

**SPECIFICATION
for
ELECTRICAL SERVICES
associated with the
REFURBISHMENT OF
2 HAREWOOD PLACE
LONDON
W1S 1BX**

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INDEX

PART 1 GENERAL CONDITIONS

CLAUSE NO.		PAGE NO.
1.1	GENERAL CONDITIONS	1.1
1.2	DEFINITIONS	1.1
1.3	INSURANCE AGAINST INJURY TO PERSONS AND PROPERTY	1.2
1.4	REGISTERED OFFICE	1.2
1.5	PROVISIONAL SUM(S)	1.2
1.6	DRAWINGS AND SPECIFICATION	1.2
1.7	VARIATIONS	1.3
1.8	QUALITY ASSURANCE	1.4
1.9	PROGRAMME OF WORKS AND CO-ORDINATION WITH OTHER TRADES	1.4
1.10	SITE SUPERVISION, MEETINGS AND ORGANISATION	1.5
1.11	COMPLIANCE WITH BRITISH STANDARDS	1.5
1.12	COMPLIANCE WITH OTHER REGULATIONS	1.5
1.13	SAFETY AND WELFARE MEASURES	1.6
1.14	ASBESTOS HAZARD	1.6
1.15	FIRE PRECAUTIONS	1.7
1.16	NICEIC MEMBERSHIP	1.7
1.17	NOMINATED SUPPLIERS AND SPECIALISTS	1.7
1.18	DRAWINGS FOR APPROVAL	1.8
1.19	MANUFACTURERS RECOMMENDATIONS	1.9
1.20	INDUCEMENTS	1.9
1.21	SITE CONDITIONS AND EXISTING EQUIPMENT	1.9
1.22	SPECIALIST ATTENDANCE FOR COMMISSIONING	1.9
1.23	PROTECTION OF EQUIPMENT AND STORAGE	1.9

INDEX

CLAUSE NO.		PAGE No
1.24	REMOVAL OF RUBBISH	1.10
1.25	MANUFACTURERS NAMEPLATES AND LABELLING	1.10
1.26	ELECTRICAL INTERFERENCE	1.10
1.27	NOISE NUISANCE	1.10
1.28	NOTICES	1.10
1.29	SITE MEASUREMENTS	1.11
1.30	MEASUREMENT OF WORKS	1.11
1.31	PROGRESS AND AS INSTALLED DRAWINGS	1.11
1.32	DEFECTS LIABILITY PERIOD	1.12
1.33	HANDOVER	1.12

INDEX

PART 2 GENERAL TECHNICAL REQUIREMENTS

CLAUSE NO.		PAGE NO.
2.1	SCOPE OF SPECIFICATION	2.1
2.2	COMPLIANCE WITH REGULATIONS	2.1
2.3	COMPLIANCE WITH BRITISH STANDARDS	2.1
2.4	BUILDERS WORK	
	(a) With Builder Attending	2.1
	(b) Without Builder Attending	2.1
2.5	POSITION AND ALIGNMENT OF EQUIPMENT	2.1
2.6	CONDUIT AND CONDUIT ACCESSORIES	
	(a) General	2.2
	(b) Additional Requirements for Steel Conduit	2.5
	(c) Additional Requirements for Plastic Conduit	2.6
2.7	FLEXIBLE CONDUITS	2.6
2.8	TRUNKING GENERAL	2.7
2.9	CABLE TRAY	2.7
2.10	WIRING GENERAL	2.8
2.11	SHEATHED WIRING SYSTEMS (OTHER THAN MINERAL INSULATED)	2.9
2.12	MINERAL INSULATED CABLES	2.10
2.13	CABLES AND FLEXIBLE CORDS Flexible Cords	2.13

INDEX

PART 2 GENERAL TECHNICAL REQUIREMENTS (Continued)

CLAUSE NO.		PAGE NO.
2.14	LIGHTING SUB-CIRCUITS	
	(a) General	2.13
	(b) Switches	2.13
	(c) Circuits	2.14
	(d) Terminations at Luminaires	2.14
	(e) Luminaires	2.16
	(f) Lamps	2.16
2.15	SOCKET OUTLETS	2.16
2.16	OTHER OUTLET POINTS	2.17
2.17	UNSPECIFIED MATERIALS	2.17
2.18	FINISH OF ACCESSORIES	2.17
2.19	SWITCHGEAR	
	(a) General	2.17
	(b) Moulded Case Circuit Breakers	2.18
	(c) Residual Current Devices	2.18
	(d) Miniature Circuit Breakers	2.18
	(e) Fuses	2.18
2.20	LABELLING AND IDENTIFICATION OF CIRCUITS	2.18
2.21	INSTALLATION DIAGRAM	2.19
2.22	SHOCK NOTICE(S)	2.19
2.23	EARTHING AND BONDING	2.19
2.24	TESTING	2.20
2.25	FINAL ADJUSTMENTS	2.20

INDEX

PART 3 – PARTICULAR REQUIREMENTS FOR ELECTRICAL SERVICES

CLAUSE NO:		PAGE NO:
3.1	INTRODUCTION	3.1
3.2	CDM REGULATIONS	3.1
3.3	EXTENT OF CONTRACT	3.2
3.4	CONTRACT PERIOD AND PRICE	3.2
3.5	COMPLIANCE WITH REGULATIONS	3.2
3.6	SCOPE OF WORKS	3.2
3.7	BUILDING DESCRIPTION	3.3
3.8	CO-ORDINATION AND ALIGNMENT	3.3
3.9	PROGRAMME	3.3
3.10	CONTRACT DRAWINGS	3.4
3.11	EARTHING AND BONDING	3.4
3.12	TESTING AND COMMISSIONING	3.4
3.13	RECORD INFORMATION	3.5
3.14	SITE VISIT	3.5
3.15	EXISTING INSTALLATION	3.6
3.16	SUBMAIN DISTRIBUTION	3.6
	3.16.1 General	3.6
	3.16.2 Landlord Distribution	3.6
	3.16.3 Tenants Distribution	3.7
3.17	LIGHTING AND EMERGENCY LIGHTING	3.7
	3.17.1 General	3.7
	3.17.2 Emergency Lighting	3.8
	3.17.3 Lighting Controls	3.8
3.18	SMALL POWER	3.8
	3.18.1 General	3.8
	3.18.2 Socket Outlets	3.8
	3.18.3 Small Power Outlets	3.9
	3.18.4 Lift Supplies	3.9

PART 3 - INDEX (Contd.)

3.19	FIRE ALARM	3.9
	3.19.1 General	3.9
	3.19.2 System Operation	3.10
	3.19.3 Main Control Panel	3.10
	3.19.4 Detectors	3.10
	3.19.5 Manual Call Points	3.10
	3.19.6 Sounders	3.10
	3.19.7 Power Supply	3.10
	3.19.8 Wiring	3.10
	3.19.9 Commissioning	3.11
3.20	DOOR ENTRY	3.11
3.21	ELECTRICAL SERVICES FOR MECHANICAL PLANT	3.11
3.22	DISABLED REFUGE INTERCOM	3.12
3.23	ACCESSIBLE WC ALARM	3.12
3.24	CABLE MANAGEMENT	3.13
S1	SCHEDULE OF LUMINAIRES	3.14
S2	SCHEDULE OF MATERIALS	3.15
S3	SCHEDULE OF CIRCUIT INFORMATION	

APPENDIX A

MAKE-UP OF TENDER

PART 1 GENERAL CONDITIONS

1.1 CONDITIONS OF CONTRACT

This specification relates to the Electrical Services works in connection with the refurbishment of **2 Harewood Place, London, W1S 1BX.**

This specification is to be read in conjunction with the Main Contract Preliminaries and specification of Building Work (Bill of Quantities) of which this document forms part. In the context of this contract, the Electrical Contractor shall be deemed to mean the Contractor (Main Contractor) or his authorised Domestic Sub-Contractor.

All relevant modifications to the contract, including Employers specific requirements, shall be as detailed in the Preliminaries. The said conditions shall apply to the electrical works, in conjunction with the requirements of this document.

Any ambiguity between the requirements of this document and the Conditions of Contract shall be referred to the Contract Administrator for verification.

The Contractor shall allow for all works as detailed in this specification and as generally shown on the contract drawings.

The Contractor shall complete and return the Form and Make-up of Tender document.

1.2 DEFINITIONS

With this document, the following expressions shall be deemed to be deleted and replaced with that indicated:-

“Engineer” shall be replaced by “Contract Administrator”.

“Architect” shall be replaced by “Contract Administrator”.

“Main Contractor” shall be replaced by “Contractor”.

“Electrical Contractor” shall be replaced by “Contractor”.

The Contract Administrator
shall mean:-

CNP Building & Project
Design Consultancy
11 Albemarle Street
London
W11 4HH

Or Authorised Representative.

1.3 INSURANCE AGAINST INJURY TO PERSONS AND PROPERTY

In connection with provisions made in the "Conditions of Contract", the Contractor shall maintain and shall cause his Sub-Contractors to maintain:-

- (a) Such insurance's as are necessary to cover the liability of the Contractor and any such Sub-Contractor in respect of personal injury to or the death of any person whosoever, arising out of the Works.
- (b) Such insurance's as are necessary to cover the liability of the Contractor and any such Sub-Contractor, in respect of damage to property, real or personal, arising out of the course of the Works or caused by negligence, omission or default.

The limit for indemnity shall be not less than £500,000.00 in respect of any one claim, or series of claims, arising out of any one event except that in respect of the liability of the Contractor for death or of injury to the Contractor's own employees arising out of or in the course of their employment and said insurance shall be completely unlimited in amount.

Insurance's are to cover the period of the Contract up to the end of the Defects Liability Period.

1.4 REGISTERED OFFICE

The Contractor and any authorised installer employed by the Contractor or supplier connected with the carrying out of the Works under this Specification must have a properly registered office.

1.5 PROVISIONAL SUM(S)

It will be deemed that the Contractor has included within his total Tender for the Provisional Sum(s) as detailed in Part III of this Specification.

The Provisional Sum(s) shall be at the disposal of the Engineer and no proportion thereof is to be expended without his written authority.

Any Provisional Sum not expended shall be deducted from the Contract Sum.

1.6 DRAWINGS AND SPECIFICATION

This Specification and any drawings or other documents attached thereto shall be interpreted in good faith and shall be deemed to include, whether or not specifically mentioned or shown, any materials, apparatus or work as may be necessary for the satisfactory completion of the works in accordance with accepted modern practice or procedure and it will be deemed that the Contractor made due allowance in his Tender for such unspecified materials or work. No extra payments will therefore be made in this respect.

It will also be deemed that where a discrepancy exists between the Specification and drawings or where the interpretation of this is in doubt the Contractor obtained clarification on such doubtful matters before submitting his Tender and included accordingly.

Any correspondence or documents from the Engineer to the Contractor dated prior to the submission of the Tender and relating to any such doubtful point shall form part of the Contract documents.

The drawings accompanying this Specification are intended to indicate mechanical and electrical requirements only, and will not be deemed to be binding upon the Engineer with respect to any building details given thereon.

The Contractor shall be responsible for ascertaining the exact building details and dimensions prior to carrying out any work, and the Engineer will be entitled, if he so wishes, to instruct work which is not installed with regard to current building drawings to be altered at no extra cost.

Where the Contractor failed to obtain clarification on any doubtful matter the Engineer will be at liberty to place such interpretation thereon as he may wish without additional costs being charged to the Client.

1.7 VARIATIONS

(a) General

No alteration, modification, variation, addition or omission in the works shall be made by the Contractor without the prior consent of the Engineer. The Contractor will bear the cost of any additional/alternative works completed without prior consent from the Engineer, including any remedial work to put right work deemed unacceptable by the Engineer.

In cases where the engineer orders additional work to be performed, the Contractor is at liberty to submit in writing, notice that additional time over and above that allotted in the programme will be required. Failure to do so will result in responsibility to satisfy all claims in respect of liquidated damages.

Variations may be made to the Contract in accordance with the Conditions of Contract.

The adjustment to be made to the Contract Sum will be calculated in one of the following ways as required by the Engineer.

- (i) By submission and acceptance of an itemised quotation covering the amendments to the Works.
- (ii) By measurement of the amendments to the Works, the materials to be priced against a schedule of basic rates in which will be included labour, profit and overheads.

(b) Schedule of Rates

The Engineer will, be at liberty to request from the Contractor prior to the acceptance of the Contract a "schedule of rates".

The schedule of rates must include all main materials used on the works and the rate indicated for each item shall be deemed to include the cost of labour for fixing or installing the item, together with allowance for overheads, sundry minor items not scheduled and profit.

The Engineer shall further be entitled to request the Contractor to show that the scheduled rates thus arrived at are reasonable and are not excessive on those items most likely to be used in any variations to the Works. The Engineer will also be at liberty to request the Contractor to show that the scheduled rates when applied to the abstracted quantities of materials on which the Tender was based will summate to the Tender price.

1.8 QUALITY ASSURANCE

All works under this Specification shall be carried out in a first class manner with materials of the best quality, and by qualified and competent tradesmen of the type most suitable for the purpose and to the complete satisfaction of the Engineer.

The materials to be incorporated in the works shall be of the make and description specified herein. In no circumstances, shall materials of any other make or description be substituted without permission, in writing, of the Engineer who may require samples of the proposed materials and workmanship to be submitted prior to installation.

In cases where it would be impracticable for samples of any particular equipment to be submitted, the Contractor shall submit to the Engineer for approval working drawings of all such companies.

Any amendments that the Engineer considers are necessary due to low standards of workmanship shall be rectified at the Contractors expense.

The Contractor shall not under any circumstances re-use existing materials rendered redundant by this Specification, unless specifically referred to in this Specification or instructed to do so by the Engineer. All items deemed to be re-usable by the Engineer shall be removed carefully such that its condition does not deteriorate and shall remain the property of the Client.

1.9 PROGRAMME OF WORKS AND CO-ORDINATION WITH OTHER TRADES

Full account shall be taken of the Technical Specification requirements when preparing the programme of works, to ensure it complies with the dates specified in the Contract.

The Contractor shall acquaint himself with the work of other trades on the site and in particular the work of other Engineering Contractors to ascertain if these concurrent works in any way hinder or obstruct his own works.

The Contractor shall be responsible for verifying the Programme of Works with the Engineer or Main Contractor as appropriate, and if for whatever reasons it would appear that the programme cannot be met, the respective parties shall be informed immediately.

The Contractor will be required to co-operate as necessary with the other Contractors that may be working on or connected with the works.

1.10 SITE SUPERVISION, MEETINGS AND ORGANISATION

The Contractor shall at all reasonable times keep on site a competent persons in charge, who can receive written instruction from the Engineer. Any such person appointed by the Contractor shall also monitor the progress of the works and ensure that adequate labour, materials and plant are available to maintain his work progress in accordance with the programme and to prevent a hindrance to other trades.

The Contractor shall be represented by senior and competent representatives at all meetings where requested to attend, provided adequate notice has been given. The Engineer will be at liberty to request from the Contractor a typed progress report indicating percentage completion of various elements etc., for presentation at any such meetings.

1.11 COMPLIANCE WITH BRITISH STANDARDS

The Contractor is to ensure that all materials used and that all work carried out comply in every respect with the relevant and latest Code of Practice of Specification issued by the British Standards Institute.

In the event of a discrepancy between this Specification and any British Standard Specification or Code of Practice current at the date of Tender, the Contractor shall seek instructions from the Engineer.

The Contractor will be held entirely responsible for any consequences or expenses resulting from his failure to comply therewith and will be required to correct any such failure at his own cost.

Where materials are specified to conform to a British Standard they shall bear the B.S.Kite Mark.

1.12 COMPLIANCE WITH OTHER REGULATIONS

The Contractor shall comply with the following, including all amendments thereto current at the time of the Works.

- (i) Bye-Laws and Regulations of the relevant Local Authority.
- (ii) Requirements and Regulations of the appropriate Gas, Water and Electricity supply Authority. The Contractor shall also be responsible for notification to all Authorities in accordance with their individual requirements.
- (iii) I.E.E. Wiring Regulations.
- (iv) Regulations for the Clean Air and Electricity Acts.
- (v) Electricity at Work Act
- (vi) Construction, Design and Management Regulations

1.13 SAFETY AND WELFARE MEASURES

The Contractor shall ensure compliance with the provisions of the Health and Safety at Work, etc., Act 1974 and Regulations made thereunder and shall satisfy the Engineer, that these requirements are being complied with.

The Contractor shall ensure that all materials, equipment, tools, manufacturing processes, procedure of construction, finishes, tests, commissioning used by him and his employees on this contract shall comply in all respects with the Act.

The Contractor shall further ensure that he and his employees shall comply in all aspects with the Act with regard to themselves and to others during the course of the Contract.

The Contractor shall make due allowance in his tender for difficult working conditions due to the presence of hazardous materials or installations, as indicated within the Tender documents, or as notified to him in writing by the Engineer prior to the submission of the Tender.

It is the responsibility of the Contractor to ascertain prior to submission of his Tender or quotation what cost allowances and contractual risk he should include in his Tender or quotation for compliance with the Health and Safety Act. Any guidance which may be required can be obtained from the Commissioners Inspectorate, appropriate Trade Associations and Professional Institutions.

The Contractors attention is drawn in particular to the following, including all the respective latest amendments current at the time of the Works.

- (i) The Construction Regulations:- General Provisions, Lifting Operations, Working Places, Health and Welfare etc.,
- (ii) The Electricity at Work Regulations.
- (iii) The Offices, Shops and Railway Premises Act.
- (iv) The Code of Welfare for the Building Industry.
- (v) Construction Design and Management Regulation 1994

Safety Helmets

In addition to the requirements of the National Working Rule Agreement - "Safety in the Building Industry" - that Safety Helmets shall be provided for operatives (including those of nominated sub-contractors), the Contractor shall also make available Safety Helmets for use by official visitors to the site, e.g. Architect, Clerk of Works, Quantity Surveyor, Consulting Engineers etc.,

1.14 ASBESTOS HAZARD

Should the Contractor during the course of Works come across existing asbestos insulation which may cause a health hazard then the following precautions are to be undertaken:-

- (i) Upon discovery of an asbestos hazard the Engineer shall be informed immediately.
- (ii) The Contractor shall cease work in the area until an authorised person has confirmed the nature of the hazard by analysing samples as required.
- (iii) If the analysis proves positive, then arrangements will be made in accordance with either of the following to enable the works to proceed.
 - (a) A Specialist Contractor shall be employed by the Client to safely remove and dispose of the hazard.
 - (b) The Engineer shall discuss alternative arrangements for the Works should (a) prove impractical.

1.15 FIRE PRECAUTIONS

The Contractor shall impress upon all his staff the necessity of due care and attention with regards to potential fire hazards on any site. Adequate measures shall be taken, where work involves the use of naked flames, to protect all building components and furnishings, and the Contractor shall be responsible for maintaining suitable fire extinguishers in readiness in all areas where such hazards exist.

The Contractor shall ensure that all fire exit routes are not hindered by the Works, and shall comply with any fire regulations peculiar to the site. Care shall be exercised in the storage of any flammable goods and disposal of rubbish.

The Contractor shall enforce "No Smoking" rules within such areas as roof spaces, service ducts, basement areas or any other area where the slightest difficulty in detecting smouldering or incipient fire is hindered.

Where so desired by the Client the Contractor shall be responsible for obtaining all necessary "Hot Work Permits" prior to commencement of any Works so requiring a permit.

1.16 NICEIC MEMBERSHIP

It will be deemed that the Contractor or any subsequent Sub-Contractor employed by him, in the execution of the Electrical Works, is approved by the National Inspection Council for Electrical Installation Contractors.

1.17 NOMINATED SUPPLIERS AND SPECIALIST

It will be deemed that the nomination in this Specification of any supplier or specialist, does not in any way remove or absolve the Contractor from full responsibility for the materials, supplies or the work carried out by the nominated supplier or specialist.

The Contractor will be required to place an order with such firms, organise, supervise and take full responsibility for the payment of any monies due to the suppliers of specialists in respect of these works.

Unless the above work or materials is covered by a P.C. or provisional sum as later detailed it will be deemed that the Contractor obtained a quotation from the nominated supplier or specialist firm prior to submitting his Tender and that due allowance was made in his Tender for the full cost of the supply, delivery and installation of the equipment, together with the costs of his own overheads, etc., and no extras will be allowed in this respect.

1.18 DRAWINGS FOR APPROVAL

The Contractor shall produce the following fully dimensioned drawings as required by the Works and submit copies in triplicate to the Engineer for approval. Thereafter the Contractor shall provide as many copies as necessary for circulation and records.

- (i) Engineering Drawings
 - (a) All major items of plant and equipment, layout of main switchgear in EMI room, or any other such collection of switchgear.
 - (b) Electrical wiring diagrams for any panels supplied under this Contract or from suppliers of specialist equipment.
 - (c) All builders works requirements associated with the works.
- (ii) Builders Work Drawings
 - (a) All bases, plinths, piers, framing etc., for supporting items of plant and equipment etc.,
 - (b) Templates in respect marking out specific requirements in connection with machinery or specialist equipment.
 - (c) Holes, pockets and openings through all aspects of the building structure.
 - (d) External trenches/service ducts and meter housings and any weatherproofing requirements for external services.
 - (e) Positions where inserts for supports etc., are to be built into structures i.e. floor slabs, walls, columns etc.,
 - (f) Positions required for access panels/doors in walls, floors and ceilings for maintenance and commissioning requirements.

Whether directly responsible for Builders Work or not, as subsequently defined in Part III, the Contractor shall produce the above mentioned drawings. In the event of a Main Contractor fulfilling the builders work requirements, the Contractor shall be responsible for ensuring the works are adequately and properly performed.

Where it has been deemed that the Contractor shall be responsible for builders work he shall employ a competent Specialist.

1.19 MANUFACTURERS RECOMMENDATIONS

In all cases, items of plant, equipment and machinery shall be installed in full compliance with the manufacturers recommendations including necessary supports etc., All such leaflets as supplied with any item by the manufacturer shall be kept in a file on site for inspection by the Engineer.

No extras shall be given for works resulting from non compliance with the above.

1.20 INDUCEMENTS

The Client shall be entitled to cancel the Contract and to recover from the Contractor the amount of any loss resulting from such cancellation if the Contractor shall have offered or given or agreed to give any person any gift of consideration of any kind as an inducement or reward for doing or forbearing to do or for having done or forborne to do any action in relation to the obtaining or execution of the Contractor or for showing or forbearing to show favour or disfavour to any person in relation to the Contractor or if the like acts shall have been done by any person employed by him or action on his behalf.

1.21 SITE CONDITIONS AND EXISTING EQUIPMENT

It will be deemed that the Contractor visited the site before submitting his Tender and obtained details of site conditions and access, and also details of existing equipment where necessary, and that he made due allowance accordingly in his Tender. No extra payment will be made for any extra works or difficulties arising from the Contractor's failure to visit the site before tendering.

1.22 SPECIALIST ATTENDANCE FOR COMMISSIONING

The Contractor shall arrange and made all payments for specialists to visit site and fully commission all items of plant, machinery and equipment as supplied by the Contractor, to ensure that the works are properly adjusted and put into working order to the satisfaction of the Engineer.

1.23 PROTECTION OF EQUIPMENT AND STORAGE

The Contractor is to ensure that all equipment to be used on the works is fully protected against damage and corrosion during delivery to and subsequent storage on site, the protection to be of the kind most suitable for the particular equipment, i.e. boxing, cartons, paint, varnish, etc.,

The Engineer, may if in his opinion it is necessary, instruct the Contractor to renew, alter or improve any such protection.

Subsequent to the installation of the equipment the Contractor shall still be required to ensure the protection of the equipment until the works are handed over, or receive its final decorative paintwork or is enclosed by a permanent protective device whichever is applicable.

The Contractor shall be responsible for the reinstatement or repair of any items damaged as a result of improper protection due to the actions of any person employed by him or inclement weather.

Where, not provided under the Conditions of Contract by the Main Contractor, the Contractor shall allow for adequate provision of lock up facilities as required for storage of equipment on site. Positions for lock ups and any additional storage areas allocated on site shall be agreed with the Client or Main Contractor, whoever is applicable. Where pipework is to be stored externally it shall be fitted with end caps to prevent ingress of dirt etc., and shall be stacked in a purpose made rack clear of ground level.

1.24 REMOVAL OF RUBBISH

At no time shall the Contractor allow waste materials and scrap metal to accumulate on site. All such rubbish shall be set aside in a 'safe' area so as not to cause a hazard to any persons on the site. At regular intervals or as deemed by the Engineer, all rubbish shall be cleared from the site and lawfully disposed.

1.25 MANUFACTURERS NAMEPLATES AND LABELLING

The Contractor is to leave in position on all equipment of which he is not the actual manufacturer the manufacturer's nameplate or marking normally attached thereto and no equipment shall be installed without ready means of identifying the manufacturer and pattern or type number of the equipment.

The Contractor is to supply and fix ivory or similar approved labels to all items of equipment, valves, switches, fuses, etc., as may have formed part of his works and these labels shall bear such information as is considered necessary by the Engineer.

1.26 ELECTRICAL INTERFERENCE

All electrical equipment supplied under the Contract or used by the Contractor during the execution of the works shall be fully suppressed to prevent radio telephone and television interference.

1.27 NOISE NUISANCE

The Contractor shall take all reasonable measures during the course of the works to prevent or minimise nuisance or inconvenience caused by noise to persons on site, occupiers or surrounding properties and the general public. Generators, compressors and other such noisy equipment shall be muffled at all times by means of silencers or screens etc., Due regard shall also be given to working hours in this respect.

1.28 NOTICES

The Contractor shall supply and fix all necessary notices relating to the safe and proper operation of plant, machinery or services. Provision shall also be made for notices, temporary or otherwise warning of potential hazards either due to working procedures or installed equipment.

1.29 SITE MEASUREMENTS

The Contractor shall be responsible for taking his own particulars and measurements from site and provide at his own expense all necessary working drawings, copies of which shall be submitted to the Engineer for approval prior to executing the works.

All measurements shall be taken from the actual buildings and plant and not from the Contract drawings, in particular where an item of plant is to be installed close to or within any structure.

The Contractor is to ensure that all major items of plant are installed with due regard to minimum clearances stated by respective manufacturers to enable maintenance. Similarly any apparatus that may need regular access or removal for maintenance should be sited to avoid any difficulties due to adjacent installations.

1.30 MEASUREMENT OF WORKS

The Contractor shall with regards to measuring Works on site comply with the following:-

- (a) Give all necessary assistance to enable the Engineer to examine or measure any of the Works.
- (b) Ensure that none of the Works are covered or concealed or insulation applied thereto without the prior approval of the Engineer and subject to any testing requirements detailed under Part II of this Specification. Due notice shall be given to the Engineer that such works are ready for examination.
- (c) Give every facility to the Engineer to measure any variations for which payment is based on a 'Schedule of Rates' or a 'Bill of Quantities'.

1.31 PROGRESS AND AS INSTALLED DRAWINGS

Throughout the duration of the Works the Contractor shall maintain on site fully detailed record drawings (marked prints) of all changes from the Tender Drawings to facilitate easy and accurate preparation of the 'As Installed Drawings' and to ensure that the drawings are in all respects a true representation of the installation. Such drawings shall also be marked to indicate progress of the Works.

Where the Works includes modifications to existing services the Contractor shall include on the "As Installed Drawings" all available information regarding the existing services. Where practical the Contractor shall check the accuracy of the existing information and supplement it where necessary from surveys of the complete installations.

The Contractor shall also upon completion of the Works produce the following drawings which are to be mounted within a hardwood timber or aluminium frame and perspex covered.

- (a) An electrical shock notice.
- (b) Schematic wiring diagram indicating incoming mains, phases, fuses and ratings switchgear and distribution network to boards etc.

Draft proposals are to be submitted to the Engineer for his approval. All equipment is to be labelled (Clause 1.25) so that it can easily be identified with the information given in the operating instructions and on the wiring diagram and valve charts.

“As Installed Drawings” shall be produced on tracing paper, film or other similar reproducible material and given to the Client at the Handover.

1.32 DEFECTS LIABILITY PERIOD

All items of equipment, whether put into operation before the completion of the Contract or not, shall be maintained in perfect order by the Contractor until the completed installation or an agreed section of the installation is handed over.

For a period of 12 calendar months, unless otherwise indicated after the completion of the Contract, the Contractor shall be responsible for any defects which may develop under normal conditions as a consequence of faulty materials, design or workmanship in the Works but not otherwise. The Contractor shall forthwith remedy such defects when called upon to do so by the Engineer who shall state in writing in what respect any portion of the installation is faulty.

The Contractor will also be held liable for any costs of dismantling or re-erection and making good of any of the works (whether forming part of this Contract or not) which may have to be undertaken in order to replace defective parts.

After the installations are completed, tested, set to work and handed over to the Client, the Contractor shall supervise and be completely responsible for the running of all installations for a period of four weeks. During this period the Contractor shall instruct the Client's Engineers in the running, operating and maintenance of the installations.

1.33 HANDOVER

Handover of the Works shall general include:-

- (a) Supply of original "As Installed Drawings", fixing of electrical charts and supply of all test certificates.
- (b) Supply of spares as specified.
- (c) Completion of all painting, application of identification requirements, supply and fixing of all labels and notices.
- (d) Cleaning of all items of plant such that they are in clean appearance and to ensure manufacturers nameplates are clearly visible.
- (e) General finishing and tidying of the installation
- (f) Agreeing with the Engineer a list of any outstanding items or defects, which shall then be rectified within 4 weeks from the handover date.
- (g) Familiarising the Clients Engineers with the installation.

PART 2 GENERAL TECHNICAL REQUIREMENTS

2.1 SCOPE OF SPECIFICATION

This specification, unless otherwise detailed in Part 3, provides for the supply, delivery, installation, testing and commissioning of the services detailed in Part 3.

The Contractor shall include for all transportation, handling, storage and associated costs, necessary to satisfactorily complete the works specified.

2.2 COMPLIANCE WITH REGULATIONS

Unless specified to the contrary, all materials and equipment shall be installed in accordance with the current edition of the Regulations for Electrical Installations, as published by the Institution of Electrical Engineers. including all amendments thereto.

2.3 COMPLIANCE WITH BRITISH STANDARDS

Unless specified to the contrary, all cables, materials and equipment, shall be manufactured in compliance with the appropriate British Standard(s).

2.4 BUILDERS WORK

(a) With Builder Attending

For contracts where the Principal Contractor is the Building Contractor, the Electrical Sub-Contractor shall mark out the exact position of all holes and chases necessary for the proper execution of the electrical works.

All cutting away and making good shall be carried out by the Principal Contractor.

(b) Without Builder Attending

For contracts where the Principal Contractor is other than a Building Contractor, the Electrical Contractor shall be responsible for all cutting away and making good of the structure, necessary for the proper execution of the electrical works.

2.5 POSITION AND ALIGNMENT OF EQUIPMENT

The position of equipment and accessories as indicated on the drawings show the general arrangement for the works. The final positions shall be agreed on site having regard for the final locations of other services and fixed furniture positions.

In the absence of alternative information in Part 3 accessories shall be mounted at the following height.

Lighting switch	1200 A.F.F.L. to centre
Local isolator	1200 A.F.F.L. " "
Socket outlet	450 A.F.F.L. " " or 150mm ABOVE BENCH LEVEL
Room thermostat	1.5m A.F.F.L. to centre

2.1

All equipment and accessories shall be installed plumb and level. The Contractor shall ascertain the depth of any finishes to ensure accessory plates fix in true alignment. Any remedial work necessary to achieve proper installation, shall be wholly at the contractors expense, including the cost of any redecoration.

2.6

CONDUIT AND CONDUIT ACCESSORIES

(a) General

Unless otherwise specified in Part 3 of the specification, all conduit and accessories are to be as detailed hereunder.

Continuous conduit systems shall be heavy gauge, seam welded, mild steel, black enamelled or galvanised, or high impact, heavy gauge PVC (suitable for installation transportation and storage at temperatures not normally below minus 5 degrees C).

Conduit used for the mechanical protection of PVC/PVC cables over short distances shall be heavy gauge, seam welded, where the conduit is exposed, but may be circular light gauge plastic where concealed.

Continuous conduit systems shall be mechanically continuous throughout, so as to afford full protection to the cables.

All conduit systems shall be fully erected and complete before the cables are drawn in.

Conduits are to be of sufficient capacity to accommodate the number and size of cables, having regard for the appropriate spacing factors and the size shall be determined in accordance with the method detailed in Appendix A of the Guidance Notes No. 1 to the IEE Regulations 16th Edition.

Notwithstanding the actual size of conduit determined by this method, the minimum size of conduit which shall be used is 20mm dia and the maximum size shall have regard for the available space, particularly with regard to conduit run in any floor screeds.

Conduit runs shall be kept as straight as possible, avoiding unnecessary bends or sets and for concealed systems, shall be arranged to follow the shortest practical route between points, with the exception that conduit, where concealed in the wall shall only follow a vertical route.

Conduits shall be installed in a manner such that cables may be drawn in, using the loop-in method. The conduit for each service shall be kept entirely separate, e.g. power, lighting, telephones etc.

Conduit sets through walls will not be permitted. Where conduits change direction through a wall, a back outlet box shall be used, located on one side of the wall.

2.2

In the case of a loop-in conduit system where the conduits enter the backs of the circular boxes, horizontal runs of conduit shall, where possible, pass over the box positions to avoid crossing of conduit. In addition, the conduit runs shall wherever possible, be planned to avoid crossing of horizontal conduits within the floor screed thickness.

The inside of all conduit and accessories is to be free from any burr or other projection liable to damage the cables contained therein.

All bends or sets must wherever possible be made by cold forming the conduit in an approved bending machine. The bending must be such that the full bore and wall thickness of the tube is retained. In addition for plastic conduit, a close fitting purpose made tube bending spring, shall be used to assist the true formation of any bend.

Other changes in direction or branches in the conduit system are to be made by the use of multi-way circular conduit boxes with the requisite number of entries, or in certain cases subject to the Engineers approval, by means of adaptable boxes installed in readily accessible positions.

No factory made bends, elbows or tees are to be used.

Draw-in points shall be arranged so that it is not necessary to draw any cable round more than two right angle bends, or the equivalent of two right angle bends, between drawing-in points.

The distance between conduit boxes or draw-in points on straight runs of conduit shall not exceed 9.0m and must not exceed 7.0m where any bend is present in the conduit run.

Conduits concealed in floor screeds and wall chases are to be securely fixed by means of steel crampets.

Generally, surface conduit is to be mounted on spacer bar saddles, finished to match the conduit finish.

Where conduits are run together they shall, as far as possible, be equally spaced and run with due regard to each other so as to present a neat final appearance.

Conduit is to be supported or saddled at the following intervals:-

	Steel	Plastic
20mm conduit every	1.0m	0.8m
25mm " "	1.0m	0.8m
32mm " " and larger every	1.5m	1.0m

2.3

Galvanised conduit is to be fixed by heavy duty galvanised spacer bar saddles and the distance from the rear of any galvanised conduit to the wall surface must be at least 6mm.

Supports are to be fixed at a distance of 150mm on either side of a bend.

Conduits run under or across girders shall be secured by manufactured girder clips.

On concealed conduit systems, all wiring accessory boxes shall be installed flush with the finished surfaces of walls and ceilings. Where necessary, extension rings or pieces shall be used to effect this.

All conduit boxes shall be fixed with not less than two screws.

Fixing for boxes and all conduit accessories shall be carried out with not less than 40mm long No.8 wood screws in fibre or other approved wall plugs, on concrete and brickwork, and not less than 25mm long No.8 wood screws into structural timber. Fixings shall not be made to building boards or plasterwork.

Countersunk headed screws shall only be used for fixing where countersunk holes have been provided for these. Except as mentioned above, all screws shall be of the round head type. All screw heads shall have burrs and sharp edges removed before wiring commences and all screws shall be driven in to their full depth.

Adaptable boxes used in steel conduit installations are to be constructed in 16 s.w.g. or heavier sheet steel or cast iron, finished to match the conduit and of sufficient size to avoid undue bunching of cables and to permit adequate cable slack to be accommodated.

A minimum of 12mm must be left between adjacent conduit entry holes on adaptable boxes and at distribution equipment.

Adaptable boxes, conduit boxes or switch boxes must be fixed independently wherever possible and should not rely merely on the support of the connecting conduit.

Wherever practicable cables shall not be drawn into any conduit until the whole of the conduit installation has been completed, swabbed through to remove dirt and loose matter, rendered dry throughout and finally approved by the Engineer. Similarly, wherever possible, cables should not be drawn in until the adjacent building work is also completed, where it is not practicable to comply with these requirements the Engineer is to be so informed and his alternative instructions obtained.

The Contractor will be held entirely responsible for checking that conduits have not been dented or otherwise damaged after installation and prior to drawing in cables.

Any upturned ends of conduit, either with or without cables, are to be protected from the ingress of foreign matter.

2.4

Unless otherwise specified in Part 3 of the specification the Contractor shall submit to the Engineer for approval drawings showing the proposed route of conduit, dimensioned to show the exact points of vertical runs and positions of outlets for wiring accessories.

After approval, the Contractor shall issue as many copies of these drawings as are reasonably required.

The Engineers approval of the above drawings will not relieve the Contractor of his responsibility to ascertain exact building dimensions, and locations of other services.

If any conduits are installed prior to approval or not in accordance with the approved drawings, the Engineer will be entitled, if he so wishes, to instruct these to be altered to comply with his requirements, at no extra cost.

(b) Additional Requirements for Steel Conduit

Steel conduit and conduit accessories shall, where applicable comply in all respects with the current edition of BS4568 and IEC614.

Steel conduit and accessories installed within the normal building areas shall be black enamel finished whether exposed or concealed. Conduit and accessories installed within internal areas having above normal air moisture content, or, externally, shall be galvanised on the inside and outside surface, using the hot dip method.

Steel conduit is to be cut with an approved cutting device or hacksaw and the end reamed to remove any burrs. Threads shall be cut using approved solid dies in good condition and adequately lubricated. All cutting lubricant shall be removed before jointing. No thread is to project outside the female socket or spout receiving the threaded end except where a running socket is used.

Conduit enamel or galvanising damaged during erection, or by the pipe vice, etc. shall be painted with an approved paint to match the original conduit finish and any conduit threads visible after erection of a conduit system shall be painted in a like manner.

Where steel conduit terminate at conduit entries, trunking, distribution boards or accessories other than threaded entries of switchgear, etc. they shall do so with a screwed conduit socket or coupler arranged to be in good mechanical contact with the case and secured by an internal brass bush screwed into the coupler from within the case, the two being locked together.

At all couplings the conduit ends or the conduit end and bush shall butt together within the coupler.

Where galvanised conduit and fittings are used, care must be taken to ensure that all joints are made watertight by means of suitable jointings and that all box covers etc., are fitted with suitable gaskets.

All bushes used on heavy gauge steel conduit systems shall be of the brass type.

2.5

With the exception of the bending of services specified in Part 3 of this Specification, steel conduits are not to touch any other pipes and shall be at least 150mm clear of all gas meters and hot water pipes wherever possible. Where this requirement cannot be complied with alternative instructions must be sought from the Engineer.

After erection the electrical resistance of the conduit, together with any intermediate trunking, for each separate circuit shall be measured, between the distribution board and each outlet position. If the resistance measured is greater than 0.4ohm, then remedial action shall be taken to reduce the value to that accepted. If remedial action cannot reduce the value, alternative instructions shall be sought from the Engineer.

(c) **Additional Requirements for Plastic Conduit**

Plastic conduit and conduit accessories shall, where applicable comply in all respects to BS4607 and IEC614 Specifications.

Connection of consecutive lengths of plastic conduit shall be made using either threaded couplers or smooth bore couplers. Bends in plastic conduit shall be formed with the assistance of a purpose made pipe bending spring.

Termination of plastic conduit at distribution boards, trunking or plain sided accessory boxes, shall be effected using a smooth bore to internally threaded coupler and male bush.

Every conduit accessory shall be of the same manufacture and range as the conduit itself.

Preformed elbows or bends shall not be used on plastic conduit systems, unless prior written approval has been obtained.

Every smooth bore conduit accessory shall be secured to the conduit using the welding adhesive and method of application as recommended by the conduit manufacturer. The adhesive shall be properly allowed to harden before any cable is drawn into the conduit system.

All plastic accessory boxes shall be of a type having threaded brass inserts for securing the accessory plate.

Each circuit contained in a plastic conduit system shall be provided with a continuous circuit protective conductor, having the same c.s.a. as the phase conductor and be insulated with green coloured PVC.

2.7 **FLEXIBLE CONDUITS**

Final connections from rigid conduit systems to motors or other electrical equipment liable to vibration or to adjustable equipment, are to be made by means of least 300mm of flexible metallic conduit connected at either end by vibration proof, approved metallic couplings. Unless otherwise specified later, this flexible conduit is to be 'Kopex' manufactured by Uni-Tubes Ltd., and with approved accessories.

2.6

A separate earth conductor is required between the fixed conduit and the earth terminal of the motor or other apparatus; the flexible conduit will not be considered an adequate earth connection.

2.8 TRUNKING GENERAL

All trunking and fittings shall comply with BS4678 and/or have an ignitability characteristic 'P' as specified in BS476 Part 5.

All trunking of a common type shall be supplied from one manufacturer and be of the same range.

End caps, bends, lids and general trunking accessories, shall be of the same manufacture and range as the trunking and no special made accessories are to be used.

Metal trunking shall be manufactured from mild steel of not less than 16 s.w.g. thickness. Separate sections shall be connected by internal sleeve couplings and all joints shall be electrically bonded by external copper links.

The complete trunking system shall be erected, fixed secure and tested for electrical continuity before any cables are drawn in.

Where sub circuit conduit(s) originates from the trunking, the resistance measurement referred to in clause 2.6(b), shall include the resistance of the trunking.

After installation of the cables, the trunking shall be fitted with cable retaining clips, as supplied for this purpose by the trunking manufacture. These clips be positioned at 1.0m centres.

The trunking shall be fixed to the building fabric with a minimum 40mm No.12 woodscrew, at 750mm centres for metal trunking and 32mm No.10 woodscrew, at 500mm centres for plastic trunking.

Where trunking is supported on structural girders, purpose made girder clamps and brackets shall be used at 750mm centres. Prior agreement to the proposed arrangement shall be obtained from the Engineer before work commences.

Where the trunking passes through floors and walls, an approved fire barrier shall be installed inside the trunking.

The size of any trunking shall be determined in accordance with the method detailed in the IEE regulations Guidance Note No. 1 Appendix A.

2.9 CABLE TRAY

Unless indicated otherwise in Part 3, where required or shown on the drawings, cable tray shall be installed as described below.

Cable tray shall be of minimum 16 s.w.g. thickness and be hot dip galvanised finished.

2.7

Every tray shall be fixed to the main building fabric using suitable brackets, fixed at intervals of 1.0 metre and arranged to provide a minimum clearance of 25mm between the fabric and the underside of the tray

Sections of tray shall be joined, using internal sleeves of minimum length 100mm.

Where it is necessary to fix tray to girders, this shall be effected using purpose made girder clamps and the proposed arrangement shall be agreed with the Engineer prior to installation.

Cables installed on tray shall be not more than two deep and the tray shall be sized to allow 25% spare cable capacity.

All bends and tees, etc., shall be purposed made.

The tray shall be bolted, complete, erected and painted on cut edges, before cables are installed along it.

All cables shall be supported on the tray according to the detail given under the appropriate clause(s) in Part 2 of this Specification.

Cable tray shall be used for support only and under no circumstances shall be used to form part of the circuit protective conductor for any circuit, nor shall it form part of the earthing system.

The tray shall be equipotentially bonded in the manner described in clause 2.23 of this Specification.

2.10 WIRING GENERAL

All wiring is to be carried out on the loop-in system using terminals of accessories to provide looping points.

For lighting installations, the looping of the live feeds shall be at switches and the looping of the neutral shall be at ceiling points.

Intermediate joints in cables, will not be permitted and only continuous lengths of cable shall be taken between points of termination.

Excessive bunching of cables in large conduits will not be accepted and a number of smaller conduits is to be used, where this requirement may result in excessive "cross over" situations, the proposed layout shall have prior agreement of the Engineer.

The separate conductors of any single or polyphase circuit must in all cases be accommodated in the same conduit.

No more than two conductors may be bunched in any one terminal and except for ring circuits, no more than one conductor shall be connected to a fuseway or circuit breaker.

The effective cross sectional area of cables shall not be reduced to enable connections to be made at terminals, in particular strands must not be removed from stranded cable and every strand must be crimped in the terminal device.

All single pole switching devices or protection devices must be connected in the live pole.

Adequate slack cable shall be left within every draw-in point and at terminal points to avoid undue stress on cables and allow for stripping back and reconnection to terminals.

Where necessary, connection between cables and flexible cables shall be made using shrouded connectors. Taped joints will not be permitted.

2.11 SHEATHED WIRING SYSTEMS (OTHER THAN MINERAL INSULATED)

Where sheathed wiring systems are used, wiring run on the building surface to switches or other accessories shall be protected by steel conduit. The wiring shall not be pulled in until the conduit and accessory box are properly installed.

The conduit is to be connected at one end to the accessory box by means of a socket coupler and bush or direct into the accessory box spout if appropriate. The other end shall project into the floor or roof space and shall be fitted with a suitable bush.

A BS small circular conduit box shall be provided at every lighting point as detailed in clause 2.14(d) of this Specification.

All lighting switch boxes shall be bonded to the circuit protective conductor in accordance with clause 2.14(b) of this Specification.

No notching of roof or floor timbers will be permitted.

Where so permitted by the Engineer, cables shall cross joists by means of suitable timber battens nailed to the joists for this purpose and these timber battens shall be supplied by the Contractor.

The cables shall be clipped to the sides of these battens. In floor and roof voids, the Contractor shall indicate to the Engineer where it is intended to drill cable holes through joists. Such holes are to be of the minimum size to accommodate the cables. The Contractor shall ensure that the holes are drilled as straight as possible between wiring outlets to make rewiring possible without the necessity to disturb the building fabric.

Cables in floor voids and elsewhere must be positioned so as to avoid the possibility of damage from nails etc.

Cables in normally inaccessible floor voids need only be fixed where necessary to take any excessive strain off the cable due to its own weight.

Cables run on the surface and in accessible voids, such as roof spaces shall be fixed in compliance with the tables as detailed in Guidance Note No.1 Appendix I, to the IEE regulations, 16th Edition.

Single cables shall be fixed with tinned brass buckle clips or one hole hard formed plastic clips and multi runs of cable in exposed areas shall be fixed with purpose made saddles formed from reinforced PVC strip.

The cables shall be neatly dressed and all fixings shall be secured with high tensile steel pins where run on timber and, be assisted by wall plugs where fixed on brickwork, masonry etc. Saddles shall be secured using brass screws in wood or wall plugs.

No junction boxes will be allowed under floors or in inaccessible roof spaces.

Particular care must be taken to ensure that all terminations of sheathed wiring systems conform to the recommendations of Chapter 52, section 527 of the IEE regulations.

2.12 MINERAL INSULATED CABLES

All mineral insulated cables are to be of the 600 or 1000 volt grade and are to comply with BS 6207, where applicable.

All accessories, gland fittings etc., used on the installation must be of the same manufacture as the cable.

Cables grouped and run together shall be fixed by means of heavy multi-way copper saddles secured by brass round head screws.

Cables run singly shall be fixed by means of one-hole copper clips secured by brass round screws. Multiple cable runs shall be secured with 2 hole copper saddles fixed with brass round head screws.

If cables are run on a mild steel tray, brass nuts and bolts or set screws shall be used to secure the saddles.

The spacing of saddles shall be regular and shall not exceed the distances given in Appendix I, Guidance Notes No.1 to the IEE Regulations.

Cables shall be supported 150mm on either side of bends, etc., boxes, fittings, etc.

Any bend in a cable is to have an inside radius of not less than six times the overall diameter of the cable.

Where exposed, the cables are to be arranged to avoid unnecessary crossing over at terminations and are to be carefully dressed to present a tidy final appearance.

Mineral insulated cables shall not be installed directly in plastered finishes, floor screeds or cast concrete.

Mineral insulated cable terminating at apparatus which is subject to considerable vibration or which is adjustable shall be formed into a single turn coil immediately prior to termination.

Unless otherwise specified in Part 3 of this Specification, all terminations for the ends of cables are to be made with the standard terminations using cold, screw-on type seals and neoprene sleeving.

Multicore cables terminating at accessories or equipment without screwed entries shall be carried out using the glands specified above and screwed conduit couplings and brass male bushes.

Single core cables shall be terminated at apparatus by means of the glands specified and brass plates if the entry covers are removable, or if this is not possible, radial saw cuts shall be made between the cable entry holes to interrupt the magnetic circuit round any individual cable.

2.10

Where temperatures in excess of 80°C are expected at terminations, high temperature sealing compound and heat-resisting sleeving is to be used.

Conductors of 6mm and above shall terminate in compression type cone grip cable sockets.

Cable lengths shall be continuous throughout between termination points and intermediate "through" or "tee" joints will not be permitted, without prior written approval of the Engineer.

Contact between the cable sheath and gas pipes where these run in close proximity is to be prevented by insulating distance pieces.

Where the cable sheath is, or may be, in contact with any other pipes or unearthed metalwork of any description an efficient metallic connection shall be made between the cable sheath and the metalwork.

Where cables pass through walls, floors or the foundation of buildings they shall be protected by close fitting conduit sleeves.

For surface run cables rising from the floor the protection shall extend 225mm above the floor finish, otherwise the conduit sleeving shall finish flush with the wall or ceiling, etc. before any plaster is applied.

The ends of all conductors shall be identified by means of coloured insulating sleeves.

All accessories and joint boxes throughout the installation are to conform with the usual practice as laid down by the manufacturer and where conduit accessories are used these must comply with the requirements in clause 2.6 of this Specification.

Cables installed external to buildings or in damp atmospheres, e.g. external unheated toilets, are to be PVC sheathed.

Cables run underground shall be PVC sheathed and laid at a depth of 0.5m below ground level and be bedded in sifted soil or soft sand.

Where possible cables shall follow the route of footpaths, however, where cables are run below unpaved areas, they shall follow the shortest practical direct route between points. Cables run underground below unpaved areas shall be clearly marked above ground at the start and finish positions using traffolite labels screwed to permanent structural features e.g. external walls, concrete columns etc. A plastic safety marker tape shall be buried 150mm below surface level for the entire length of any cable and be positioned vertically above that cable.

The exact positions of all cables which are buried underground shall be accurately shown in drawings to be supplied by the Contractor.

Unless indicated otherwise in Part 3 of this Specification, cables run in heating ducts shall be saddled to the side of the ducts clear of all pipes and thermal insulation, etc. The cables shall not be installed until after the heating pipes etc. have been installed but before any thermal insulation is applied.

2.13 CABLES AND FLEXIBLE CORDS**(a) General Requirements**

Tough rubber and polythene insulated cables shall not be used.

If possible, all cables used shall be as produced by one manufacturer. If this is not possible, all cables of any one type shall be supplied by one manufacturer.

Each coil of cable and flexible cord shall bear the Makers label, sealed to the coil stating the result of the test at the Makers works as specified. No coil of polyvinyl chloride cable or flexible cord manufactured more than twelve months prior to delivery on the site is to be used and the Contractor may be required to furnish to the Engineer satisfactory evidence of the date of manufacture of any coil.

Unless otherwise indicated hereunder all conductors are to be stranded high conductivity copper to BS 3360.

Where possible cables having stranded cores shall be used.

The size of cables are to be as indicated elsewhere but are in no instance to be less than 1.5mm on lighting circuits or 2.5mm on power circuits.

All cables are to be properly colour-coded in accordance with the IEE Regulations.

(b) Cables

Unless otherwise indicated all cables and insulation are to be of 600/100 volt grade.

'PN4VC insulated only' cables shall comply with BS6004:1969, including amendments.

'Butyl rubber insulated, braided and compounded' cables shall comply with BS 6007:1969.

(c) Flexible Cords

Unless otherwise indicated all flexible cords and insulation are to be of 300/500 volt grade.

Only the flexible cords detailed below shall be used and shall be in accordance with the relevant parts of BS 6500:1969. The applicable table of this British Standard is indicated alongside each type of flexible cord given below.

"VR. insulated, tough rubber sheathed" (300/500 volt) - Table 6.

"PVC. insulated only - Table 8.

"PVC, insulated, PVC sheathed" (300/500 volt) - Table 11.

2.12

"PVC.(HR) insulated, PVC sheathed" (300/500 volt)	- Table 12.
"EPR insulated, CSP sheathed" (300/500 volt)	- Table 14.
"Silicone Rubber insulated, glass fibre braided"	- Table 15.
"Silicone Rubber insulated, glass fibre braided" (circular)	- Table 16.
"Glass fibre insulated"	- Table 17.
"Glass fibre insulated, glass fibre braided" (circular)	- Table 18.

(d) Armoured Flexible Cords

"PVC insulated, PVC sheathed, armoured" flexible cords shall be in accordance with BS 6500 where this is applicable.

The flexible cords and insulation are to be of 300/500 volt grade.

The armouring of these flexible cords shall be comprised of interlocking convolutions of galvanised mild steel tape.

(e) Screened Cable

"Screened cable" for use with automatic control systems, etc. is to be PVC insulated, PVC sheathed, copper braided and PVC served overall and shall be in accordance with BS 6004 where applicable.

2.14 LIGHTING SUB-CIRCUITS

(a) General

On heavy gauge conduit installations the wiring shall be carried out on the looping principle with the live feeds looped at the lighting switch terminals and the neutral feeds looped at the lighting points.

For domestic installations carried out on a three plate wiring system with PVC insulated and sheathed cable, both the live and neutral feeds shall be looped at the lighting outlet position, and this shall be effected as indicated in section (d) below.

On PVC insulated and sheathed installations cables of the type incorporating a circuit protective conductor shall be used throughout and the circuit protective conductors shall be bunched and connected at switches and lighting points as indicated in sections (b) and (d) below.

(b) Switches

Unless otherwise indicated all switches are to be of a flush pattern mounted 1.2m from finished floor level to the centre of the switch.

At positions where switches are grouped, multiple gang switches are to be used, in this situation the box shall be mounted for the centre gang to be at 1.2m AFFL.

2.13

Switches in boiler rooms, fuel stores, tank rooms or similar situations are to be of a surface metal clad protected industrial pattern.

Any switches in external positions are to be a surface galvanised industrial weatherproof pattern.

Switches controlling remote fittings are to be engraved to indicate the areas they control.

On PVC insulated and sheathed wiring systems, and other types of systems where separate circuit protective cables are specified, the circuit protective conductors shall be terminated at every switch position. The circuit protective conductors shall be connected to the switch boxes by means of earthing terminals supplied by the manufacturers for use in their boxes.

Where earthing terminals are provided on the removable frames of grid type switches circuit protective conductors shall be connected from these to the earthing terminals fixed in the switch boxes.

The exact manufacture, type and finish of the switches will be given in the schedule at the end of Part 3 of this Specification.

(c) Circuits

Generally, the drawing or schedules accompanying this Specification will indicate which lighting points are to be served from each fuseway or circuit breaker.

However, in the absence of such detailed information, each sub-circuit is to be protected at the nearest sub-distribution board and shall serve a maximum of 10 points or carry no more than 5 ampere load.

Where there are more than 4 luminaires in any one room or area the circuits are to be arranged so that they are served by more than one fuse or circuit breaker. Similarly, wherever possible the adjacent rooms or areas are to be on different circuits so that, in the event of a failure, large areas of the building are not completely darkened. In arranging such circuitry due consideration must be given to the phasing of each circuit and their proximity to each other in rooms etc.

All sub-circuit wiring is to be identified as later specified.

(d) Terminations at Luminaires

Unless otherwise indicated in Part 3 of this Specification, a small circular steel BS conduit box shall be provided behind every luminaire in concealed wiring installations, including PVC insulated and sheathed systems. Each box shall be positioned over the centre entry hole of the luminaire and shall be supported by a suitable timber noggin in cases where a plaster and timber joist construction is used.

2.14

On PVC insulated and sheathed systems, the cable shall enter the conduit boxes provided behind every luminaire through rubber or PVC grommets holes, or alternatively through the screwed spouts of the boxes which shall be fitted with screwed brass male bushes.

On concealed wiring systems, the hard wiring to luminaries, with the exception of domestic type pendants, is to terminate within the conduit boxes in shrouded connectors. The final wiring to the luminaires shall be executed with 24/.20 (0.75mm) heat-resisting flexible cords.

Where domestic type pendants are specified the hard wiring cables shall be directly connected into the ceiling roses.

Where batten lampholders are specified these shall be of the type giving provision for the installation of heat-resisting 'tails' between the hard wiring terminals and the terminals of the lampholder. The hard wiring circuit cables shall be connected direct into the terminals provided for this purpose in the back plate of the lampholder.

In each case above, care shall be taken that the cable sheaths in PVC insulated and sheathed systems, enter the conduit boxes in accordance with the recommendations of the IEE regulations.

An earthing terminal shall be provided in every lighting point conduit box on all types of wiring and conduit systems. Terminals of the type fixed with screws inserted from the back of the boxes shall not be used.

On PVC insulated and sheathed wiring systems, and on other types of systems where separate circuit protective cables are specified, the circuit protective conductors shall be connected into the earthing terminals fixed in the lighting point conduit boxes.

A circuit protective conductor shall be installed from each earthing terminal fixed in the conduit box to any earthing terminal provided on the associated luminaire, ceiling rose or batten lampholder.

On surface wiring systems, the cables entering luminaires, with the exception of domestic type pendants, shall be protected with glass or other approved sleeving.

Circuit wiring, other than that feeding the luminaire shall not be run into or through luminaires.

Where special luminaires or other equipment such as stage lighting equipment is specified, the Contractor will be responsible for ensuring that adequate and correct terminations are left to receive and support these luminaires.

Where metal lamp shades are used these are to be adequately earth bonded to the conduit or circuit protective conductor and where such shades are carried on chains, the chain will not be considered an ample earth connection.

(e) Luminaires

Unless otherwise indicated, the Contractor is to supply, deliver and install all luminaires indicated on the drawings and in Part 3 of this Specification.

On luminaires where pendant lengths are adjustable the Contractor will be required to offer up one or more of each type of fitting in each location to enable the Engineer to issue any final instructions on mounting heights, pendant lengths etc. The Engineer will also be at liberty to request the Contractor to obtain samples of various luminaires at any early stage of the works to permit a final choice to be made.

Luminaires shall, where relevant, be fixed to the conduit box provided at the lighting point and in addition, shall be fixed to the building structure.

Luminaires shall not be fixed to building boards or plasterwork.

(f) Lamps

With the exception of domestic premises, all luminaires are to be fitted with a lamp of the correct size, type and wattage.

All lamps are to comply with the latest relevant BSS and are to be manufactured by a firm holding a BSI licence for electric lamps.

All lamps are to be of the wattage scheduled later in this Specification and to be suitable for the supply voltage.

Unless otherwise indicated all tungsten lamps are to be, wherever possible, of the internally frosted type.

Lamps up to 100 watt in sizes are to have coiled coil filaments whilst larger lamps are to have single coil filaments.

Fluorescent lamps are to be of the hot cathode type with bi-pin caps and with external silicone coating, unless otherwise specified.

All fluorescent lamps, unless otherwise stated, are to be "daylight" or "natural" colours.

2.15 SOCKET OUTLETS

All socket outlets shall comply with the relevant British Standards. The manufacturer, type and finish of socket outlets is to be as scheduled at the back of Part 3 of this Specification.

No spurs will be permitted on ring circuits unless indicated in Part 3 of this Specification.

An earthing terminal shall be provided in every outlet box on all types of wiring and conduit systems. Terminals of the type fixed with screws inserted from the backs of the boxes shall not be used.

2.16

On PVC insulated and sheathed systems, and on all other types of systems where separate circuit protective cables are specified, the circuit protective conductors shall be connected into the terminals fixed in the outlet boxes.

Earth bonding 'tails' shall be installed between the terminals fixed in the conduit boxes and the terminals of the socket outlets.

2.16 OTHER OUTLET POINTS

Connections to clocks, immersion heater and other fixed appliances are to be made as specified later and with accessories as detailed in the schedule at the back of Part 3.

All 13 ampere accessories and boxes shall be earthed and bonded in the manner specified for socket outlets in Clause 2.15.

2.17 UNSPECIFIED MATERIALS

Any materials not specified or detailed are to be new, the best of their kind and made by a reputable manufacturer. Details of such equipment are to be submitted for the Engineer's approval before it is placed on order.

2.18 FINISH OF ACCESSORIES

The finish of all accessories and cover plates is to be as detailed in the schedule at the back of Part 3.

Unless otherwise specified all accessories in the same room or area are to have the same finish and be mounted at a common height appropriate to position and function.

2.19 SWITCHGEAR

(a) General

All switchgear, switchboards, distribution boards and distribution equipment shall be manufactured to comply with BS5486 and IEC 439 standards as appropriate.

Every item of equipment shall be totally enclosed, dust protecting and in addition, shall be protective against the ingress of moisture.

All switchgear components, circuit breakers and enclosures shall be made by the same manufacturer and as far as possible of the same range, style and finish.

Each item shall include correct sized terminals, lugs and glands as appropriate to accommodate the cable sizes and types to be terminated therein.

Industrial type switchpanels shall be mounted on a substantial mild steel framework and, the arrangement of all switchpanels shall be logical and progressive in sequence.

Prior to erection of industrial type panels, or, manufacture and delivery of cubicle type panels, the final arrangement shall be submitted to the Engineer for approval.

2.17

At multiway distribution boards the neutral conductor of every circuit shall occupy the relative terminal position within the neutral bar as the pole conductor(s) occupy in the fuse carrier or circuit breaker arrangement.

The relative location shall be as detailed in the circuit schedules of Part 3.

(b) **Moulded Case Circuit Breakers**

Each moulded case circuit breaker (MCCB) shall be thermal magnetic type to BS 4752 1977, IEC 157-1-1973, IEC 157-1A-1976 having trip free mechanism and for operation at normal ambient temperatures, appropriate to the site conditions.

(c) **Residual Current Devices**

Each residual current device (r.c.d) shall be current balance operated to BS 4213 with trip current rating no greater than 30mA.

(d) **Miniature Circuit Breakers**

Each miniature circuit breaker (M.C.B) shall be to BS 3871 part 1, thermal magnetic type with ambient temperature compensation and trip free mechanism.

(e) **Fuses**

Semi enclosed rewirable fuses shall not be used unless specified in Part 3.

Fuses shall be of the high breaking capacity (H.B.C) to BS 88 specification.

2.20 **LABELLING AND IDENTIFICATION OF CIRCUITS**

The proposed text of all labels, lists or charts are to be submitted to the Engineer for approval before the final printing.

Non-flammable white labels of an approved size and design are to be fixed by not less than two brass instrument headed screws to the outside of each isolator, switchfuse, starter or other equipment.

The lettering is to be at least 5mm high, in black, and is to adequately describe the function of the equipment to which it is attached. No abbreviations will be permitted without prior approval.

On distribution boards the labels are to be as above but are to be white on a red ground.

Each final sub-circuit shall be identified by a circuit list on each distribution board. The circuit list shall be printed on stiff white card with clear plastic cover and shall be securely fixed to the inside of the board cover or door. The list shall indicate the rating of the circuit protection device, the size of cable, the nature and situation of the load and the load in watts.

The circuit list shall also clearly list the phase(s) of the supply to which the distribution board is connected, the voltage present, the size of the sub-main and the total connected load in kilowatts.

2.18

The cables of individual circuits enclosed in trunking shall be taped together at 225mm intervals. If any circuits contained in the trunking are supplied by different phases the tapes shall indicate the phase colour.

2.21 **INSTALLATION DIAGRAM**

The Contractor is to supply and fit a substantial 600mm x 450mm glazed dustproof frame of hardwood or metal adjacent to the main switchboard containing an 'as installed' schematic diagram of electrical distribution.

The drawing shall be arranged to occupy the whole of the frame with a 25mm border and shall be drafted for the approval of the Engineer before the final drawing is prepared.

2.22 **SHOCK NOTICE(S)**

The Contractor shall provide and fix in each electric intake room, lift motor room or boiler house, an 'Electric Shock' notice. The wording shall be printed direct on aluminium sheet and varnished and shall describe the 'Mouth to Mouth' method of treatment.

2.23 **EARTHING AND BONDING**

All non-current carrying metal work associated with the electrical installation shall be earthed in accordance with the requirements of the I.E.E. Regulations.

Unless specified in Part 3 and the 0.4ohm maximum resistance condition can be obtained, as specified in Clause 2.6, steel conduit and trunking systems shall not form the circuit protective conductor.

A separate circuit protective conductor shall be provided throughout these systems which shall be terminated at every outlet and switch position in accordance with Part 3 of this Specification.

Earth contacts of all socket outlets shall be bonded to the circuit protective conductor and particular attention is drawn to section 413 of the I.E.E. Regulations.

Earthing shall be to the earthing terminal provided by the Electricity Authority, unless specified otherwise in Part 3. Earthing to gas or water pipes is prohibited.

The entire earthing cable installation, together with all metallic parts shall be electrically continuous throughout forming a completely bonded system, in accordance with the recommendations contained in the I.E.E regulations and BS CP 1013.

Bonding to gas and water pipes shall be carried out in compliance with section 547-1 to 547-7 of the I.E.E. regulations and as detailed in Part 3.

In domestic units supplementary bonding shall be carried in compliance with section 547-1 to 7 of the I.E.E regulations and as detailed in Part 3, in each and every unit, in addition to bonding of the main incoming services for the building.

Unless specified to the contrary every earthing lead shall be protected against mechanical damage and at the termination points shall have affixed a permanent label marked "SAFETY ELECTRICAL EARTH-DO NOT REMOVE".

2.24 TESTING

On completion of the works the Contractor shall carry out testing in accordance with Part 7 of the I.E.E Regulations, and will submit to the Engineer in duplicate, a completion certificate in the form detailed in Appendix 6 of the I.E.E Regulations.

The works will not be deemed complete until this completion certificate is submitted to the Engineer.

When the Supply Authority requests a certificate of tests and/or a PME compliance certificate the Contractor shall furnish such certificates direct to the Supply Authority.

The Contractor shall provide all necessary attendance upon the Supply Authority during any tests carried out by them. The Contractor shall bear the cost of any subsequent tests or inspections rendered necessary by the failure of the installation to satisfy the requirements of the Supply Authority.

The Contractor shall also carry out such additional tests as may be required during the progress of the works, or at the completion of the works.

The Contractor will be required to make available labour and instruments etc. for the carrying out of all tests and to provide the Engineer with adequate notice of the date prior to any measurement and testing.

Tests on mineral insulated cables shall be carried out not sooner than three days after the seals have been made and for insulation resistance to earth and between cores an infinity reading is to be obtained. Cables which will be buried in floor screed etc. or which will otherwise be inaccessible, shall be tested immediately prior to covering and again two days after covering. The insulation resistance shall again be infinity.

Any faults revealed as a result of these tests are to be rectified at the Contractors own cost and the tests repeated until the engineer is entirely satisfied with the results thereof.

2.25 FINAL ADJUSTMENTS

The Contractor is to adjust to the complete satisfaction of the Engineer any time switches, clocks, overloads, thermostats, etc. and shall correctly fuse all fuseways and check the satisfactory operation of protective devices such as miniature circuit breakers, motor no volt and overload trips, etc.

PART 3 PARTICULAR REQUIREMENTS FOR ELECTRICAL SERVICES**3.1 INTRODUCTION**

This part of the specification describes the particular requirements for the provision and installation of electrical services in connection with the refurbishment of **2 Harewood Place, London, W1S 1BX.**

3.2 CDM REGULATIONS

The Health & Safety Co-Ordinator, for the purposes of the CDM regulations, shall be as nominated by the client and shall be responsible for the overseeing of resources of parties and facilitating the planning and maintenance of the Safety Plan.

The Building Contractor, for the purposes of CDM Regulations, shall be the Principal Contractor and shall be responsible for the development and implementation of the Safety Plan, management and co-ordination of all contractors/tradesmen throughout the duration of the works in this respect.

The Electrical Contractor shall accept decisions and rulings made by the Principal Contractor in respect of the CDM Regulations and shall specifically have a responsibility for the following.

- (i) Co-operation with the Principal Contractor to enable all parties to comply with Statutory duties.
- (ii) Provide information to the Principal Contractor (Risk Assessment) which may affect Health & Safety.
- (iii) Comply with any rules developed in the Safety Plan.
- (iv) Inform the Principal Contractor of notifiable injuries.
- (v) Pass information to the Principal Contractor which may need forwarding to the Planning Supervisor.
- (vi) Ensure all operatives are fully briefed on relevant information from the Safety Plan before works commence.
- (vii) The Electrical Contractor shall be responsible for providing all electrical services record drawings and information necessary for the Safety Plan.

3.3 EXTENT OF CONTRACT

This Contract shall include for the supply, installation, test and commissioning of the electrical services described in the specification and detailed on the drawings which form part of the specification.

Any discrepancies between the drawings and specification shall be brought to the attention of the Engineer for clarification prior to submission of a tender, it will be otherwise deemed that the Contractor has included for the greater quantity and/or cost which may be incurred.

3.4 CONTRACT PERIOD AND PRICE

The Contract period shall be as detailed in the Main Contract Preliminaries which form part of this specification and apply equally to all Sub Contract works.

The price tendered shall remain fixed for the duration of the contract period.

3.5 COMPLIANCE WITH REGULATIONS

All materials and equipment shall be installed in accordance with the requirements of the 17th Edition of the Regulations for Electrical Installations (BS 7671), as published by the Institution of Electrical Engineers, including all amendments thereto.

3.6 SCOPE OF WORKS

The works to be undertaken in this project are as follows:-

1. Disconnect and remove redundant installation.
2. Supply and installation of sub main distribution.
3. Supply and installation of Landlord and Tenant lighting, including lighting control systems.
4. Supply and installation of Landlord small power and socket outlets.
5. Supply and installation of Fire Alarm system.
6. Supply and installation of Cable management systems.
7. Supply and installation of Mechanical services supplies.
8. Supply and installation of Video Door Entry System.
9. Supply and installation of Disabled Refuge Intercom
10. Supply and installation of Accessible WC Alarm
11. Testing and Commissioning.
12. Production of record information.
13. Earthing and Bonding

3.7 BUILDING DESCRIPTION

The existing building comprises a multi storey office block and two shop units at ground floor level, (McDonalds & Sketchers).

There are basement, ground and first to fifth floors.

The proposed works comprise of infilling a lightwell to the centre of the building, minor building works in the shop areas and a total refurbishment to the office landlord and tenant areas.

Two new 630kg 8 person traction lifts are being installed to the communal entrance area.

Existing walls are solid brick / block with new walls formed with stud partitions.

3.8 CO-ORDINATION AND ALIGNMENT

The Electrical Contractor shall liaise closely with all other trades to determine exact locations of all items of equipment etc., to avoid any clash of services.

The Contract Administrator's room furniture and equipment layout drawings shall take precedence over the electrical services layout drawings, for final outlet positions.

The Electrical Contractor shall check with the building drawings before installing electrical services and shall bring any discrepancies to the attention of the Contract Administrator.

No claim for additional payment will be entertained for the repositioning of any outlets, services or equipment made necessary by the Electrical Contractors oversight or failure to check before installation.

3.9 PROGRAMME

For details of the programme, refer to the Main Contract Preliminaries.

The existing services to the bar and shop areas are required to be maintained for the duration of the works and the Contractor shall make any necessary allowance within their tender to include for temporary connections and relocations to suit.

The Contractor shall include allowance for any out of hours working as is necessary for the installation of the works.

3.10 CONTRACT DRAWINGS

The following drawings form an integral part of this specification and should be read in conjunction with this specification and all other contract documents.

SDA 2380/E1	Basement Electrical Services Layout
SDA 2380/E2	Ground Floor Electrical Services Layout
SDA 2380/E3	First Floor Electrical Services Layout
SDA 2380/E4	Second, Third & Fourth Floor Electrical Services Layout
SDA 2380/E5	Fifth Floor Electrical Services Layout
SDA 2380/E6	Roof Area Electrical Services Layout
SDA 2380/E7	Electrical Services for Mechanical Plant – All Floors
SDA 2380/E8	Fire Alarm, Disabled Refuge Alarm & Accessible WC Alarm Layout – All Floors

3.11 EARTHING AND BONDING

The Contractor shall supply and install for the domestic water and heating system pipework, a system of earthing and bonding in accordance with the 17th Edition of the IEE Regulations, (BS 7671) generally as detailed herein and noted on the drawings.

The Contractor shall supply and install an earth bonding connection to the pipework serving each sink and hand basin and shall bond to each steel sink itself. The earth connection shall be made by means of flush mounted conduit and an accessory outlet box extended from the nearest small power circuit and positioned adjacent to the bonding point.

In addition, for an exposed grid, suspended ceiling system the grid shall be bonded to the lighting installation by means of a 1.5mm² fly lead taken from each luminaire to the adjacent grid section bars.

The accessory box shall be fitted with a flex outlet plate through which the earth cable shall pass from the earth stud to “Tenby” or similar BS951 earth clamp and warning label fitted to each point. The earth conductor shall be 4mm stranded copper conductor with PVC sheath coloured green and yellow and shall be clipped between the box and clamp to present a neat appearance.

Ventilation ductwork shall be bonded at and across the fan units and any non metallic joints and expansion units.

3.12 TESTING AND COMMISSIONING

The Contractor shall carry out tests on the whole installation on completion, as described in the 17th Edition of the IEE Regulations (BS7671).

The Contractor shall provide the Contract Administrator with at least seven days prior notice of testing, such that the Contract Administrator may be present to witness such tests if desired.

Whether or not witnessed by the Contract Administrator, full records of all test results shall be completed at the time and shall be available for inspection upon request.

3.4

Should the Contract Administrator so request, the Contractor shall repeat any or all tests in the presence of the Contract Administrator at no additional cost to the Contract.

The Contractor shall provide Completion and Inspection Certificates, as described in the 17th Edition of the IEE Regulations (BS 7671), duly completed with all test results, etc.

The Contractor shall be responsible for providing instruments and equipment necessary to test the installation together with personnel sufficiently qualified and experienced to carry out such tests.

3.13 RECORD INFORMATION

The Contractor shall supply all labels, circuit lists, notices, diagrams and the like, as detailed in the general requirements.

14 days prior to completion of the project, the Contractor shall provide one copy of circuit charts and diagrams to the Contract Administrator for his approval.

Following incorporation of any comments the Contract Administrator may make, the Contractor shall supply a further two copies of all circuit lists and diagrams to the Contract Administrator, together with duplicate copies of all manufactures details for equipment, accessories and fittings installed, which shall be bound in hard back plastic coated folders, (whole building).

The Contractor shall keep a set of Contract Drawings on site, which shall be marked with any changes to the project and shall indicate the route taken for each circuit, to enable record drawings to be produced. The completed record drawings shall be handed to the Contract Administrator 14 days prior to the end of the Contract for approval. The Contractor shall supply the client with copies, as detailed in the Preliminaries Section of the Specification.

The Contractor shall provide all test certificates commissioning certificates and operating and maintenance instructions for the project, produced in duplicate and bound in the above manuals, approved and ready on the date of Practical Completion.

The Contractor shall also provide individual manuals for each tenant area, with all relevant record drawings, test certificates and operating/ maintenance instructions for associated equipment.

3.14 SITE VISIT

It will be deemed that the Contractor has visited site prior to tendering to determine the exact extent of modification required to provide the revised installation arrangement in its entirety.

No claims for want of knowledge in this respect will be entertained.

3.15 EXISTING INSTALLATION

Include for isolation, disconnection, dismantling and removal from site all existing parts of the electrical installation within the area of works.

The Contractor shall include for any rewiring/reconnection of circuits which run external to the works area, but which are directly fed from within the area of works.

For tender purposes include for rewiring 3No. lighting and 3No. small power circuits in McDonalds and Sketchers shop units.

3.16 SUBMAIN DISTRIBUTION

3.16.1 General

A new incoming 400A TPN EDF service is being installed to the basement area.

A provisional sum has been included to cover this cost.

Provide, install and connect a 6way TPN Ryefield Distribution Board within the electrical intake room.

Install a suitably sized fireproof backboard and a main earth bar at the new service head location.

Install a suitable length of 150 x 150 galvanised trunking to inter-connect the service head and the Ryefield Board.

Liaise with EDF to ensure their requirements are met in respect of a 400A service head for inter-connecting tails, trunking and mounting arrangements.

3.16.2 Landlord Distribution

There are to be separate landlord supplies, one for general lighting and power and one for Mechanical Plant / Air Conditioning equipment.

Provide, install and connect a 12way TPN MCB distribution board in the basement switch room (ref:LL).

Provide, install and connect a 12way TPN MCB distribution board in the roof plant room, (ref: DBR).

Arrange for 2No. separate landlord meters to be installed serving each board.

Provide, install and connect a 12way SPN MCB distribution board 'LMR' in the lift motor room.

This board shall be for lift car, lift shaft and motor room lighting and small power, (which is to be carried out by specialist Lift Contractor).

Refer to schedule S3 for details of cabling / circuit protection.

3.16.3 Tenants Distribution

Within the electrical cupboard at floor levels first to fifth, provide, install and connect new 24 way SPN MCB Distribution boards with integral 100A Isolators for Tenant Lighting and Power circuits.

Arrange for new 100A SPN electricity meters to be installed in the riser, at each level.

Install submains from the Ryefield fuseboard at ground floor level to each tenant meter and distribution board using 25mm² 2C PVC/SWA/PVC cable run on the rising 300mm cable tray through the services riser.

3.17 LIGHTING AND EMERGENCY LIGHTING

3.17.1 General

Provide and install the lighting layout shown on the drawings, using the luminaires and accessories detailed in the schedules and generally as described below.

The main entrance / reception lighting shall comprise decorative wall luminaires, and downlights.

The office areas utilise recessed linear louvred fittings with perimeter downlights and wall uplights.

The stairwell utilises low voltage downlights.

The WC areas utilises recessed downlights.

Wiring shall be carried out using 1.5mm² PVC/PVC Twin and Earth cables run on a Cable tray throughout suspended ceiling areas and in recessed conduits through areas with solid ceilings.

All lighting circuits shall be connected to the local MCB Distribution Boards via 10A type C MCBs.

For areas having an accessible ceiling void the conduit shall terminate above each luminaire position in a small circular conduit box, fixed at the height of the conduit system and forming an integral part.

The hard wiring shall terminate at the respective conduit box, for accessible ceilings in a plug in ceiling rose, with the final connection made using 1.0mm² 3 core heat resisting flexible cable, and inaccessible ceilings at terminal connectors, with the final connections being made using 1.0mm² single core heat resisting flexible cable.

Hard wiring shall not be taken into the interior of any luminaire and the flexible cables entering luminaires shall be positioned to avoid heat producing components.

3.17.2 Emergency Lighting

Where designated on the drawings 'EM', the luminaires shall be wired for or be supplied complete with a battery charger/inverter unit to provide self contained emergency supply to lamp within the luminaire, for a period of 3 hours on main supply failure.

Luminaires having self contained charging equipment shall be provided with a separate permanent live feed for the charger, in addition to the normal switch line cables. All wiring shall be as described for lighting generally.

Each luminaire shall have an integral LED to indicate healthy charging supply and a grid pattern key switch shall be installed in circuit at the distribution board location, arranged to simulate failure of normal supply to the luminaire or group of luminaires.

The Contractor shall supply and handover to the Contract Administrator six spare test switch operating keys.

3.17.3 Lighting Controls

a) WC areas / Stairs / Lobbies / Corridor.

These areas shall be controlled via a PIR movement sensor with a run-on timer

b) Reception Desk and Wall Lights.

The reception desk will have local switch control

c) Office area – Recessed Linear Fittings.

The main office lighting shall have combined PIR sensor / photo-cell sensor with daylight linked dimming.

d) Office area – Downlights and Wall Uplights

These luminaire shall be controlled via local light switches.

3.18 SMALL POWER

3.18.1 General

Unless specifically detailed otherwise, the socket outlets and small power outlets shall be wired using PVC/PVC Twin and Earth cables drawn into minimum 20 dia BE HGSW conduit.

3.18.2 Socket Outlets

Provide and install flush mounted 13 ampere switch socket outlets of the type and manufacture as detailed in the schedule of materials.

Socket outlets shall be wired using 2.5mm² PVC/PVC Twin and earth cable run in recessed BE HGSW conduit and connected to form continuous ring circuits and no spurs will be allowed.

Socket outlets in offices and computer rooms shall have dual earth terminals.

Socket outlets shall generally be recessed into the building structure as shown on the drawings.

3.18.3 Small Power Outlets

(i) Fire Alarm System

Supply and install a 13A fused connection unit adjacent to the Fire Alarm Control Panel in the location shown.

The Connection unit shall be served using 2.5mm² PVC/PVC Twin and Earth cable drawn into 20 dia BE HGSW conduit from a dedicated way on the Landlord Distribution Board.

The MCB shall be complete with a lockable red coloured front cover and the circuit chart shall be labelled Fire Alarm, Do Not Switch Off.

(ii) Door Entry / Disabled Refuge Intercom

Supply and install a 13A fused connection Unit adjacent to the control panels.

The Connection units shall be served using 2.5mm² PVC/PVC twin and earth cable drawn into 20 dia BE HGSW conduit from a dedicated way on the Landlord Distribution Board

3.18.4 Lift Supplies

Provide and install 2No. 63A TPN switch dis-connectors within the lift motor room for the connection to the new passenger lifts.

Wire to each switch using 16mm² 4C PVC/SWA/PVC cable from 63A MCB on the landlord distribution board.

Final connection to lifts will be by the specialist Lift Contractor.

3.19 FIRE ALARM

3.19.1 General

Supply and install a new multi-zone analogue addressable fire alarm system to cover all office / landlord areas. The system shall comprise smoke detectors, heat detectors, flashing xenon beacons, manual call points and electronic sounders.

Equipment locations shall be as detailed on the drawing SDA 2380/E8.

3.19.2 System Operation

Initiation of an alarm shall cause all sounders to operate at a level of 65 dBA to all areas.

The system shall include all necessary interface and relay units to communicate with the following:

1. Air Handling supply air system, (to shut down in a fire situation).
2. Door access control system (to release in a fire situation).
3. Electric lift (to return to ground level and remain disabled with doors opened).
4. Remote offsite monitoring station.
5. Disabled Refuge Intercom Master Station, (to signal in a fire situation).
6. Two way signalling to McDonalds & Sketchers shops fire alarm panels.
7. Reception area - concierge fire curtain to operate after a 60 second delay.

The system shall provide a type L1 coverage as detailed in BS 5839.

3.19.3 Main Control Panel

The main panel and all associated batteries shall be located in the main entrance area.

3.19.4 Detectors

Supply and install where shown on the drawings, optical smoke detectors and rate of rise heat detectors.

3.19.5 Manual Call Points

Where indicated on the drawings, install semi-flush mounted break glass contacts of the type scheduled.

3.19.6 Sounders / Strobes

Supply and install combination electronic sounder/smoke detector units and xenon beacons in the locations shown.

3.19.7 Power Supply

Adjacent to the main panel, install a recessed 13A fused connection unit fitted with a 3A fuse and wired using 2.5mm² PVC/PVC multi-core cables as a radial circuit from DB LL.

Within the distribution board, the fire alarm circuit MCB shall be fitted with a locking mechanism and padlock to prevent unauthorised isolation of the circuit.

3.19.8 Wiring

Commencing at the main panel for each detector zone, the wiring shall be installed using 1.5mm² 2 core FP200 Gold cable, (or equivalent), run clipped direct in the ceiling void and in flush 20 dia. BE HGSWconduit in walls to manual call points.

3.19.9 Commissioning

On completion, the fire alarm system shall be fully tested and commissioned by the specialist equipment supplier.

The Contractor shall include for such commissioning and arrange for the issue of a Certificate of Compliance with BS 5839.

3.20 DOOR ENTRY

Provide and install a video door entry system to control the office main entrance area.

The door shall have the following equipment installed as described below:

- 1 x semi-recessed entry control unit - with PAC reader
- 6 x wall mounted telephone/video screen handset release unit
(1 for each tenant office floor and 1 for Concierge)
- 1 x double door magnetic lock
- 1 x fixing bracket
- 1 x internal push button door release
- 1 x green break glass unit
- 1 x control cubicle and power unit
- 1 x fire alarm relay device
- 1 x timeswitch for free access isolation

Provide and install the power supply unit and controller with an adjacent fused connection unit in the Electrical Switchroom.

Install the entryphone unit adjacent to the double entrance doors.

Install the magnetic double lock, internal push button release and break glass to the entrance doors.

Install the handset release units in the reception areas on first to fifth floor.

Install a handset release unit to the Concierge reception desk.

The system shall have a switchable control on the Concierge handset to enable all calls to route via the Concierge or to be directed to the relevant floor level.

All wiring shall be installed in recessed 20 dia. BE HGSW conduit.

The Contractor shall include for all necessary builders work and making good associated with fitting the Maglocks to the doors.

Provide and install 100 No. PAC operating keys to the CA on completion of the works.

3.21 ELECTRICAL SERVICES FOR MECHANICAL PLANT

Comfort Cooling units for the tenant offices are being installed by the Mechanical Services Contractor.

3.11

Adjacent to each internal fan coil unit, provide and install 1No. 13A switched fused connection units.

Wire to the connection units as a 20A radial circuit from local tenant distribution boards. Include for final connection to fan coil unit using 1.0mm² multicore flexible cable.

At roof level, provide and install a 12way TPN MCB Distribution Board, reference DBR.

5No. condensing units are being installed in the roof plant area.

Provide and install a 32A TPN IP65 switch disconnecter adjacent to each condensing unit.

Provide and install a 32A TPN switch disconnecter adjacent to the air handling control panel.

Wire to each switch disconnecter using 4mm² 4C PVC/SWA/PVC cable on 150 galvanised steel cable tray.

Install an electricity check meter for each condensing unit and the AHU control panel, mounted adjacent to the distribution board.

3.22 **DISABLED REFUGE INTERCOM**

Provide, install and commission a disabled refuge intercom system.

The system shall comprise a master station located at the Concierge Desk in the entrance area and intercom stations at each lift lobby on upper floor levels.

Install a control unit with an adjacent 13A fused connection unit in the electrical switchroom.

Wire from the control unit to all master and slave units, using 2 core 1.5mm² FP 200 Gold cable.

The system shall be interfaced to operate only when the fire alarm system is operated, or when an authorised person overrides the system.

3.23 **ACCESSIBLE WC ALARM**

Provide, install and commission an assisted WC Alarm system, comprising pull cord, re-set switch, PSU and over door indicator / buzzer in each assisted WC.

The system shall be wired using multi-core PVC/PVC cable in recessed 20dia BE HGSW conduit.

3.24 CABLE MANAGEMENT

Provide and install 2No. 300mm galvanised steel cable ways run from basement to roof level in the electrical riser.

One cable tray for LV and one for ELV comms.

Provide and install 100 galvanised steel cable tray run throughout the ceiling voids to all areas for running the lighting circuit wiring.

S1 SCHEDULE OF LUMINAIRES

Ref	Description	Manufactures	Cat.Ref
A1	Recessed continuous fluorescent luminaire with specular louvre - 3800 long (2 x 80 + 1 x 54W T5)	Modular Lighting	Lichtkanal 70 Specular Louvre
A2	Recessed continuous fluorescent luminaire with specular louvre - 2588 long (1x 80 + 1 x 54W T5)	Modular Lighting	Lichtkanal 70 Specular Louvre
A3	Recessed continuous fluorescent luminaire with specular louvre - 3065 long (2 x 80W T5)	Modular Lighting	Lichtkanal 70 Specular Louvre
A4	Recessed continuous fluorescent luminaire with specular louvre - 1725 long (2 x 39W T5)	Modular Lighting	Lichtkanal 70 Specular Louvre
A5	Recessed continuous fluorescent luminaire with specular louvre - 1358 long (1 x 54W T5)	Modular Lighting	Lichtkanal 70 Specular Louvre
B	50W ELV downlight mounted on aluminium extrusion (white 3260 long)	Modular Lighting	Freeway 93180311
B1	50W ELV downlight	Modular Lighting	10881009
D	Surface mounted up / downlight	Modular Lighting	11070609
F	Recessed ceiling mounted adjustable downlight	Modular Lighting	10271105 Alu
F1	Recessed ceiling mounted downlight	Zumtobel	60810208
G	Recessed dual downlight	Modular Lighting	11070539
L	Surface mounted dual downlight	Modular Lighting	11060409
M	Concealed pelmet linear fluorescent	Thorn	96003914
N	IP65 linear fluorescent luminaire	Thorn	96229524
S	External luminaire	Modular Lighting	10780419
T	Compact fluorescent bulkhead luminaire	Thorn	96230478
U	Recessed compact fluorescent downlight	Thorn	96242362
Z	IP65 Bulkhead luminaire	Thorn	96230498
Exit	Suspended illuminated Exit signage	Philip Payne	1 880 300 FC-LED version
EM	Denotes luminaire with integral 3hr emergency function		

CONTACT NO's

Modular Lighting - 0207 681 9933
Philip Payne - 0121 705 2384

Thorn - 0208 732 9800
Zumtobel - 0208 589 1800

Note: Luminaire types A1 – A5 shall all require HF dimmable ballasts compatible with Thorlux Eco lighting control system.

S2 SCHEDULE OF MATERIALS

Item	Manufacturer	Range / Remarks
Main building distribution board	Ryefield	6 way TPN board
Landlord distribution board	MEM	Memshield 2 - BM 122
Tenants distribution board	MEM	Memshield 2 – BM82 + SP conversion kit
Lighting switch (general)	MK	Edge Satin Aluminium
Ceiling Rose	Ashley/Rock	Klik
Socket outlet (general) (all with dual earth terminal)	MK	Logic plus - K2746 WHI
Fused connection unit	MK	Logic plus
Weatherproof Isolator	MK	Commando
Switch dis-connector	MEM	Exel
Earth clamp	Tenby	
Fire Alarm equipment	Channel	Firewatch 200 PWS
Door entry system	Door Entry Direct	BPT system
Accessible WC Alarm	Channel	CH/G/SS/Pack
Disabled Refuge Intercom	Channel	16 line control distribution panel 2 x CH/LIN driver boards 5 x RCO / FH/SS flush call units
Lighting Control System (Offices)	Thorlux	LCM System
(i) Lighting Control Module		LCM 10335B
(2) Lighting Sensor & PIR		LCM 11419ID
(iii) Infra Red Remote (1 per floor)		ECO 11817
Lighting Control System (WC / Corridor areas)	BEG	Luxomat PD4

1 Holgate Court, Western Road

Romford, Essex, RM1 3JS

01708 745666

Date 20th Aug 2008

Project harewood-oxford st

Project no. -

Engineer BL

Checked by

Date checked

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Board and way data

Reference	DB 3
Served by	Ryefield
Description	Tenant third floor distribution board
Location	thirdfloor riser
Phase	1 L3 (Board is Non-essential)
Number of ways	24
Incomer	Generic, Isolator
Incomer size	100A (fixed)
Board device type	Eaton, EATON MEMshield 2 MCB Type C 10kA
Other device types used	No
Spare capacity	0.0%
Average power factor	1.00

Circuit ref.	Design Amps	Device size (A)	Design length	CPC size	Cable size	Auxiliary neutral size	Cable type	Circuit type	Description
1	2.0	20	30.0	1.5	1 x 2 core x 2.5	-	PVC multi R E	Radial 13A sockets	FAN COIL UNITS
2	1.0	20	15.0	1.5	1 x 2 core x 2.5	-	PVC multi R E	Radial 13A sockets	FAN COIL UNITS
3	2.0	20	30.0	1.5	1 x 2 core x 2.5	-	PVC multi R E	Radial 13A sockets	FAN COIL UNITS
4	13.0	20*	10.0	1.5	1 x 2 core x 2.5	-	PVC multi R E	Fixed power	WATER HEATER
5	2.0	10*	30.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	WC AREA
6	1.0	10*	30.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	DOWNLIGHTS
7	2.0	10*	45.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	DOWNLIGHTS
8	2.0	10*	40.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	DOWNLIGHTS
9	1.0	10*	30.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	WALL LIGHTS
10	4.0	10*	25.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	MAIN OFFICE
11	3.0	10*	20.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	MAIN OFFICE
12	3.0	10*	15.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	MAIN OFFICE
13	2.0	10*	25.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	MAIN OFFICE
14	4.0	10*	20.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	MAIN OFFICE
15	1.0	10*	20.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	DOWNLIGHTS CORRIDOR
16	-	-	-	-	-	-	-	Spare	-
17	-	-	-	-	-	-	-	Spare	-
18	-	-	-	-	-	-	-	Spare	-

* denotes fixed size

Project harewood-oxford st

19	-	-	-	-	-	-	-	Spare	-
20	-	-	-	-	-	-	-	Spare	-
21	-	-	-	-	-	-	-	Spare	-
22	-	-	-	-	-	-	-	Spare	-
23	-	-	-	-	-	-	-	Spare	-
24	-	-	-	-	-	-	-	Spare	-

* denotes fixed size

Project harewood-oxford st

Reference	DB 4
Served by	Ryefield
Description	Tenant fourth floor distribution board
Location	fourth floor riser
Phase	1 L1 (Board is Non-essential)
Number of ways	24
Incomer	Generic, Isolator
Incomer size	100A (fixed)
Board device type	Eaton, EATON MEMshield 2 MCB Type C 10kA
Other device types used	No
Spare capacity	0.0%
Average power factor	1.00

Circuit ref.	Design Amps	Device size (A)	Design length	CPC size	Cable size	Auxiliary neutral size	Cable type	Circuit type	Description
1	2.0	20	30.0	1.5	1 x 2 core x 2.5	-	PVC multi R E	Radial 13A sockets	FAN COIL UNITS
2	1.0	20	15.0	1.5	1 x 2 core x 2.5	-	PVC multi R E	Radial 13A sockets	FAN COIL UNITS
3	2.0	20	30.0	1.5	1 x 2 core x 2.5	-	PVC multi R E	Radial 13A sockets	FAN COIL UNITS
4	13.0	20*	10.0	1.5	1 x 2 core x 2.5	-	PVC multi R E	Fixed power	WATER HEATER
5	2.0	10*	30.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	WC AREA
6	1.0	10*	30.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	DOWNLIGHTS
7	2.0	10*	45.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	DOWNLIGHTS
8	2.0	10*	40.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	DOWNLIGHTS
9	1.0	10*	30.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	WALL LIGHTS
10	4.0	10*	25.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	MAIN OFFICE
11	3.0	10*	20.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	MAIN OFFICE
12	3.0	10*	15.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	MAIN OFFICE
13	2.0	10*	25.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	MAIN OFFICE
14	4.0	10*	20.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	MAIN OFFICE
15	1.0	10*	20.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	DOWNLIGHTS CORRIDOR
16	-	-	-	-	-	-	-	Spare	-
17	-	-	-	-	-	-	-	Spare	-
18	-	-	-	-	-	-	-	Spare	-
19	-	-	-	-	-	-	-	Spare	-
20	-	-	-	-	-	-	-	Spare	-
21	-	-	-	-	-	-	-	Spare	-
22	-	-	-	-	-	-	-	Spare	-
23	-	-	-	-	-	-	-	Spare	-
24	-	-	-	-	-	-	-	Spare	-

* denotes fixed size

Project harewood-oxford st

Reference	DB 5
Served by	Ryefield
Description	Tenant fifth floor distribution board
Location	fifth floor riser
Phase	1 L2 (Board is Non-essential)
Number of ways	24
Incomer	Generic, Isolator
Incomer size	100A (fixed)
Board device type	Eaton, EATON MEMshield 2 MCB Type C 10kA
Other device types used	No
Spare capacity	0.0%
Average power factor	1.00

Circuit ref.	Design Amps	Device size (A)	Design length	CPC size	Cable size	Auxiliary neutral size	Cable type	Circuit type	Description
1	2.0	20	30.0	1.5	1 x 2 core x 2.5	-	PVC multi R E	Radial 13A sockets	FAN COIL UNITS
2	0.5	20	30.0	1.5	1 x 2 core x 2.5	-	PVC multi R E	Radial 13A sockets	FAN COIL UNITS
3	2.0	20	15.0	1.5	1 x 2 core x 2.5	-	PVC multi R E	Radial 13A sockets	FAN COIL UNITS
4	13.0	20*	10.0	1.5	1 x 2 core x 2.5	-	PVC multi R E	Fixed power	WATER HEATER
5	2.0	10*	30.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	WC AREA
6	1.0	10*	20.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	DOWNLIGHTS
7	1.0	10*	40.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	WALL LIGHTS
8	1.0	10*	30.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	WALL LIGHTS
9	2.0	10*	35.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	PELMET
10	2.0	10*	30.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	PELMET
11	1.0	10*	20.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	DOWN LIGHTS
12	4.0	10*	20.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	MAIN OFFICE
13	2.0	10*	20.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	MAIN OFFICE
14	2.0	10*	15.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	MAIN OFFICE
15	-	-	-	-	-	-	-	Spare	-
16	-	-	-	-	-	-	-	Spare	-
17	-	-	-	-	-	-	-	Spare	-
18	-	-	-	-	-	-	-	Spare	-
19	-	-	-	-	-	-	-	Spare	-
20	-	-	-	-	-	-	-	Spare	-
21	-	-	-	-	-	-	-	Spare	-
22	-	-	-	-	-	-	-	Spare	-
23	-	-	-	-	-	-	-	Spare	-
24	-	-	-	-	-	-	-	Spare	-

* denotes fixed size

Project harewood-oxford st

Reference	DB1
Served by	Ryefield
Description	Tenant first floor distribution board
Location	first floor riser
Phase	1 L1 (Board is Non-essential)
Number of ways	18
Incomer	Generic, Isolator
Incomer size	100A (fixed)
Board device type	Eaton, EATON MEMshield 2 MCB Type C 10kA
Other device types used	No
Spare capacity	0.0%
Average power factor	1.00

Circuit ref.	Design Amps	Device size (A)	Design length	CPC size	Cable size	Auxiliary neutral size	Cable type	Circuit type	Description
1	1.0	20	30.0	1.5	1 x 2 core x 2.5	-	PVC multi R E	Radial 13A sockets	FAN COIL UNITS
2	1.0	20	30.0	1.5	1 x 2 core x 2.5	-	PVC multi R E	Radial 13A sockets	FAN COIL UNITS
3	13.0	20*	10.0	1.5	1 x 2 core x 2.5	-	PVC multi R E	Fixed power	WATER HEATER
4	2.0	10*	30.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	WC AREA
5	2.0	10*	50.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	DOWNLIGHTS
6	1.0	10*	25.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	WALL LIGHTS
7	4.0	10*	35.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	MAIN AREA
8	2.0	10*	30.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	MAIN AREA
9	1.0	10*	10.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	LINK AREA
10	3.0	10*	15.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	SMALL OFFICE
11	2.0	10*	25.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	DOWN/WALL LIGHTS
12	-	-	-	-	-	-	-	Spare	-
13	-	-	-	-	-	-	-	Spare	-
14	-	-	-	-	-	-	-	Spare	-
15	-	-	-	-	-	-	-	Spare	-
16	-	-	-	-	-	-	-	Spare	-
17	-	-	-	-	-	-	-	Spare	-
18	-	-	-	-	-	-	-	Spare	-

* denotes fixed size

Project harewood-oxford st

Reference	DB2
Served by	Ryefield
Description	Tenant second floor distribution board
Location	second floor riser
Phase	1 L2 (Board is Non-essential)
Number of ways	24
Incomer	Generic, Isolator
Incomer size	100A (fixed)
Board device type	Eaton, EATON MEMshield 2 MCB Type C 10kA
Other device types used	No
Spare capacity	0.0%
Average power factor	1.00

Circuit ref.	Design Amps	Device size (A)	Design length	CPC size	Cable size	Auxiliary neutral size	Cable type	Circuit type	Description
1	2.0	20	30.0	1.5	1 x 2 core x 2.5	-	PVC multi R E	Radial 13A sockets	FAN COIL UNITS
2	1.0	20	15.0	1.5	1 x 2 core x 2.5	-	PVC multi R E	Radial 13A sockets	FAN COIL UNITS
3	2.0	20	30.0	1.5	1 x 2 core x 2.5	-	PVC multi R E	Radial 13A sockets	FAN COIL UNITS
4	13.0	20*	10.0	1.5	1 x 2 core x 2.5	-	PVC multi R E	Fixed power	WATER HEATER
5	2.0	10*	30.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	WC AREA
6	1.0	10*	30.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	DOWNLIGHTS
7	2.0	10*	45.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	DOWNLIGHTS
8	2.0	10*	40.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	DOWNLIGHTS
9	1.0	10*	30.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	WALL LIGHTS
10	4.0	10*	25.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	MAIN OFFICE
11	3.0	10*	20.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	MAIN OFFICE
12	3.0	10*	15.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	MAIN OFFICE
13	2.0	10*	25.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	MAIN OFFICE
14	4.0	10*	20.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	MAIN OFFICE
15	1.0	10*	20.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	DOWNLIGHTS CORRIDOR
16	-	-	-	-	-	-	-	Spare	-
17	-	-	-	-	-	-	-	Spare	-
18	-	-	-	-	-	-	-	Spare	-
19	-	-	-	-	-	-	-	Spare	-
20	-	-	-	-	-	-	-	Spare	-
21	-	-	-	-	-	-	-	Spare	-
22	-	-	-	-	-	-	-	Spare	-
23	-	-	-	-	-	-	-	Spare	-
24	-	-	-	-	-	-	-	Spare	-

* denotes fixed size

Project harewood-oxford st

Reference	DBR
Served by	Ryefield
Description	Roof plant distribution board
Location	Roof electrical cupboard
Phase	3 (Board is Non-essential)
Number of ways	12
Incomer	Generic, Isolator
Incomer size	125A
Board device type	Eaton, EATON MEMshield 2 MCB Type C 10kA
Other device types used	Yes
Spare capacity	0.0%
Average power factor	1.00

Circuit ref.	Design Amps	Device size (A)	Design length	CPC size	Cable size	Auxiliary neutral size	Cable type	Circuit type	Description
1	18.0	32*	15.0	38	1 x 4 core x 4	-	PVC/swa/pvc	Fixed power	CONDENSING UNIT 1F
2	18.0	32*	15.0	38	1 x 4 core x 4	-	PVC/swa/pvc	Fixed power	CONDENSING UNIT 2F
3	18.0	32*	15.0	38	1 x 4 core x 4	-	PVC/swa/pvc	Fixed power	CONDENSING UNIT 3F
4	18.0	32*	15.0	38	1 x 4 core x 4	-	PVC/swa/pvc	Fixed power	CONDENSING UNIT 4F
5	18.0	32*	15.0	38	1 x 4 core x 4	-	PVC/swa/pvc	Fixed power	CONDENSING UNIT 5F
6	20.0	32*	10.0	38	1 x 4 core x 4	-	PVC/swa/pvc	Fixed power	AHU PANEL
7 L1	1.0	10*	30.0	15.9	1 x 2 core x 1.5	-	PVC/swa/pvc	Lighting	PLANT RM LTG
7 L2	1.0	10*	40.0	15.9	1 x 2 core x 1.5	-	PVC/swa/pvc	Lighting	ROOF EXT PLANT AREA
7 L3	-	-	-	-	-	-	-	Spare	-
8 L1	1.0	20*	20.0	18.4	1 x 2 core x 2.5	-	PVC/swa/pvc	Radial 13A sockets	PLANT RM S/O
8 L2	-	-	-	-	-	-	-	Spare	-
8 L3	-	-	-	-	-	-	-	Spare	-
9 L1	-	-	-	-	-	-	-	Spare	-
9 L2	-	-	-	-	-	-	-	Spare	-
9 L3	-	-	-	-	-	-	-	Spare	-
10 L1	-	-	-	-	-	-	-	Spare	-
10 L2	-	-	-	-	-	-	-	Spare	-
10 L3	-	-	-	-	-	-	-	Spare	-
11 L1	-	-	-	-	-	-	-	Spare	-
11 L2	-	-	-	-	-	-	-	Spare	-
11 L3	-	-	-	-	-	-	-	Spare	-
12 L1	-	-	-	-	-	-	-	Spare	-
12 L2	-	-	-	-	-	-	-	Spare	-
12 L3	-	-	-	-	-	-	-	Spare	-

* denotes fixed size

Project harewood-oxford st

Reference	LL
Served by	Ryefield
Description	Landlord distribution board
Location	basement electrical intake
Phase	3 (Board is Non-essential)
Number of ways	12
Incomer	Generic, Isolator
Incomer size	100A (fixed)
Board device type	Eaton, EATON MEMshield 2 MCB Type C 10kA
Other device types used	No
Spare capacity	0.0%
Average power factor	1.00

Circuit ref.	Design Amps	Device size (A)	Design length	CPC size	Cable size	Auxiliary neutral size	Cable type	Circuit type	Description
1	10.0	20*	15.0	1.5	1 x 4 core x 2.5*	-	PVC multi R E	Fixed power	CWS BOOSTER PUMP
2	-	-	-	-	-	-	-	Spare	-
3	25.0	63*	40.0	74.4	1 x 4 core x 16	-	PVC/swa/pvc	Fixed power	LIFT 1
4	25.0	63*	40.0	74.4	1 x 4 core x 16	-	PVC/swa/pvc	Fixed power	LIFT 2
5 L1	5.0	63*	40.0	45.4	1 x 2 core x 16*	-	PVC/swa/pvc	Fixed power	LIFT DB
5 L2	1.0	16*	20.0	1.5	1 x 2 core x 2.5*	-	PVC multi R E	Fixed power	FIRE PANEL
5 L3	1.0	16*	20.0	1.5	1 x 2 core x 2.5*	-	PVC multi R E	Fixed power	DOOR ENTRY PANEL
6 L1	1.0	10*	20.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	LIFT LOBBY
6 L2	1.0	32	40.0	1.5	1 x 2 core x 2.5	-	PVC multi R E	13A ring	B,G AND 1F LL S/O
6 L3	1.0	32	50.0	1.5	1 x 2 core x 2.5	-	PVC multi R E	13A ring	2,3,4 AND 5 FL LL S/O
7 L1	1.0	10*	25.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	BASEMENT WC/STORE
7 L2	2.0	10*	25.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	STAIR BASEMT - 1F
7 L3	2.0	10*	25.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	BASEMENT PLANTRMS
8 L1	2.0	10*	25.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	GF RECEPTION
8 L2	2.0	10*	50.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	STAIR 2-5FL
8 L3	2.0	10*	25.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	LIFT LOBBY2 -5 FL
9 L1	1.0	10*	35.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	GF WALL LIGHTS
9 L2	1.0	16*	20.0	1	1 x 2 core x 1.5	-	PVC multi R E	Fixed power	DISABLED REFUGE INTCM
9 L3	-	-	-	-	-	-	-	Spare	-
10 L1	1.0	10*	25.0	1	1 x 2 core x 1.5	-	PVC multi R E	Lighting	GF CORRIDOR
10 L2	-	-	-	-	-	-	-	Spare	-
10 L3	-	-	-	-	-	-	-	Spare	-

* denotes fixed size

Project harewood-oxford st

11 L1	-	-	-	-	-	-	-	Spare	-
11 L2	-	-	-	-	-	-	-	Spare	-
11 L3	-	-	-	-	-	-	-	Spare	-
12 L1	-	-	-	-	-	-	-	Spare	-
12 L2	-	-	-	-	-	-	-	Spare	-
12 L3	-	-	-	-	-	-	-	Spare	-

* denotes fixed size

Project harewood-oxford st

Reference	Ryefield
Served by	supply
Description	Main ryefield
Location	basement
Phase	3 (Board is Non-essential)
Number of ways	4
Incomer	Generic, Isolator
Incomer size	315A
Board device type	Eaton, BS88 INDUSTRIAL FUSES RATING 2-100 DIMENSIONS A2-A4
Other device types used	Yes
Spare capacity	0.0%
Average power factor	1.00

Circuit ref.	Design Amps	Device size (A)	Design length	CPC size	Cable size	Auxiliary neutral size	Cable type	Circuit type	Description
1	26.0	100*	10.0	76	1 x 4 core x 25*	-	PVC/swa/pvc	Sub-main	LL
2 L1	50.5	80*	23.0	61	1 x 2 core x 25*	-	PVC/swa/pvc	Sub-main	DB1
2 L2	61.5	80*	26.0	61	1 x 2 core x 25*	-	PVC/swa/pvc	Sub-main	DB2
2 L3	61.5	80*	29.0	61	1 x 2 core x 25*	-	PVC/swa/pvc	Sub-main	DB 3
3 L1	61.5	80*	32.0	61	1 x 2 core x 25*	-	PVC/swa/pvc	Sub-main	DB 4
3 L2	61.5	80*	35.0	61	1 x 2 core x 25*	-	PVC/swa/pvc	Sub-main	DB 5
3 L3	-	-	-	-	-	-	-	Spare	-
4	112.0	125*	40.0	85	1 x 4 core x 35*	-	PVC/swa/pvc	Sub-main	DBR

* denotes fixed size

APPENDIX A

MAKE-UP OF TENDER for the ELECTRICAL SERVICES ASSOCIATED WITH THE REFURBISHMENT of 2 Harewood Place, London, W1S 1BX

For the whole of the works to supply, install and commission the services listed below:

ITEM	DESCRIPTION	£	p
1	Isolate, disconnect and remove redundant electrical equipment	£	
2	Provision of new sub-mains and distribution equipment	£	
3	Provision of Earthing and Bonding	£	
4	Supply only luminaires, including lamps and emergency packs	£	
5	Installation of lighting, including erection and connection of luminaires	£	
6	Installation of lighting control system to office areas	£	
7	Provision of small power and socket outlets, including final connections	£	
8	Provision of Fire Alarm system	£	
9	Provision of Disabled Refuge Intercom system	£	
10	Provision of Accessible WC Alarm system	£	
11	Provision of Access Control Equipment	£	
12	Provision of supplies to mechanical services equipment	£	
13	Provision of record information, testing and labelling	£	
14	Any other works specified, not included in the above (Contractor to specify)	£	
15	TOTAL 1 – 14 inclusive	£	
16	Add 1/39 for MCD	£	
17	Add provisional sum for McDonalds works	£ 10,000.00	
18	Add provisional sum for new EDF Electrical Supply	£ 30,000.00	
19	Add provisional sum for re-location works to shop mechanical plant	£ 15,000.00	
	TOTAL items 15 – 19 carried to Summary	£	