit in line with the Ene 6 requirements

PASSIVHAUS

Cables entering through the airtightness line shall be pulled through tight fitting neoprene grommets.

Cables passing through thermal lines shall be suitably sized and debated

The lighting installation directly impacts the Passivhaus maximum annual consumption of primary energy and the lighting installation should be designed in accordance with the Max Fordham Passivhaus Guidelines.

W10 TELECOMMUNICATIONS

PERFORMANCE OBJECTIVES

To provide all dwellings with telecom and broadband infrastructure. The broadband service should be the fasted available to the development.

To investigate eligibility for the installation of FTTP (fibre to the premises) installation rather than copper helping you get up to 300Mb connection speeds if required via an open access BT system (not currently available everywhere)

To provide a robust telecoms link for statutory monitoring of all landlords' life safety systems.

To promote working from home by providing occupants with the necessary space and services thus reducing the need to commute. CfSH Ene 9

PERFORMANCE PARAMETERS

The installation systems shall comply with all the requirements of BT Openreach.

BT Openreach - Builders Guide issue 7

IET Wiring Regulations 17th Edition, as amended (BS7671:2008+AMD1:2011+AMD2:2013)

BS EN 50132 part 7.

Code for Sustainable Homes, credit Ene 9

NHBC Standards Part 8 - services and internal finishes

Openreach's Next Generation Access (NGA) Commercial Engagement Manager for London and the South East - Nicola Porter-Vaughan

SYSTEM DESCRIPTIONS

<u>Disconnections of existing supplies</u>

Phase 1 as part of the demolition and enabling works that precede this contract, existing telecoms and Cable Access Television (CATV) services to the Broadstone properties 1-4, will have been disconnected beyond the site boundary by the respective service provider.

Phase 2: The contractor shall engage BT Openreach and Virgin Media to disconnect the supplies entering site to Manston House & Sherborne House, from Agar Grove. The contractor shall arrange diversions with the service providers where services extend on to other dwellings.

New Connection

The consultant has already been in discussions with BT Openreach Next Generation Access (NGA) Commercial Engagement Manager London & SE, regarding brining Fibre To The Premises (FTTP). The project is considered of significant scale to be considered for FTTP.

Its note notes BT Openreach have no statutory obligations to provide FTTP, until such time they make a formal offer by means of a quotation and that quotations being accepted and paid in full.

The street infrastructure differs significantly to the copper infrastructure.

FTTP requires no above ground externals cabinets, between the exchange and the premises. Fibre distribution node are accommodated in below ground pits within the footpaths. The specification of below ground ducts differs as do the entry details.

The incoming telecommunications service shall incorporate Fibre to the Premises (FTTP). Optical fibre will be the only communication source and will provide all voice and Super Fast BroadBand (SFBB) services. This network with be installed from the outset.

In the first instance an application shall be made to the BT Openreach New sites connection team

Include for all the requirements of the Openreach Developers Guide for a Multiple Dwelling Unit.

http://www.openreach.co.uk/orpg/home/network/developingournetwork/documentationandinformation/buildersguide/downloads/developers_guide.pdf.

Blown fibre tube is to run to in the main electrical risers within each Plot/Core. Subsequent distribution to each flat is to be via cabling/fibre tube/ any other equipment required located in electrical risers and distribution routes.

The final design of the fibre infrastructure will be completed during the next stage with the New Sites team so as to agree the placing of Customer Splicing Points, Optical Network Terminal, etc.

Allow for all internal distribution works irrespective of whether these are carried out by the service provider or the trade contractor. Its noted that BT Openreach pay a developers rebate for the installation of their infrastructure, and offer free issue martials for the sole purpose of the developments telecoms infrastructure.

RJ45 data plates shall be provided for all telecoms / data points within the dwellings, star wired from the incoming service point within the dwelling.

Should FTTP not be offered to the development, the contractor shall demonstrate to the client that all avenues for securing an FTTP service to the development, including presenting all communications, written, electronic, minutes of meetings and telephone notes. The contractor shall await instruction before commencing with the installation of a copper infrastructure.

The CONTRACTOR shall then install draw ducts and junction pits for a new below ground distribution network for BT telecom services. Draw ducts, draw ropes, junction pit ironmongery and standard junction pit covers/frames are available free issue from BT Openreach for use on assigned projects. Builders work materials, bricks, concrete, mortar and bedding are to be supplied by the CONTRACTOR.

New group services are to be brought into the buildings from the existing infrastructure in Agar Grove & Agar Place, below ground to each stair core. Below ground entry details shall be in accordance with the BT Openreach Builders Guide 'entry into flats and business properties', Distribution Points DP Boxes, shall be located in locked landlords' areas, preferably at the base of an electrical service riser. Sealed metal containment shall be provided by the CONTRACTOR for the internal distribution of telecom services generally run within a dedicated compartment of a multi compartment service trunking. Within the riser, common parts ceiling void.

Internal distribution within the dwelling shall be through uPVC high impact conduit run within the ceiling void, stud walls or floor build-up. The primary BT socket shall be installed within the living room BT shall make final connections and provide the primary socket front plate. The contractor shall install all back boxes and wiring beyond the primary socket including cover plates. Extension sockets are to be provided within each bedroom and 2no. are required at the designated home office station for compliance CfSH Ene 9 credit.

BT Openreach shall install cables and DPS unless BT Openreach instructs the CONTRACTOR otherwise.

The landlord should be provided with 1telecoms lines. Dedicated BT lines are also to be installed within the landlords areas for the.

The emergency autodialer of each lift.
Heat metering network gateway,
Common parts fire detection red care line (no active subscription required)
Building Management System, network gateway per boiler plant room.

GENERAL

Provide fire stopping of the inside of all trunking, containment and cable trays, etc, passing through fire barriers. Locations of fire barriers are indicated on the architects' drawings. Cabling and containment is to be fire stopped through the fire compartment boundaries described in the Architect's documentation. CONTRACTOR to supply and install fire stopping material to the inside of all trunking and containment, supply and install all fire stopping materials on the outside of trunking and containment.

All cables and containment to be concealed except where written agreement has been obtained from the CA/Employers Agent. Where written agreement has been obtained wiring should be contained in hot dip galvanised steel conduit.

CONTRACTOR to supply and install labels to all primary distribution cables and final circuits at their origin, destination and at regular intervals.

Ensure references on plant coordinates with references on RECORD DRAWINGS. All labelling shall coordinate with the record drawings so that the location, function of each item of plant can be determined.

All labelling shall coordinate with the record drawings so that the location, function of each item of plant can be determined.

The entire installation shall be tested, commissioned and demonstrated in accordance with the MFllp testing, commissioning & handover schedule 4726/A64-500.

DOCUMENTATION AND RECORDS

Provide accurate documentation and records of all cabling and equipment provided as part of the installation. These should include the following:

Full as finished floor plans showing locations of all plant and equipment.

Full sets of Documentation and Records will be required on disc. All diagrams to be presented in a computerised format compatible with and transferable to the Auto CAD system 2008.

Supply full sets of documentation and record information in accordance with and as described in this specification. Comply with the requirements of Table E "Production of Handover Information" in Appendix A, "Testing &

Commissioning Schedule" (dwg no. A64.500), and other clauses given in Section A64 of the Prelims A64-700.

OPERATION & MAINTENANCE MANUALS

Provide full O&M manuals. These shall include record drawings, a full description of this particular system, set-up, operation and modifications. Provide full and clear instructions for the building staff (who shall not be trained technicians) on how to operate the systems.

CODE FOR SUSTAINABLE HOMES

Credit **Ene9** Home office: data and broadband telecom points shall be provided in an appropriate location to support the securing of the credit.

PASSIVHAUS

Cables entering through the airtightness line shall be pulled through tight fitting neoprene grommets.

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W40 ACCESS CONTROL

PERFORMANCE OBJECTIVES

The access control system shall comply with the Camden controlled door entry system specification for new door entry systems dated 10th October 2012

PERFORMANCE PARAMETERS

IET Wiring Regulations 17th Edition, as amended (BS7671:2008+AMD1:2011+AMD2:2013)
BS 8300: Design of Buildings & their Approaches to meet the need of Disabled People - Code of Practice.
BS EN 50133-1 Alarm Systems – Access Control systems for use in security applications.BS EN 14637:2007
BS 7273-4:2007
CIBSE Guides.
Local Authority and other statutory requirements.
The requirements of Secure by DesignNACOSS Code of Practice.
Manufacturers recommendations.
Code of Practice for Planning, Installation and Maintenance of Access Control Systems.
The requirements of Building Control.
Fire Officers Requirements.

Plant/equipment life: A minimum of 20 years without major replacement.

System life: In excess of 25 years.

All maglock secured doors 275kg holding force

Stand by battery power - 8 hours

SYSTEM DESCRIPTIONS

The CONTRACTOR shall engage an ACCESS CONTROL SPECIALIST sub-contractor to design, supply test and install the video door entry and access control system. The specialist sub-contractor must be an approved installer of the access control system equipment manufacture.

A video/audio door entry system shall be provided to each stair core, not including ground floor maisonettes. Ground floor maisonettes have their own front doors and therefore are not connected to the entry system, but PAC key fobs shall be provided for access through communal doors and gates.

The systems shall use the Proximity Access Control (PAC) key fob as means of authorised residence entry. PAC access shall also be provided to the bicycle store and the bin store. All PAC equipment shall be purchased via the approved manufactures.

The entry panel shall be located on the front elevation of the residential entrance, each panel shall only be able to call the individual dwellings accessed from that stair core. A separate button should be provided for tradesmen.

The panel is to be fully sealed against the ingress of moisture, adverse weather and vandalism. Power supply unit, stand-by batteries and controls shall be located within the landlords' areas.

All cabling shall be run through containment concealed behind the architectural finishes, within the corridor ceiling void cables shall run within a dedicated compartment of the multi compartment trunking, and enter each dwelling at high level into the ceiling void of the dwelling through conduit. Cables entering through the airtightness line shall be pulled through tight fitting neoprene grommets.

Video monitors with audio handsets shall be provided inside each dwelling connected to the system, ideally close to the front door 1300 AFFL . The hand set shall have the facility to release the door from which it receives a call.

A doorbell shall be provided to each dwelling, push buttons wired to an internal bell; wireless doorbells shall not be used.**TBC by Client / Architect**

Secured doors

All doors shall be secure by a face pull maglock, shear maglocks shall not be permitted. Wiring shall be concealed and routed through the door frames, surface run cables shall not be permitted. All maglocks power supplies and accessories shall be mounted on the secure side of the doors. All maglock secured doors shall have a minimum holding force of 275kg. The Access Control Specialist shall liaises with Architect and contractor as to suitable maglocks

Push to exit buttons shall be fitted on the secure side of doors fitted with maglocks.

Green emergency break glass door release buttons shall be provided at all secured emergency escape doors and shall directly disconnect the power to the maglock until reset.

Fireman's key override shall be provided outside the main entrance at ground level.

The CONTRACTOR shall allow for all builders work in related to containment and connection to the electrical installation included local power requirements for magnetic locks.

No security detection and alarm shall be provided to the residential dwellings or the common parts.

Entry Panel

The entry phone panel should be rectangular, set flush to the brickwork and be conveniently located for wheelchair uses, i.e. 1200mm to speech console. It is to be stainless steel, waterproof and vandal resistant.

A tradesman's access facility to be provided to the communal entrance doors which should unlock the door between certain times of the day. Operating instructions must be clear. Buttons are to be numbered clearly and illuminated, suitable for use for the elderly and partly sighted people.

An integrated LED warning indicator is to be provided to show if an entrance door has been wedged open.

The keep and lock are to be located within the frame, to be heavy duty and non-tamper proof, to be of fail-safe type and to have two integral switches for monitoring door status.

Where secure post lobbies are provided, a second audio entry panel shall be provided, between the lobbies and the common parts.

The system shall be powered by the Landlord’s electricity supply but supported by a stand-by battery capable of operating all functions for a minimum period of 8 hours. After which the systems should fail safe and release all doors until power is restored.

The system shall be wired so that no individual dwelling, if faulty or vandalised shall cause the system to malfunction and wiring shall be so arranged that an individual dwelling can be removed from service without having to gain access to the dwelling by use of plug in connectors.

The system shall be fully rewireable, i.e. all cabling shall be contained in conduit or trunking concealed from view

GENERAL

Provide fire stopping of the inside of all trunking, containment and cable trays, etc, passing through fire barriers. Locations of fire barriers are indicated on the architects' drawings. Cabling and containment is to be fire stopped through the fire compartment boundaries described in the Architect's documentation. CONTRACTOR to supply and install fire stopping material to the inside of all trunking and containment, supply and install all fire stopping materials on the outside of trunking and containment.

All cables and containment to be concealed except where written agreement has been obtained from the CA/Employers Agent. Where written agreement has been obtained wiring should be contained in hot dip galvanised steel conduit.

CONTRACTOR to supply and install labels to all primary distribution cables and final circuits at their origin, destination and at regular intervals.

Ensure references on plant coordinates with references on RECORD DRAWINGS. All labelling shall coordinate with the record drawings so that the location, function of each item of plant can be determined.

All labelling shall coordinate with the record drawings so that the location, function of each item of plant can be determined.

The entire installation shall be tested, commissioned and demonstrated in accordance with the MFllp testing, commissioning & handover schedule 4726/A64-500.

DOCUMENTATION AND RECORDS

Provide accurate documentation and records of all cabling and equipment provided as part of the installation. These should include the following:

Full as finished floor plans showing locations of all pant and equipment.

Full sets of Documentation and Records will be required on disc. All diagrams to be presented in a computerised format compatible with and transferable to the Auto CAD system 2008.

Supply full sets of documentation and record information in accordance with and as described in this specification. Comply with the requirements of Table E "Production of Handover Information" in Appendix A, "Testing &

Commissioning Schedule" (dwg no. A64.500), and other clauses given in Section A64 of the Prelims A64-7000.

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OPERATION & MAINTENANCE MANUALS

Provide full O&M manuals. These shall include record drawings, a full description of this particular system, set-up, operation and modifications. Provide full and clear instructions for the building staff (who shall not be trained technicians) on how to operate the systems.

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W50 FIRE DETECTION AND ALARM

PERFORMANCE OBJECTIVES

Design, supply, install, test and commission a mains powered (with integral battery backup) combined smoke detector sounders and combined heat detector sounders, within each dwelling.

Appoint a specialist to design, supply, install, test and commission a fire alarm system for the basement car park and the building cores.

PERFORMANCE PARAMETERS

BS 5839: Part 1: 2002
IET Wiring Regulations 17th Edition, as amended (BS7671:2008+AMD1:2011+AMD2:2013)
Local Fire Authority Requirements.
Building Regulations Part B
The Requirements of Building Control.
The requirements of the Fire Officer.
The Regulatory Reform (Fire Safety) Order 2005
BS 9999: 2008 Code of practice for fire safety in the design, management and use of buildings
Plant/equipment life: A minimum of 20 years without major replacement. System life: In excess of 25 years.
Fire Strategy Document
NHBC Technical Standards 8:2014

BS 5839: Part 1: 2002 system type L3.

SYSTEM DESCRIPTIONS

The information prepared for the tender has been developed to a RIBA stage E level to establish; the scope of works for MEP installations for this phase, the design strategies, space requirements and distribution routes. The Contractor is to design, supply, install, test and commission the new installation in line with the intent described in this specification, V90 and W50-series drawings, schematics and schedules. All design responsibility for the correct operation and compliance with the performance objectives and design parameters within the specification rest with the contractor.

Any information relating to the size and duty of equipment that has been included within the tender information, has been included to indicate the assumptions used to establish the space requirements and distribution routes, and should not be relied upon for the purposes of the contractors design.

<u>Dwellings</u>

The CONTRACTOR shall supply, install and commission mains powered (with integral battery backup to BS 5446) combined smoke detector sounders and combined heat detector sounders, within each dwelling. In accordance with Building Regulations Approved Document part B.

Heat detector/ sounder within the kitchen
Smoke detector/ sounder within the protected hallway, and at each landing level for maisonettes.

Only the devices within a dwelling shall be interlinked where detection by one device activates the sounders of both devices. The heat detector shall be central to the kitchen /living room, a minimum of 500 mm away from the light fitting and not directly above the cooker. The same detector shall be in the hallway minimum of 500 mm away from light fittings. At least one smoke detector shall be fitted per floor. Smoke/ heat detectors should be positioned in accordance with BS 5839-6.

Sound levels shall be audible at 70 dB in all habitable rooms within the dwellings

The system is to be powered (via fire resistant cable - see below description) from a single MCB protected way (not 30mA RCD protected) from the consumer unit within the flat / maisonette.

An accessible test switch/ key switch shall be provided within the designated wheelchair accessible units, to facilitate the domestic testing of sounders.

RESIDENTIAL COMMON PARTS

The CONTRACTOR shall engage a Fire Alarm System Specialist to design, supply & install an automatic analogue addressable fire alarm system for each stair core to meet BS 5839-1:2002 requirements for type L3 life safety protection, with automatic detection in all areas except stairway lobbies, small cupboards which are considered low risk, and voids less than 800 mm deep.

The system shall be a fully addressable panel at the ground floor entrance lobby to the residential units. The panels shall provide a clear text detection zone and sensor location with indication of status, fault and alarm and capable of event logging and reporting. Schematic plans with labelled zones shall be provided adjacent to the panel for easy location of the source of alarm. A UPS battery backup on mains failure is to be provided for all panels with sufficient capacity for a full 30 min evacuation alarm after the system being in operation for at least 24h. The system shall give an audible indication that the mains power supply has been lost and the batteries are discharging. Upon reconnection of the mains supply the batteries shall re-charge.

Combined smoke detectors, sounders, beacons shall be positioned within at the top of the lift shaft, and top of the mechanical services riser, stair cores, and corridors.

Heat detectors shall be provided in each of the plant areas.

Manual call points shall be positioned at each landing and at final exit points.

Sound levels shall not exceed 95dB yet be audible at 65dB within each dwelling.

A zero volt output/input interface shall be provided for the Lift to take signal upon activation of the fire alarm, and return the lift to the ground floor.

The fire alarm system shall have the means to be monitored by a remote system such as REDcare or similar. No active subscription is required to be provided.

The system shall also interface with the automated smoke clearance system within the stair cores. See section U14

The entire installation shall be wired in enhanced fire rated cables, providing 120 minutes fire resistance in accordance with BS EN 50200:2000 Method of test for resistance to fire of unprotected small cables for use in emergency circuits and BS8434. Cables shall be run concealed behind architectural finishes within the stair

core, partition walls, and clipped to galvanised steel tray within the corridor ceiling void. The use of metal clips only shall be permitted.

GENERAL

Provide fire stopping of the inside of all trunking, containment and cable trays, etc, passing through fire barriers. Locations of fire barriers are indicated on the architects' drawings. Cabling and containment is to be fire stopped through the fire compartment boundaries described in the Architect's documentation. CONTRACTOR to supply and install fire stopping material to the inside of all trunking and containment, supply and install all fire stopping materials on the outside of trunking and containment.

All cables and containment to be concealed except where written agreement has been obtained from the CA/Employers Agent. Where written agreement has been obtained wiring should be contained in hot dip galvanised steel conduit.

CONTRACTOR to supply and install labels to all primary distribution cables and final circuits at their origin, destination and at regular intervals.

Ensure references on plant coordinates with references on RECORD DRAWINGS. All labelling shall coordinate with the record drawings so that the location, function of each item of plant can be determined.

All labelling shall coordinate with the record drawings so that the location, function of each item of plant can be determined.

The entire installation shall be tested, commissioned and demonstrated in accordance with the MFllp testing, commissioning & handover schedule 4726/A64-500.

DOCUMENTATION AND RECORDS

Provide accurate documentation and records of all cabling and equipment provided as part of the installation. These should include the following:

Full as finished floor plans showing locations of all plant and equipment.

Full sets of Documentation and Records will be required on disc. All diagrams to be presented in a computerised format compatible with and transferable to the Auto CAD system 2008.

Supply full sets of documentation and record information in accordance with and as described in this specification. Comply with the requirements of Table E "Production of Handover Information" in Appendix A, "Testing & Commissioning Schedule" (dwg no. A64.500), and other clauses given in Section A64 of the Prelims A64-7000.

OPERATION & MAINTENANCE MANUALS

Provide full O&M manuals. These shall include record drawings, a full description of this particular system, set-up, operation and modifications. Provide full and clear instructions for the building staff (who shall not be trained technicians) on how to operate the systems.

W51 EARTHING, BONDING, EMC MEASURES AND SURGE PROTECTION

PERFORMANCE OBJECTIVES

To protect occupants and equipment from the effects of short circuits and fault currents by providing a low impedance path to earth.

To protect occupants and equipment from the effects of potential differences between metalwork in fault conditions by equipotential bonding.

PERFORMANCE PARAMETERS

The Building Regulations.
The 17th edition of the IET wiring regulations, as amended (BS 7671:2008+AMD1:2011+AMD2:2013)
BS 7430
The Electricity at Work Act.
The requirements of the Electrical Supply Authority (including PME requirements).
Electricity Association Engineering Recommendations G12/3 and G87
Local Authority and other statutory requirements.
All relevant British Standards and Codes of Practice.
Plant / equipment life - a minimum of 25 years without major replacement
System life - in excess of 30 years.

SYSTEM DESCRIPTIONS

Each stair core treated as an equipotential zone. Provide main and supplementary equipotential bonding to meet IET requirements and as required under other work sections.

Provide a Main earth bar to be located with each incoming electrical service. Main Earth Bars to be bonded to the incoming water and gas and to the water, gas (where installed), heating, Dry Risers and telecommunications installations.

Where multiple stair cores form part of a single building structure, provide main bonds between each stair core.

Provide supplementary equipotential bonding within the dwellings (accounting for where plastic pipework is used), plant access, louvers, grillage, access ladders and platforms etc.

All incoming supplies will be of the PME (Protective Multiple Earth) type. The earthing shall comply with the current PME requirements of the Institute of Electrical Engineers Regulations BS 7671 (17th edition) and the requirements of the supply utility. New main equipotential bonds will be supplied and installed to all incoming services (gas & water pipes, rising drainage pipework, the building structure, lightning protection system) by the Contractor.

Supplementary earth bonds will need to be provided to each distribution board.

The main building earth bar is to be connected directly to the earth connection provided by the electricity supplier using a main bonding conductor with a cross-sectional area which is related to the cross-sectional area of the supply neutral conductor. Contractor to confirm requirements for sizing and connection of this conductor with the local supply utility/network operator, but shall make use of copper main bonding conductors, no smaller than 50mm^2 for compatibility with future cross-bonding with a central landlord's supply (connection to central landlord's supply in a later phase under separate contract).

As well as the earth provided by the Network Operator / Supply Utility, the CONTRACTOR shall provide a local buried earth electrode which is bonded to the main earth bar to provide protection in the event of a failure of the combined neutral / earth provided by the Network Operator / Supply Utility. The electrical contractor shall propose and agree the location of this earth electrode with the main contractor, consultant and architect.

Within the building, the following equipment is to be electrically connected to the main earth bar:

All conductive parts of electrical load casings
All conductive parts of buried incoming water and gas pipes, heating pipes
All metal containment for LV and ELV services.
Photovoltaic installation, and support frame work .
All extraneous metal parts.
All ventilation air ductlines (block A Common MVHR system)

Main bonding conductors shall make use of copper conductors, no smaller than 50mm^2 for compatibility with future cross-bonding with a central landlord's supply (connection to central landlord's supply in a later phase under separate contract).

Conductive parts of electrical load casings are to be electrically connected to the main earth bar via secondary earthing bars on the distribution boards and main switchboards. Other extraneous metal parts within the building will be connected using supplementary bonding to local earthed conductors, such as water pipes.

GENERAL

Ensure references on plant coordinates with references on RECORD DRAWINGS. All labelling shall coordinate with the record drawings so that the location, function of each item of plant can be determined.

All labelling shall coordinate with the record drawings so that the location, function of each item of plant can be determined.

The entire installation shall be tested, commissioned and demonstrated in accordance with the MFllp testing, commissioning & handover schedule 4726/A64-500.

DOCUMENTATION AND RECORDS

Provide accurate documentation and records of all cabling and equipment provided as part of the installation. These should include the following:

Full as finished floor plans showing locations of all plant and equipment.

Full sets of Documentation and Records will be required on disc. All diagrams to be presented in a computerised format compatible with and transferable to the Auto CAD system 2008.

Supply full sets of documentation and record information in accordance with and as described in this specification. Comply with the requirements of Table E "Production of Handover Information" in Appendix A,

"Testing & Commissioning Schedule" (dwg no. A64.500), and other clauses given in Section A64 of the Prelims A64-700.

OPERATION & MAINTENANCE MANUALS

Provide full O&M manuals. These shall include record drawings, a full description of this particular system, set-up, operation and modifications. Provide full and clear instructions for the building staff (who shall not be trained technicians) on how to operate the systems.

PASSIVHAUS

Cables entering through the airtightness line shall be pulled through tight fitting neoprene grommets.

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W52 LIGHTNING PROTECTION

PERFORMANCE OBJECTIVES

Provide a complete lightning protection system to reduce the probability of damage to the building and/or injury to the building occupants and passers-by as a result of a lightning strike to the building.

To be installed sympathetically to the architecture.

PERFORMANCE PARAMETERS

The Building Regulations.
BS 7430 Code of Practice for Earthing.
BS EN 62305-1, Protection against lightning - Part 1: General principles.
BS EN 62305-2, Protection against lightning - Part 2: Risk management
BS EN 62305-3, Protection against lightning - Part 3: Physical damage to structures and life hazard
BS EN 62305-4, Protection against lightning - Part 4: Electrical and electronic systems within structures
BS EN 62305-5, Protection against lightning - Part 5: Services
IET Wiring Regulations 17th Edition, as amended (BS7671:2008+AMD1:2011+AMD2:2013)
Local Fire Authority Requirements

SYSTEM DESCRIPTIONS

The information prepared for the tender has been developed to a RIBA stage E level to establish; the scope of works for MEP installations for this phase, the design strategies, space requirements and distribution routes.

The Contractor is to design, supply, install, test and commission the new installation in line with the intent described in this specification, W52-series drawings, schematics and schedules. All design responsibility for the correct operation and compliance with the performance objectives and design parameters within the specification rest with the contractor.

Any information relating to the size and duty of equipment that has been included within the tender information, has been included to indicate the assumptions used to establish the space requirements and distribution routes, and should not be relied upon for the purposes of the contractors design.

Provide a complete lightning protection system to reduce the probability of damage to the building and/or injury to the building occupants and passers-by as a result of lightning strike to any of the buildings.

Employ a Lightning Protection Specialist to design, supply, install and test a complete lightning protection system with all necessary components to ensure a complete system in accordance with A64.100.060C, as described in the Preliminaries.

The lightning protection specialist is to carry out risk assessments for each Block A , F G & H to determine the level of protection required. For the purposes of tender, an initial risk assessment has been carried out which suggests that all block should be provided with a lightning protection system of level II.

Roof

Provide aluminium lightning protection tape to the roof, installed on all high points of roof, on parapets and all around the roof edges of each of the Blocks. Use PVC coated lightning tape on the roof in all the visible areas. Colour of the PVC cover for the lightning tape to be confirmed with the Client / Architect prior to installation. Connect the lightning tape using tape clip roof fixings suitable for the roof finish. Roof fixings, at 800mm centres during straight runs and 300mm centres at corners (distance to be confirmed by the lightning specialist), to be free issued by the lightning protection contractor to the roof installer. Lightning protection contractor to provide architect and roof installer with specialist advice on locations and quantities of the roof fixings. Refer to Architects roof layout drawings for details of all external wall and roof finishes to establish fixing methods.

Provide connections to all mechanical plant and terminations on the roof including flues, air handeling units PVs, solar thermal and support structure provide bonds to any metallic gutters and any metallic handrails.

Provide an LPS earth connection and protection to the satellite and TV IRS system on the roof of each communal core. Provide lightning rod or other suitable air termination point if required to protect the roof mounted IRS plant. Connect this air terminal to the roof mounted tape system.

Provide connections to all balcony metallic handrails back to the down conductors (see down conductor description below)

The air termination network shall be bonded to the down conductors at appropriate centres for the plot's lightning protection level – to be determined by the lightning protection specialist.

Down Conductors – Block A & G

The reinforced concrete structure is to be used as the down conductor element of the LPS. Clamp or overlap all rebar a minimum of 20 times their diameters and bind or otherwise securely connect.

The electrical continuity of the reinforcing bars shall be determined by electrical testing between the uppermost part and ground level. The overall electrical resistance shall not be greater than

0.2 ohms measured using test equipment suitable for this purpose. The electrical continuity shall continue to the earth termination.

The lightning protection contractor is to provide for attendance with the main contractor, the ground worker and the reinforced concrete frame contractor to coordinate the requirements of the lightning protection design to ensure electrical continuity through the structure from the roof of the plots to the pile connections forming the earth termination in earth rods connected to the rebar by tape

The lightning protection contractor shall develop the necessary connection details based on those illustrated at tender with the ground worker and the reinforced concrete frame contractor and free issue the required clamps and cable connections to allow the contractor installing the rebar to form electrically continuous routes through the structure as required by BS EN 62305.

The lightning protection contractor shall provide for site attendance to be programmed with the other trades to satisfy themselves of the workmanship and ensure the continuity of the rebar within the structural down conductors. During this attendance the earth resistance shall be measured progressively starting at the pile caps and working upwards as the structure is erected to ensure that a low earth resistance is achieved and maintained.

Should a resistance value of >0.2Ohms be measured at any one of the down conductors the lightning protection specialist is to offer an alternative solution to rectify the problem to the Main Contractor for approval.

Use bimetallic connectors to change the material of the lightning tape from aluminium to copper, before connecting to the re-bars of concrete slab/columns or before submerging to below ground. Use earth points with pre-welded tail and mechanical clamps around the re-bars for connection of the lightning tape conductor to the re-bars. **to be confirmed with structural engineer**

Down Conductors Block F & H

PVC sheathed aluminium down conductor tape shall be used for the blocks with Cross Laminated Timber (CLT) structure. These are to be routed discretely behind the rainwater down pipes, routes shall be coordinated with the architects.

Test points shall be provided at ground level in accordance with the requirements a BS EN 62305.

Earth Termination Network

A soil resistivity test shall be undertaken before the installation commences to determine the earthing requirement and number of piles to ensure compliance with BS EN 62305. Complete all necessary testing during construction to ensure that the electrical continuity is correct and provide results before each part of the works is covered. Test the earth on completion and provide additional and/or longer earth bars if required to ensure adequate earth for the lightning protection system. Provide suitable earth electrodes for the ground conditions.

Where it is not possible to use the piles to earth the lightning protection system, use lightning protection tape to connect the rebar to the earth rods for the earth termination of the system. Use bimetallic connectors for changing the material of the lightning tape from aluminium to copper, before connecting the copper tape to the earth rods.

Where the reinforced concrete in the building structure is utilised, clamped bonding connections are to be used to connect the reinforcement together in the pile caps and to the reinforcement bars in the columns as indicated on the tender drawings. These clamped connections shall be supplied by the lightning protection contractor, for installation by the ground worker or reinforced concrete frame contractor as appropriate. The lightning protection contractor shall provide for site attendance to be programmed with the other trades to satisfy themselves of the workmanship and ensure the continuity of the rebar within the structural down conductors. During this attendance the earth resistance shall be measured progressively starting at the pile caps and working upwards as the structure is erected to ensure that a low earth resistance is achieved and maintained.

Provide adequately sized copper earth connections to each of the landlord's earth bars within each of the ground floor electrical plant rooms to meet the requirements of the design parameters. Provide for coordination with the electrical contractor to coordinate the provision of the earth connections in line with BS7671 recommendations. Electrical contractor will provide the earth bar terminals. The lightning protection specialist is to size the connecting cables between the LPS and the main equipotential bonding system.

Provide 3 phase surge protection devices such as Furse 415 to each landlord distribution board to protect the Landlords incoming power supplies from indirect/direct lightning strikes. Provide a further surge protection device to the incoming PV power supplies. Liaise with the PV specialist to ensure the correct selection of surge protection device.

Provide surge protection to all incoming low voltage devices such as the incoming telecom cables.

Testing

Carry out tests to prove the adequate earthing and continuity. BS EN 62305 requires the impedance of the earth termination network to be less than 10 ohms.

The electrical continuity of the down conductors or the reinforcing bars forming a down conductor shall be determined by electrical testing between the uppermost part and ground level. The overall electrical resistance shall not be greater than 0.2 ohms.

Provide completed test certificates as required by the BS and include details for the building manual.

DOCUMENTATION AND RECORDS

Provide warning notifications as required to identify any hazards associated with the LPS system.

Certify the design and provide completed certification certificate.

The LPS specialist shall also provide accurate documentation and records of all cabling and equipment provided as part of the installation. These should include the following:

Full as finished floor plans showing locations of all bonds and connections.
The preparation of as-installed drawings and full record Drawings is to be allowed for by the Lightning Protection Specialist. The specialist is to include on his layout and detail drawings the location and nature of all lightning protection and bonding connections installed.

Full sets of documentation and records will be required on disc. All diagrams to be presented in a computerised format compatible with and transferable to the Auto CAD system 2008.

Supply copies of digital site photographs showing each type of earthing connection detail as work proceeds.

Circulate to the Consultant and Main Contractor and include copies in the record Information to be provided.

Supply copies of impedance testing results for each down conductor, pile earth connection and earth pit and the findings of the soil resistance tests to be included with the record Information.

APPENDIX A

1.1 Design, Commissioning & Handover Information Responsibilities

Allocation of Design Responsibilities

Table a: the consultant carried out the design

Except where specifically stated in the Preliminaries (clauses 100.060B & 100.060C), the Consultant has developed and completed the design of the mechanical & electrical specialist works described within the tender documentation.

TABLE A	GENERAL DESIGN ACTIVITIES				
Design Activity		**Responsibility**			**Comments**
		MFLLP	Cont'r	Other	
A1	Production of Drawings				See A64 Preliminaries for definitions and BRSIA TN22/97 for example drawings.
	Sketch Drawings	✓			
	Schematic Drawings	✓			Issued as tender drawings as reasonably necessary in the opinion of MFLLP to enable the Contractor to prepare Coordination & Installation Drawings.
	Detailed Design Drawings	✓			As above.
	Coordination Drawings		✓		
	Installation Drawings		✓		Including setting out information where not given by MFLLP on the Detailed Design Drawings. This includes setting out of visible equipment & accessories to the approval of the CA. Co-ordination of the Installation Drawings is to be managed by the Mechanical Contractor (see Preliminaries clause 100.070).
	Installation Wiring Diagrams		✓		
	Manufacturer's Drawings		✓		
	Manufacturer's Certified Drawings		✓		
	As-installed Drawings		✓		To be marked up on site as the work proceeds.
	Record Drawings		✓		
	Builder's Work Drawings (design stage)	✓			MFLLP Builder's Work Drawings and/or schedules have been prepared to allow development of the structural design and preparation of the bills of quantities only. These drawings and/or schedules may not necessarily be issued for tender

TABLE A	GENERAL DESIGN ACTIVITIES				
Design Activity		**Responsibility**			**Comments**
		MFLLP	Cont'r	Other	
					purposes.
	Builder's Work Drawings (installation stage)		✓		Based on the Installation Drawings prepared by the Contractor. Co-ordination of the Builder's Work Drawings is to be managed by the Mechanical Contractor (see Preliminaries clause 100.070).
	Specialist Drawings		✓	✓	"Other" = Specialist Designer appointed by the Contractor.
A2	Spatial Co-ordination (i.e. overall responsibility for resolving difficult spatial clashes).		✓		Process to be managed by the Mechanical Contractor (see Preliminaries clause 100.070).
A3	Confirmation of plant or system sizing MFLLP is responsible for all installed plant & system sizes/capacities other than those items that are identified below. These items require final confirmation by the party indicated.				
	• Selection of commissioning valves and/or automatic flow balancing valves.		✓		
	• Alternative plant or equipment suppliers to those specified in the tender documentation.		✓		See Preliminaries clauses 300.170 & 520.040.
A4	On-site Co-ordination.		✓		Process to be managed by the Mechanical Contractor (see Preliminaries clause 100.070).
A5	System Compatibility Confirm the compatibility of plant/equipment specified for use within the same system or where an interface is required between systems.		✓		

Table based on BSRIA Technical Note TN 21/97 "Allocation of Design Responsibilities for Building Engineering Services"

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Table b: the contractor verifies, adopts, develops & completes the design

The Contractor is to verify, adopt, develop & complete the design the Works or specialist elements provided by or on behalf of the Employer within the tender documentation, and as described in the Preliminaries.

TABLE B	DESIGN & DRAWING PRODUCTION ACTIVITIES				
Design Activity		**Responsibility**			**Comments**
		MFLLP	Cont'r	Other	
B1	Verify and develop the Consultant's design detailed within the tender documents, to a form agreed with the CA.		✓		
B2	Prepare proposals for the installations for the agreement of the CA. Investigate the options available and describe the performance that can be achieved.		✓		
B3	Design and detail the installations as part of the overall co-coordinated building design allowing for every stage of the design to be brought to a successful conclusion by the process of repeated refinement until it is clear that the Installation and Coordination Drawings can be completed.		✓		
B4	Provide copies of calculations if requested by the CA.		✓		
B5	Provide copies of any risk assessments undertaken in compliance with the requirements of Regulation 13 of the Construction (Design and Management) Regulations 1994.		✓		
B6	If appropriate, negotiate and agree all details with regulatory bodies as necessary.		✓		Where the Contractor's proposals modify or add to the Consultant's tender information.
B7	If appropriate, negotiate and agree all details with the Statutory Authorities as necessary.		✓		Where the Contractor's proposals modify or add to the Consultant's tender information.
B8	If appropriate, meet with Building Control and provide the CA with written confirmation of the various stages including detailed Building Control Approval for the installations proposed, prior to construction.		✓		Where the Contractor's proposals modify or add to the Consultant's tender information.
B9	Modify the design and/or an installation, should the installation not meet the specification and/or agreed		✓		

TABLE B	DESIGN & DRAWING PRODUCTION ACTIVITIES				
Design Activity		**Responsibility**			**Comments**
		MFLLP	Cont'r	Other	
	proposals, Statutory requirements, etc.				
B10	Production of Drawings				See Preliminaries for definitions and BRSIA TN22/97 for example drawings.
	Sketch Drawings	✓			Tender drawings provided to indicate the design intent and the performance to be achieved.
	Schematic Drawings		✓		
	Detailed Design Drawings		✓		
	Coordination Drawings		✓		Services co-ordination is to be managed by the Mechanical Contractor (see Preliminaries clause 100.070).
	Installation Drawings		✓		Co-ordination of the Installation Drawings is to be managed by the Mechanical Contractor (see Preliminaries clause 100.070).
	Installation Wiring Diagrams		✓		
	Manufacturer's Drawings		✓		
	Manufacturer's Certified Drawings		✓		
	As-installed Drawings		✓		To be marked up on site as the work proceeds.
	Record Drawings				
	Builder's Work Drawings		✓		Co-ordination of the Builder's Work Drawings is to be managed by the Mechanical Contractor (see Preliminaries clause 100.070).
	Specialist Drawings		✓		
B11	Spatial Co-ordination (i.e. overall responsibility for resolving difficult spatial clashes).		✓		Process to be managed by the Mechanical Contractor (see Preliminaries clause 100.070)
B12	Confirmation of plant or system sizing.		✓		
B13	On-site Co-ordination.		✓		Process to be managed by the Mechanical Contractor (see Preliminaries clause 100.070).
B14	System Compatibility. Confirm the compatibility of plant/equipment specified for use within the same system or where an interface is required between systems.		✓		

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TABLE C: THE CONTRACTOR CARRIES OUT THE DESIGN

The Contractor is to carry out the whole of the design and drawing production for the Works or specialist elements described within the tender documentation.

TABLE C	**DESIGN & DRAWING PRODUCTION ACTIVITIES**				
Design Activity		**Responsibility**			**Comments**
		MFLLP	Cont'r	Other	
C1	Prepare proposals for the installations for the agreement of the CA. Investigate the options available and describe the performance that can be achieved.		✓		
C2	Prepare and develop, to a form agreed with the CA, the Sketch & Detailed Design Drawings.		✓		
C3	Design and detail the installations as part of the overall co-coordinated building design allowing for every stage of the design to be brought to a successful conclusion by the process of repeated refinement until it is clear that the Installation and Coordination Drawings can be completed.		✓		
C4	Provide copies of calculations if requested by the CA.		✓		
C5	Provide copies of any risk assessments undertaken in compliance with the requirements of Regulation 13 of the Construction (Design and Management) Regulations 1994.		✓		
C6	Negotiate and agree all details with regulatory bodies as necessary.		✓		
C7	Negotiate and agree all details with the Statutory Authorities as necessary.		✓		
C8	If appropriate, meet with Building Control and provide the CA with written confirmation of the various stages including detailed Building Control Approval for the installations proposed, prior to construction		✓		
C9	Modify the design and/or an installation, should the installation not meet the specification and/or agreed proposals, Statutory requirements, etc.		✓		
C10	Production of Drawings.				See Preliminaries for definitions

TABLE C	DESIGN & DRAWING PRODUCTION ACTIVITIES				
Design Activity		**Responsibility**			**Comments**
		MFLLP	Cont'r	Other	
					and BRSIA TN22/97 for example drawings.
	Sketch Drawings		✓		
	Schematic Drawings		✓		
	Detailed Design Drawings		✓		
	Coordination Drawings		✓		Services co-ordination is to be managed by the Mechanical Contractor (see Preliminaries clause 100.070).
	Installation Drawings		✓		Co-ordination of the Installation Drawings is to be managed by the Mechanical Contractor (see Preliminaries clause 100.070).
	Installation Wiring Diagrams		✓		
	Manufacturer's Drawings		✓		
	Manufacturer's Certified Drawings		✓		
	As-installed Drawings		✓		To be marked up on site as the work proceeds.
	As-installed Drawings		✓		
	Record Drawings		✓		
	Builder's Work Drawings		✓		Co-ordination of the Builder's Work Drawings is to be managed by the Mechanical Contractor (see Preliminaries clause 100.070).
	Specialist Drawings		✓		
C11	Spatial Co-ordination (i.e. overall responsibility for resolving difficult spatial clashes).		✓		Process to be managed by the Mechanical Contractor (see Preliminaries clause 100.070).
C12	Confirmation of plant or system sizing.		✓		
C13	On-site Co-ordination.		✓		Process to be managed by the Mechanical Contractor (see Preliminaries clause 100.070).
C14	System Compatibility. Confirm the compatibility of plant/equipment specified for use within the same system or where an interface is required between systems.		✓		

Allocation of Commissioning Responsibilities

TABLE D	SPECIFYING SYSTEM COMMISSIONING ACTIVITIES				
Design Activity		**Responsibility**			**Comments**
		MFLLP	Cont'r	Other	
Design					
D1	Ensure that the selected systems will meet the employer's brief and that their commissioning requirements are compatible with any project restraint concerning sectional handover/phasing.	✓	✓		The contractor is responsible for those services, systems or work elements design by them and/or specialist sub-contractors appointed by them.
D2	Identify and incorporate into system designs the essential components and features necessary to enable the proper preparation and commissioning of building services.	✓	✓		Note as D1.
D3	Review all designs to ensure that systems can be properly prepared, and are commissionable.	✓	✓		Note as D1.
D4	Prepare the commissioning specification.	✓	✓		Note as D1.
Management					
D5	a) Produce a commissioning method statement and logic diagram for integration into the building contractor's construction and finishes programmes. b) Produce a "commissioning plan" as required by Part L2 of the Building Regulations.		✓ ✓		It is for the Contractor is to demonstrate to the local Building Control office that the person(s) providing this report are suitably qualified. See Preliminaries clause 740.065.
D6	Produce a flushing, chemical cleaning and water treatment method statement, logic diagram and programme for integration into the building contractor's construction, commissioning and finishes programmes.		✓		
D7	Attend commissioning meetings as necessary OR Arrange and chair commissioning meetings as necessary.		✓		Give notice to MFLLP of when these meetings are taking place. MFLLP will only attend meetings as and when they feel necessary.
D8	Comment on the adequacy of systems for commissioning as		✓		

TABLE D	SPECIFYING SYSTEM COMMISSIONING ACTIVITIES				
Design Activity		**Responsibility**			**Comments**
		MFLLP	Cont'r	Other	
	detailed on specialists' drawings and manufacturers' shop drawings prior to actual manufacture at works. Ensure comments are incorporated into finished products.				
D9	Carry out site inspections, to ensure that the commissioning facilities are being installed. Check compliance with specified guides and standards.		✓		
D10	Monitor the on-going progress of the procurement, manufacture, installation and commissioning of all plant items.		✓		
D11	Assess the effects of any anticipated delays to the services installation and the completion of interfaces with the building works critical to the commissioning programme. Formulate strategies to overcome potential delays.		✓		
D12	Establish an agreed set of pro forma documentation relating to the commissioning and testing of plant and systems.		✓		Issue to MFLLP for comments.
D13	Approve the proposed set of instruments of the commissioning and testing works.		✓		
D14	Ensure that the instrumentation is periodically calibrated as necessary and records retained.		✓		
D15	Witness the flushing, cleaning and treatment of systems in accordance with the specification.	✓	✓		Contractor is to be fully satisfied with the pre-commissioning cleaning before inviting MFLLP to witness.
D16	Witness pre-commissioning activities in accordance with the specification.	✓			
D17	a) Commission all systems to methods, logic and programme (see 4.5) and record results.		✓		
	b) Witness specified demonstration of system	✓	✓		Contractor is to be fully satisfied with the

TABLE D	SPECIFYING SYSTEM COMMISSIONING ACTIVITIES				
Design Activity		**Responsibility**			**Comments**
		MFLLP	Cont'r	Other	
	commissioning results.				commissioning results before inviting MFLLP to witness.
D18	Witness and record the specified demonstration and testing of plant items and systems in accordance with the specification.	✓	✓		Contractor is to be fully satisfied with the commissioning results before inviting MFLLP to witness.
D19	Establish procedures to allow the demonstration of normal emergency, shutdown and standby mode operation of plant and systems.		✓	✓	"Other" = manufacturers or suppliers of plant items.
D20	Witness demonstration of same to specified requirements.	✓	✓		Contractor is to be fully satisfied with the demonstration results before inviting MFLLP to witness.
D21	Demonstrate the partial load testing of plant to the employer and designer in accordance with the specification.		✓		
D22	Witness the operation of the BMS on site to the specified requirements.	✓	✓	✓	"Other" = BMS Specialist Designer. Contractor is to be fully satisfied that the performance of the BMS meets the requirements of the contract documents before inviting MFLLP to witness.
D23	Witness the functional testing of all safety interlocks in accordance with the commissioning specification.	✓	✓		Contractor is to be fully satisfied with the commissioning results before inviting MFLLP to witness.
D24	Witness the demonstration of acoustic tests, if any, in accordance with the specification.	✓	✓		Contractor is to be fully satisfied with the commissioning results before inviting MFLLP to witness.
D25	Witness the operation of plant and systems for specified periods of time to prove plant reliability.	✓	✓		
D26	a) Produce commissioning report detailing the results of the commissioning and commenting on the performance of systems b) Produce a "commissioning report" as required by Part L2 of the Building Regulations for submission to the local Building Control office.		✓ ✓		It is for the Contractor is to demonstrate to the local Building Control office that the person(s) providing this report are suitably qualified.

TABLE D	SPECIFYING SYSTEM COMMISSIONING ACTIVITIES				
Design Activity		**Responsibility**			**Comments**
		MFLLP	Cont'r	Other	
					See Preliminaries clause 740.065.
D27	Ensure that all plant settings are recorded, including appropriate reference to plant items. The records should be incorporated within the operating and maintenance manuals.		✓		

Table taken from BSRIA Technical Note TN 21/97 "Allocation of Design Responsibilities for Building Engineering Services"

Production of Handover Information

TABLE E	PRODUCTION OF HANDOVER INFORMATION				
Design Activity		**Responsibility**			**Comments**
		MFLLP	Cont'r	Other	
E1	Define the scope and content of operating and maintenance manuals appropriate to the size of project, the employer's operating and maintenance strategy and the technical capability of the maintenance staff.	✓			
E2	Define the requirement for record drawings appropriate to the employer's operating and maintenance strategy.	✓			
E3	Advise on the need for a specialist author for production of operating and maintenance manuals.	✓			
E4	Advise on the need for a separate survey of installed systems to facilitate production of record drawings.	✓			This survey will only be required if the Contractor has failed in their duty to fully record the installed services as the work proceeds and before it is covered up. The cost of this survey, if required, will be recovered through the Contract.
E5	Prepare a specification for operating and maintenance manuals. Specify the section headings and required technical content.	✓			See Preliminaries for details of the level of information required.
E6	Prepare a specification for record drawings. Specify content, form of delivery and the method of production of the drawings to be produced.	✓			See Preliminaries for details of the level of information required.

TABLE E	PRODUCTION OF HANDOVER INFORMATION				
Design Activity		**Responsibility**			**Comments**
		MFLLP	Cont'r	Other	
E7	Define what level of documentation, commissioning results and other information must be available prior to practical completion and handover. Take into account possible implications of phased handover and partial possession.	✓			In order to comply with the CDM Regulations the Contractor is to ensure that complete O&M information and Record Drawings are available to the employer prior to Practical Completion. See Preliminaries for further information.
E8	Produce operation and maintenance manuals in accordance with the specified requirements.		✓		
E9	Ensure that information needed for inclusion in the operating and maintenance manuals is obtained as the works progress. Identify individual sources of information.		✓		
E10	Establish target dates for when information must be available to the author of the operating and maintenance manuals. Advise on timescales for production of maintenance information relative to key dates i.e. installation start date, setting to work, start dates for testing and commissioning and handover dates.		✓		
E11	Monitor the programme for production of operating and maintenance manuals and adjust dates to allow for progress of the project.		✓		
E12	Receive, inspect and comment on the contents of the operating and maintenance manuals in order to confirm general compliance with the specified requirements.	✓	✓		The Contractor is to inspect and comment on the manuals where produced by others on their behalf prior to submission to MFLLP. The Contractor is to ensure that drafts of the O&M manual(s) are available for comment at least 8 weeks prior to Practical Completion.
E13	Modify and update operating details to reflect commissioning results.		✓		

TABLE E	PRODUCTION OF HANDOVER INFORMATION				
Design Activity		**Responsibility**			**Comments**
		MFLLP	Cont'r	Other	
E14	Accept the completed operating and maintenance manuals on behalf of the employer.	✓			
E15	Identify key dates and intervals at which draft record drawings will be inspected.		✓		Contractor is to provide schedule of dates for the release of this information.
E16	Modify the record drawings as the works progress so that all alterations from the installation drawings are recorded as work proceeds.		✓		Contractor is to ensure that the As-installed Drawings are maintained on site and updated as the work proceeds. The As-installed Drawings are to be made available for inspection when requested by the CA.
E17	Receive, inspect and comment on the Record Drawings in order to confirm general compliance with the specified requirements.	✓	✓		The Contractor is to inspect and comment on the record drawings where produced by others on their behalf prior to submission to MFLLP.
E18	Accept the completed record drawings on behalf of the employer.	✓			
E.19	Prior to handover, make recommendations for the commencement and carrying out of operation and maintenance during and after the Defects Liability Period.		✓		When stated in the preliminaries the Contractor is to provide a priced proposal for the maintenance of the installed services during the period concurrent with the Defects Liability Period within their contract price.
E20	Provide the employer with a log-book as required by statute under Part L2 of the Building Regulations.		✓		

Table taken from BSRIA Technical Note TN 21/97 "Allocation of Design Responsibilities for Building Engineering Services"

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SUMMARY OF TENDER – ELECTRICAL

The Contractor is to complete the following in full.

		Phase 1	Phase 2		
A64	Preliminaries generally	£	£		
	320.060 Provisional sums (Total of Appendix C)	£	£		
	740.000 Testing & commissioning	£	£		
	810.000 Record Documentation	£	£		
	900.090 Training of employer's staff	£	£		
	C910 Maintenance contract during defects liability period	£	£		
	Total of Preliminaries	**£**	**£**		
		Block A	**Block F**	**Block G**	**Block H**
V10	Electricity generation plant	£	£	£	£
V20	LV distribution	£	£	£	£
V21	General lighting	£	£	£	£
V22	General LV power	£	£	£	£
V40	Emergency lighting	£	£	£	£
W10	Telecommunications	£	£	£	£
W20	Radio/TV/CCTV	£	£	£	£
W40	Access Control	£	£	£	£
W50	Fire detection and alarm	£	£	£	£
W51	Earthing and bonding	£	£	£	£
W52	Lightning protection	£	£	£	£
	Total of Work Sections	**£**	**£**	**£**	**£**
	TENDER TOTAL (inc. 2.5% MCD)	**£**	**£**	**£**	**£**

Signed .....

For & on behalf of .....

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