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Specification

for the

Upgrade to Sub-main Cabling

to Flats

at

Centre Point House

15a St Giles High Street

London W C2H 8LW

for

Alamcantar Centre Point Nominee No 1 &
Alamcantar Centre Point Nominee No 2 Ltd

c/o HML Group

Gillingham House,

38-34 Gillingham St

London SW1V 1HU

November 2021

ELECTRICAL SPECIFICATION

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GENERAL CONDITIONS OF CONTRACT

FOR

ENGINEERING SERVICES

SECTION A - GENERAL CONDITIONS OF CONTRACT FOR ENGINEERING SERVICES

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GENERAL CONDITIONS OF CONTRACT FOR ENGINEERING SERVICES

1.0 General

Electrical Contractors tendering for this work are required to be members of the N.I.C.E.I.C or E.C.A with considerable experience of the current IEE Regulations.

This document contains the specification for the Electrical Engineering Services and here after is referred to as Engineering Services Works.

All costs for this proviso are to be deemed to be included in the Tender.

The Electrical and Mechanical Services installations will be based on the Intermediate Form of Building Contract IFC84.

1.1 Scope of Work

Carry out, and be responsible for the correct installation and the proper working of the installation comprising the Engineering Services Works.

The Engineering Services Works comprise the whole of the labour and unless otherwise indicated, all the materials necessary to form a complete installation and such tests, adjustment, commissioning and temporary services or connections as are prescribed in subsequent Clauses, or in any other related document and as may otherwise be required to give an effective working installation to the satisfaction of the Supervising Officer.

The words “complete installation” referred to above means not only the major items of plant and equipment covered by this Specification but all the incidental sundry components necessary for the complete execution and proper operation of the Engineering Services Works, with their labour charges, whether or not these sundry components are mentioned in detail in the specification, any omissions, errors or unqualified exclusions relating thereto whether unintentional or otherwise will not later be accepted as justification or in itself constitute any justification for subsequent cost variation.

If the Electrical Contractor is of the opinion that any part of the Engineering Services Works described, drawn or specified in instructions, documents or drawings issued subsequent to the tender date is impracticable or inconsistent with his responsibilities, the Electrical Contractor must state his opinions and reasons immediately on receipt of such instructions, documents or drawings and prior to the commencement of the Engineering Services Works affected thereby.

Include in the Contract sum for all work necessary to complete the installation as specified hereafter and in connection with the following:

- Preparation of all working drawings, details, calculations and all other information necessary for the executing the installations.

- Procurement, transporting, providing and fixing, in accordance with the specification of all necessary materials and equipment.

- Liaison with specialist suppliers and installers both prior to and whilst working on the site.

- Fixing only of certain items which are supplied Free Issue and delivered to site by the Employer or others. Where applicable, this is detailed in the Particular Specification. Any defects or deficiencies of free issue equipment must be reported to the Supervising Engineer immediately

- Provision and fixing of identification labels and reference markings on the pipework, valves cabling and isolators etc.

- Anti - corrosion treatment of all materials or equipment painted at works or the application of additional coats of paint.

- In general, all work, provisions or services necessary for the perfect completion and operation of the installations.

- Removal from site of all waste and debris; keeping in good order and cleaning the site during and on completion of the Engineering Services Works.

- Cleaning all fittings on completion of the Engineering Services Works.

- Effective protection of all equipment and apparatus to avoid deterioration during the course of the Engineering Services Works.

- Testing and commissioning the whole of the installations.

- Providing samples, if required, of all new materials.

- All labour equipment and tools necessary for erecting, commissioning, balancing and testing, including that required by reason of the guarantee.

- Three copies, or as specified elsewhere in this document, of bound operation and maintenance instructions with drawings and schematic diagrams included.

1.2 Visit to Site

The Electrical Contractor is deemed to have acquainted himself fully with the site, conditions of contract, specification, drawings, schedules and phasing operations and to make allowance for these in his Tender. Claim due to lack of knowledge causing delays to the contract and/or additional costs will not be accepted.

1.3 Builderswork

All holes, chases, ducts, trenching and back filling is the responsibility of the Main Contractor. The Electrical Contractor is to set out and be responsible for the correct positions of such holes and chases that he may require for his installation.

Drawings showing positions of all holes, supports, recesses etc. are to be prepared by the Electrical contractor and forwarded to the Supervising Officer for approval in time to meet the due time to allow formation of such items to accord with the construction programme.

Full details of the building structure via the Architect's and Structural Engineers drawings are available for inspection. As the price quoted may be influenced by the construction of the building, the Tenderer is advised to view these drawings, it is being understood that no claims will be entertained due to lack of knowledge of the building structure. It is also the responsibility of the Electrical Contractor to check all pre - determined builderswork items relevant to his installation.

1.4 Acceptance of Tender

No undertaking is given to accept the lowest or any tender and all tenders are prepared at the tenderers own cost.

1.5 Sub - Letting

Be totally responsible for all installation work tendered for shall be sub - let in part or whole without prior approval. Any sub - letting of part or whole of the Engineering Services envisaged at tender stage must be listed in full with details of any proposed Sub - Contractors.

Where it is agreed to sub - let part of the Works to other firms they are to be responsible to the Electrical Contractor and hence subject to all the Conditions of Contract and the relevant requirements of this Specification.

1.6 Contractor's Plant

Unless specific arrangements be made to the contrary, the Electrical Contractor shall, at his own expense, provide all materials, labour, haulage, tools, tackle and apparatus necessary to execute and complete the works covered by this Specification and drawings.

1.7 Electricity and Water

The Electrical Contractor shall be entitled to use such supplies of electricity and water as are made available on the site for the purpose of works and shall, at his own expense, provide any apparatus necessary for such use. The Electrical Contractor shall be responsible for ensuring that the service and plant is safe for the purpose for which he intends to use it.

Comply with BS4363 - "Extra Low Voltage Installations on Building Sites".

Electric welding plant shall not be connected to the electricity supply without the written consent of the supervising Officer, and the issue of a hot work permit.

1.8 Government Legislation

The Electrical Contractor shall tender in accordance with all government legislation which affects the running of the Contract and abide by such legislation as may come into force during the Contract period.

1.9 Programme for the works

The Electrical Contractor shall complete a programme for carrying out the Engineering Services Works and integrate the Engineering Services programme into the overall Main Contract programme. The Electrical Contractor will be required to execute the Works in such order and manner as directed from time to time by the Supervising Officer.

1.10 Value Added Tax

Unless otherwise stated in the tender the Contract price is deemed to exclude Value Added Tax. To the extent that the Tax is properly chargeable on the supply to the Purchase of any goods or services provided by the Electrical Contractor under the Contract, the Purchaser shall pay such Tax as an addition to payments otherwise due to the Contract. The Electrical Contractor shall however allow all incidental costs and expenses he may incur consequent upon the administration of this Tax.

1.11 Existing Services

The Electrical Contractor shall arrange with the Supervising Officer that when work affecting the existing operational services is carried out, the Electrical Contractor shall include for regulating such existing services to ensure satisfactory sequential operation as appropriate.

1.12 Site Inspections

The Supervising Officer will inspect the site to ensure that work is carried out in accordance with the specification, drawings and variation orders. However, this does not relieve the Electrical Contractor of his responsibility to meet the requirements of the Tender documentation.

The Electrical Contractor shall alter any work which does not fulfil the true intent of the Contract at his own expense. Poor workmanship, low quality and any non - compliance shall be rectified as instructed by the Supervising Officer.

Any dispute on site with the Electrical Contractor shall be referred to the Supervising Officer without delay.

The Electrical Contractor shall approach the Supervising Officer appointed under these General Conditions for a decision to modify, change or otherwise alter the Contract drawings or Specification.

1.13 Corruption

The Employer shall be entitled to cancel the Contract and to recover from the Electrical Contractor the amount of any loss resulting from such cancellations if the Electrical Contractor shall have offered or given or agreed to give to any person any gift, consideration or bribe of any kind as inducement or reward for doing or forbearing to do, or having done or forborne to do any action in relation to obtaining or execution of the Contract or any other Contract with the employer or if the like acts shall have been done by any person being employed by him or acting on his behalf (whether with or without the knowledge of the Electrical Contractor) or if in any relation to any Contract with the Client the Electrical Contractor or any person employed by him or acting on his behalf shall have committed an offence under the Prevention of Corruption Acts 1889 to 1916.

1.14 Fire Precautions

The Electrical Contractor shall take all reasonable precautions to avoid the outbreak of fire particularly in work involving the use of naked flames and obtain issue of a hot work permit from the Employer.

1.15 Site Coordination

The Electrical Contractor shall provide site supervision throughout the Contract and shall constantly employ on the site at least one competent Working Site Co-ordinator to manage and direct the works on his behalf.

The Working Co-ordinator shall have charge of all drawings, specifications and other documents which are sent to the Electrical Contractor for use of guidance and shall also receive, execute and obey all instructions as may be given by the Supervising Officer.

The Working Co-ordinator shall not be changed or removed without the written approval of the Supervising Officer, but the Supervising Officer shall have full power to require the Electrical Contractor to remove the co-ordinator or any other person from the site, if in the opinion of the Supervising Officer the person is not competent to carry out his duties.

The Working Co-ordinator shall be the Electrical Contractor's representative in overall charge of the Engineering Services Works and shall be identified at the Pre-contract Meeting.

1.16 Omissions

The Electrical Contractor shall make due allowance in his tender for any items such as switches, fuses, pipes, sets, elbows, valves, emptying cocks, supports, brackets etc., which although not indicated on the drawings or mentioned in the Specification but which are necessary for the proper construction of the works and the correct operation of the systems in accordance with the best current practice and to comply with the Specification.

Any item shown on the Contract drawings but omitted from the Specification or described in the Specification but omitted from the Contract drawings, shall be included.

The Electrical Contractor shall not omit any part of the works described in the Specification or shown on the drawings without consent from the Supervising Officer in writing.

The Supervising Officer shall be entitled to instruct the Electrical Contractor to omit any part of the Works and the cost of items omitted shall be deducted from the Contract price.

1.17 Provisional Sums and Prime Cost Sums

A Provisional Sum included in the Contract price shall be expended or used as the Supervising Officer may, in writing to the Electrical Contractor direct or not. Insofar as a provisional sum is not expended or used, it shall be deducted from the Contract sum. Quotations for equipment and/or work chargeable to provisional sums shall be deemed to include the Contractor's overheads, profit and Main Contractor's discount.

All Prime Cost (PC) items included in The Contract Price shall be expended or used as the Supervising Officer may, in writing, through the Electrical Contractor, direct or not. PC Items shall be deemed to include 2.5% Main Contractor's discount.

1.18 Specification and Drawings to be Read Together

Read the Specification in conjunction with the Drawings. If there is ambiguity in either the Specification or the drawings, or there are differences between them, clarify the differences and seek instructions before submitting a tender. Failure to do so will not relieve the tenderer of responsibility.

If any of the particulars required cannot be obtained from the specification, Drawings and Site, formally apply for the information needed. No variation in cost or programme will be allowed in the event of failure to comply with this Clause.

1.19 Tender and Installation Drawings

The Tender Drawings listed in the Schedule of Tender Drawings are representative of the work to be done, and when read in conjunction with the Specification provide sufficient information for tendering purposes.

Provide and accept responsibility for all necessary installation drawings including detailed builderswork drawings, shop drawings, wiring diagrams etc., necessary for the execution of the works. Apply to the Supervising Officer for any additional information required for the preparation of such drawings in reasonable time in relation to the programme.

Provide all installation drawings in good time to meet the programme of works.

Dimensions written on drawings shall, in all cases be taken in preference to those given by the scale and the wording of the Specification shall be taken in preference to dimensions written on the drawings. Any conflicting information shall be brought to the notice of the Supervising Officer and clarification shall be obtained prior to the submission of the Tender.

1.20 Compliance with British Standards

Except where otherwise specified all the work in the Contract to which this Specification applies shall conform with the relevant provisions of appropriate British Standards or British Standard Codes of Practice in being at the time the Contractor submits his tender. The Electrical Contractor shall also comply with any relevant British Standard Specification which may be issued subsequent to the acceptance of his tender, provided that the part or parts of the Works has been completed, the Electrical Contractor must inform the Supervising Officer so that a decision may be reached as to the procedure to be adopted.

1.21 Schedule of Rates

Unless the tender quote is based on a completed Bill of Quantities, provide within 10 days of being so requested by the Supervising Officer, furnish a Schedule of Rates showing in detail the quantities, prices and extensions used in the calculations of the Tender Price, and the Tenderer shall accept responsibility for the accuracy of any quantities and extensions contained therein. The Schedule shall balance with the items of the Summary of Tender and shall be considered as forming part of the tender and in any event of the Contract being awarded the quantities and extensions shall be cancelled and the rates in the said schedule shall be used for the measurement and valuation of any alteration in addition to, or omissions from the works. Where it is not practical to apply the rates in the manner aforementioned, such alterations and additions and omissions as are ordered shall be valued at rates or prices and may be agreed with the Supervising Officer on a pro rata basis.

1.22 Pricing of Instructions and Variations

Price each authorised variation in accordance with the conditions of contract. Submit for approval within 7 days of receipt of instruction, the price of each authorised variation showing the quantities and rates applicable for all materials etc., employed.
When materials or equipment which are not included in the Schedule of Rates are required to be provided under a Variation Order or Instruction, include within the estimate for work a copy of the quotation received from the suppliers and show separately the allowance required for overheads and profit, all to be in accordance with the conditions of contract.

1.23 Dayworks

No works shall be carried out on a daywork basis unless agreed in writing by the Supervising Officer. Daywork sheets shall clearly show all time and materials expended on each item and shall be signed by the Supervising Officer representative by the end of the week following the work being undertaken. Priced sheets in duplicate shall be submitted to the Supervising Officer, within 14 days of the work being completed.
The Electrical Contractor shall give with his price the percentage he requires for overheads and profit, labour and materials which if appropriate should be as stated in the Bill of Quantities.

The percentage shall be worked out in accordance with the definition of the Prime Cost for the Heating and Electricity Industry, prepared and published jointly with the Royal Institution of Chartered Surveyors, the Heating and Ventilation Contractors Association and the Electrical Contractors Association.

1.24 Variations Based on Supplementary Quotations

The Supervising Officer will whenever possible, ask for supplementary quotations prior to variations being carried out. Otherwise they shall be fixed on the Electrical Contractors estimates of labour, plant and materials at the nett rates to which his overheads and profit are added. The basis for arriving at these percentages will be in accordance with the Schedule of Daywork.

1.25 Measurement of Works

The Electrical Contractor shall give all necessary assistance to enable the Quantity Surveyor to examine or measure any of the works if necessary.

The Electrical Contractor shall give every facility to the Quantity Surveyor to measure any variations for which payment is based on a schedule of rates.

1.26 Final Account

This shall be submitted to the Quantity Surveyor as soon as possible but not more than one month after the handing over date and shall be sub-divided as follows:-

1. The Contract price less Provisional Sums and PC Sums plus the percentage shown in the Contract.

2. Variations carried out under supplementary quotations.

3. Variations executed as daywork.

The Authority for 2 and 3 shall be shown against each item included under these divisions.

1.27 Electrical Contractors Liability

The Electrical Contractor is to satisfy himself that all systems, equipment and plant for the project are suitable in application and performance for the purpose for which they are intended.

1.28 The Ordering of Materials and Equipment with Long Deliveries

To avoid delays due to non-delivery of materials and equipment the Electrical Contractor shall place orders, immediately the instructions for appointment have been received by him to proceed with the work.

Every effort shall be made by the Electrical Contractor to obtain all materials and have them delivered to site so that they are available for installation when required.

Alternative manufacture and/or type of components may be submitted for approval to the Supervising Officer where this is necessary to avoid delay in delivery or where delivery dates can be improved.

Take over and accept any provisional orders in the form of "Letters of Intent" which may have been made with any specified manufacturers because of long delivery periods.

1.29 Off-Loading of Materials

The Electrical Contractor shall be responsible for the off loading and placing into position, of all equipment on site. He shall pay any demurrage charge incurred due to retarded off loading. He shall also be responsible for the return of all packing cases, cable drums etc., including free issue materials.

1.30 Care

Commodities are to be new unless otherwise specified. Handle, store and fix commodities with care to ensure that they are in perfect condition when incorporated into the works.

1.31 Protection of New Materials

The Electrical Contractor shall ensure that a lockable facility is provided by the Main Contractor where appropriate for adequate and safe storage and protection for all new materials and equipment provided and/or installed by him. If this is physically impossible obtain a relaxation of this clause in writing from the Supervising Officer.

Conduits, pipes and similar material shall be adequately supported and stored on properly made racks, to prevent bending and distortion and the ends shall be closed and threads protected by means of purpose made end caps.

The storage of pipes and conduits or other materials by laying them on earth will not be permitted.

When materials and equipment cannot be stored in suitable buildings they shall be raised and supported clear off the ground and be protected against frost, damage due to building work and operations by other Contractors by means of waterproof covers or other appropriate means.

Machined and bright surfaces shall be protected by paint, tallow or grease where this has not been carried out by others or has become removed in transit. On completion, surfaces so coated shall be cleaned and where appropriate, polished.

All plant and equipment is to be left in a condition ready for painting whether painting is specified either as part of this Contract or by others. Parts liable to corrode are to be painted immediately after removal of the temporary protection.

1.32 Suppliers and Specialist Contractors

In providing any commodities or services which are specified as being technically in accordance with a particular quotation form a named supplier or specialist sub-contractor, obtain a quotation and the Conditions of Sale for that commodity or service and allow for ensuring that liabilities under the Terms of Contract are covered.

1.33 Materials and Design

Execute the Engineering Services Works to ensure satisfactory operation in which continuity of service and high reliability are the first consideration and to facilitate inspection, maintenance, cleaning and repairs.

All materials and equipment are to be the best of there kind, new and free from defects and designed to ensure satisfactory operation under the atmospheric conditions prevailing on site. Corresponding parts are to be inter-changeable wherever possible, in order to reduce spares to a minimum.

Where a specification has been issued by the British Standard Institution dealing with equipment or materials forming part of the specification, such materials or equipment are to be in accordance with the recommendations contained in the latest issue of the relevant British Standard, except where otherwise specified or agreed in writing.

Where in this specification attention is drawn to specific British Standard or Codes of Practise, this does not absolve the Electrical Contractor from complying with all other applicable British Standards.

If any material or equipment is not covered by British Standard the Electrical Contractors proposals are to be subject to the approval of the supervising officer.

1.34 Materials to be Bacteria Free and Non-Flammable

All materials supplied are to be of a type that will not support bacteria. Acoustic insulation or sound deadening materials must not contain animal hair. All materials are to be non-flammable and asbestos free.

1.35 Installation Standards

The Engineering Services Works are to be executed in a neat and workmanlike manner to the entire satisfaction of the Supervising Officer. Where, in the opinion of the Supervising Officer, materials of sub-standard quality or faulty workmanship, have been employed, the Electrical Contractor at his own expense is to remove the rejected works and provide a new installation to the satisfaction of the Supervising Officer.

1.36 Miscellaneous Services

The whole of the Contract Works will ultimately be taken over by the Employer and liaison will be essential between the Electrical Contractor and the Employer during the Maintenance and Defects Liability periods.

1.37 Installation Liaison

The positions of all plant, equipment, etc., are shown in approximate positions on the drawings, determine their exact locations in consultation with the Supervising Officer.

Cooperate with other trades engaged on the works to ensure a correct and neat installation. Any work that has to be re-done due to negligence in this respect will not be paid for. Take particular care to prevent obstruction of other services.

Ensure that all services, equipment or plant are accessible for maintenance. Where large items of equipment, AHU's, transformers, switchboards or long lengths of ducting or cabling are to be installed, ensure that access is provided for installation at the proper time in the construction programme.

Services in ducts, above suspended ceilings and in other voids shall be so arranged and secured that as far as is practicable they will not prevent convenient access for the maintenance and renewal of any other service.

1.38 Interference Suppression of Electrical Contractor's Equipment

All the equipment used by the Electrical Contractor for the erection of the works shall be suppressed to comply with BS 800 as appropriate, so as to cause no electro-magnetic interference with radio or television equipment.

1.39 Specialist Trades Attendance on Equipment

The Electrical Contractor shall arrange and make all payments for specialist plant and equipment, as detailed in this Specification.

1.40 Regulations

The Electrical Contractor shall comply with the Health and Safety at Work Act and all other statutory notices and local bye-laws and regulations as called for in the Contract. This shall include the testing and stamping of the equipment as required by the Local Water Authorities.

All work on hot and cold water services shall satisfy the requirements of the Local Water Authority.
All electrical work shall comply with the current edition of the Regulations for Electrical Equipment of Buildings issued by the Institution of Electrical Engineers and the requirements of the Local Authorities.Comply with the latest COSHH Regulations.

1.41 Trade Custom

The Electrical Contractor shall be responsible throughout the Contract for ensuring that the trade custom and local practise is followed in the employment of the appropriate grades of operatives. Not more than one apprentice or semi-skilled mate shall be employed for each full-rate tradesman.

1.42 Liaison with Local Statutory Authorities

Give all necessary notices to the Electricity, Gas, Telecommunications and Water Companies, if required, and pay all fees in connection with the testing of the installation by the Utilities.

Where the installation is on a new site and not already supplied by the Local Utilities, or on an existing site but with a new service, coordinate all works of the utilities in relation to the installation of their supply and the establishment of their termination and metering position at the approximate locations indicated on the tender drawings.

Where alterations are carried out at the intakes on an existing site, the Electrical Contractor is to arrange for the utilities to make any necessary disconnection/connections.

Note that the tests do not in any way relieve the Electrical Contractor of his own obligations to carry out tests as detailed in Clauses in this Specification and to submit to the Supervising Officer written records of these tests.

1.43 Instrumentation and Control Drawings

Provide the suppliers of the instrumentation and control equipment with full details of all plant to be controlled.

Obtain from the supplier complete wiring diagrams for external connections, check them and submit them to the Supervising Officer for comment.

1.44 Removal of Rubbish

Clear from the site as it accumulates, all rubbish and materials not required. Leave the whole of the installation and working areas clean and tidy.

1.45 Cleaning

On completion or sectional completion, thoroughly clean all equipment in good time so as to be ready for inspection prior to hand-over.

1.46 Testing and Commissioning

1. General

The Electrical Contractor shall fully test and commission the installations in accordance with the following conditions:

The Electrical Contractor shall provide representatives who are fully conversant with the operation of the works and are competent to supervise and carry out all tests and commissioning throughout the Contract to a successful Final Acceptance Test.

The Electrical Contractor shall also provide such additional assistance, competent labour, material, lubricants, specified by makers and other such equipment and test instruments as may be required and reasonably demanded to carry out the tests and commissioning.

The Electrical Contractor shall demonstrate that the installations are properly commissioned, operate in the correct manner and are capable of functioning to accomplish the design intention as outlined in this Specification and the Contract as fitted documentation.

2. Commissioning Procedures

These will comprise:-

Visual checks and examination by the Supervising Officer during construction, covering materials, workmanship and methods of installation.

Tests during construction and installation of plant and services or manufacture of sections of work and/or items of plant which shall be carried out by the Electrical Contractor and witnessed by the Supervising Officer.

The Electrical Contractor shall give to the Supervising Officer at least five working days notice in writing of tests to be carried out.

Each installation shall be operated as an interrogated whole and be regulated, balanced, set to work, proved and brought to operational status in accordance with design and/or manufactures requirements.

Final Acceptance Tests of the works by the Electrical Contractor shall be witnessed by the Supervising Officer in accordance with the Specification.

Should the Supervising Officer decide that the works or any part thereof defective, or not in accordance with the Contract, he may reject the works or part thereof by giving the Electrical Contractor notice in writing of such rejection, stating therein the grounds upon which the decision is based.

3. Testing

The Electrical Contractor shall allow for testing of the works in sections in conjunction with the Contract programme and to this specifications requirements. No services shall be buried or covered or ceilings assembled or duct covers placed in position until the tests have been carried out by the Electrical Contractor and accepted by the Supervising Officer.

Testing shall not eliminate the need for tests on completed works.

4. Penalties, Failures and Rejections

If any portion of the works fails to pass the Final Acceptance Test through negligence on the part of the Electrical Contractor, they shall be repeated. Resulting additional expenses incurred shall be at the Electrical Contractors own Expense.

5. Cost and Commissioning

The Electrical Contractor shall allow in the Contract Sum for all costs involved in carrying out the commissioning procedures described above.

6. Programme of Commissioning

All commissioning procedures shall be completed within the contract period to a programme agreed with the Supervising Officer.

7. Test Certificate

Site tests, results and records shall be entered by the Contractor on the type of form supplied or agreed with the Supervising Officer.

During construction the Electrical Contractor shall provide the Supervising Officer with one copy of all works and manufactures test certificates at the time they were received by the manufacturer or supplier. Further copies shall be included in the service manuals complete with Electrical test and inspection certificates.

1.47 Record Drawings

1. During the progress of the works, record on drawings in an approved manner, the information necessary for preparing as fitted drawings. The marked up drawings must be available for inspection at all times by the Supervising Officer.

2. The drawings are to be on a scale similar to the original tender information and are to include the specific details adopted during the installation.

3. The Electrical Contractor is reminded to make adequate records and to take any measurements prior to concealment of his work.

4. Provide two copies of the standard Electrical and Mechanical drawings to the Supervising Officer, marked up to show complete "As Installed" information. These prints should be signed and stamped as a true record of the Electrical and Mechanical installation for the particular site.

5. Frame a copy of the schematic diagram and mount within the distribution cupboard.

   The drawing is to show all distribution cables, rating and number of ways of each switch fuse, isolator and distribution board.

   Display the following safety charts:

   1) Electrical Supply Regulations.

   2) A poster showing "Kiss of life" and Holger Neilson methods of resuscitation after electric shock.

6. The sum included in the tender for as fitted documentation must be realistic estimate of the cost necessary to comply with the above clauses.

1.48 Operating and Maintenance Instruction Manual

1. Provide and assemble three copies of the Manual at the time of practical completion. They shall be as follows:

   1) On A4 size sheets.

   2) Bound in a loose leaf binder with suitable identification on the cover and spine.

   3) Each of the sections shall be subdivided with dividers.

   4) Each section is to have an index and all pages are to be numbered.

   5) Include information in the following format:

      (a) **Introduction** - project name, companies involved, main contracts and an outline of the installation is to be included and written by the Electrical Contractor.

      (b) **Operating Procedures** - standard operating pages should be included and amended to suit any particular requirements of the site by the Electrical Contractor.

      (c) **Main Plant** - A standard plant schedule should be included and amended to suit any particular requirements of the site by the Electrical Contractor.

      (d) **Maintenance Operations** - Contractor to issue a number of pages to be included that detail maintenance on a daily, weekly, monthly etc., basis for each system. Any additions or unique items to the installation are to be amended by the Electrical Contractor.

      (e) **Emergency Operations** - Contractor to issue a number of pages to be included in the document. Missing data denoted by dotted lines are to be completed by the Electrical Contractor.

      (f) **List of Spares** - Electrical Contractor to provide a list of recommended spares.

      (g) **Schedule of Drawings** - Electrical Contractor to provide a schedule of drawings.

      (h) **Manufactures** - Electrical Contractor to provide a list of Manufacturers used including address and telephone numbers along with references to the items supplied. Catalogue cutouts are to be included.

      (i) **Test Certificate** - Include a complete series of all test certificates.

1.49 Defects Liability Period

1. Be responsible for making good with all possible speed and defect or damage to any portion of the works which may develop during a period of six months after that portion shall have been taken over and which arises either:

1) From defective materials, workmanship or design (other than a design made, furnished or specified by the Supervising Officer for which the Electrical Contractor has disclaimed in writing responsibility within a reasonable time after the receipt of the Employers instruction), or

2) From any act or omission of the Electrical Contractor done or omitted during the Electrical Contractor defects liability period.

2. If any such defect or damage shall occur, the Supervising Officer shall inform the Electrical Contractor stating in writing the nature of the defect or damage. If the Electrical Contractor replaces or renews any portion of the works, the provisions of the Clause shall apply to the portion of the Works so replaced or renewed until the expiration of twelve months from the date of such replacement or renewal.

3. If any such defect or damage is not remedied within a reasonable time, the Employer may proceed to do the work at the Electrical Contractors risk and expense but without prejudice to any other rights which the Electrical Contractor may have against the Employer in respect of the failure of the Electrical Contractor to remedy such defect or damage.

4. If the replacement or renewals are of such a character as may effect the efficiency of the works or any portion thereof, the Electrical Contractor may within one month of such replacement or renewal give to the Employer notice in writing requiring that Tests on completion be made, in which case such tests shall be carried out as provided in Clause 1.46.

5. These general conditions shall apply to all inspections, adjustments, replacement and renewals and to all tests occasioned thereby, carried out by the Electrical Contractor during the defects liability period.

1.50 Spares List

Not less than two weeks before the hand-over date, the Electrical Contractor shall provide a full priced list of manufactures recommended spares for all plant of his supply.

1.51 Instruction of Client Representative

Allow at a mutually convenient time within two weeks of practical completion, to instruct and demonstrate to person(s) in charge of the premises or an appointed representative, in the use of the installation, e.g. purpose of switchgear, local switches, alarms, operation of special systems etc.

Note: All such information together with catalogue cutouts, drawings and maintenance procedures shall be contained within the operating and maintenance manual provided under Clause 1.48 and supplied in triplicate at the end of the contract prior to the instruction demonstrations.

Allow for at least two half day visits on separate occasions to perform the instructions as specified above.

1.52 Practical Completion

As a prerequisite to the issue of the practical completion certificate issued by the Supervising Officer the Electrical Contractor must;

1. Demonstrate all works visually complete.

2. Have carried out the specified tests.

3. Proved that the installation is satisfactory and that the specification is met.

4. Provide all documentation or ensure that it will be carried out in accordance with this section of the specification.

1.53 Health and Safety (CDM Regulations)

The Client will appoint a Principle Designer who shall be provided with all information necessary to forfill his duties as required under regulation 14 of the Contruction and Design Regulations 2019

The Contractor shall be responsible for developing a full Health & Safety plan prior to commencing operations on site in doing so shall consider the work and materials of his own sub-contractors and suppliers who will be involved in the works.

The Contractor shall ensure that his Health & Safety plans are drawn up in a coherent and logical fashion and shall provide a comprehensive ,fully indexed and itemised document which clearly identifies the risk assessment and health and safety issues.

The Contractor shall ensure that all his sub-contractors and suppliers are fully conversant with the requirements of the regulations and are made fully aware of all site conditions and the need to comply fully with these requirements.

The Contractor shall update the Health & Safety Plan as the project proceeds and shall ensure that all information is included in the master Health & Safety file.

The Contractor shall provide all necessary health & safety training for all employees, sub-contractors and visitors to the site so as to ensure that they are also able to comply with the requirements under the Regulations and statutory provisions.

The Contractor is required to demonstrate that sufficient resources have been allocated to perform the necessary duties under the regulations and identify competent personnel responsible for health and safety on site.

SECTION B

GENERAL TECHNICAL REQUIREMENTS

SECTION B - GENERAL TECHNICAL REQUIREMENTS

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SECTION B - GENERAL TECHNICAL REQUIREMENTS

1.0 GENERAL

This part of the specification is to be read in conjunction with the following:

1. Section A - General Conditions of Contract for Engineering Services.
2. Section C - Particular Requirements.
3. Appendix A

The Clauses included in this section are standard requirements applicable to all Electrical Engineering Services Works and section C details the more specific requirements for this particular project.

SECTION B - GENERAL TECHNICAL REQUIREMENTS

2.0 REGULATIONS AND GENERAL INSTALLATION REQUIREMENTS

2.1 Regulations

Ensure the components, installation and system fully comply with the recommendations and requirements (as applicable) of the current edition (including amendments, if any) of the following:-

1) The I.E.E. Regulations for the Electrical Equipment of buildings with amendments.

2) The British Standard specifications and Codes of Practice.

3) The Electricity (Factories Act) special regulations 1908 and 1944.

4) The Electricity supply regulations 1988.

5) The Factories Act 1961.

6) The Electricity at Work Regulations 1989.

7) The Control of Substances Hazardous to Health Regulations 1988.

8) The Consumer Protection Act 1987.

9) The Construction Design & Management Regulations 1995.

2.2 Definitions of Voltage

1 The terminology used for defining voltage throughout this document is that in IEE Publication 449, Voltage Bands I and II, which has been adopted as a CENELEC Harmonisation document.

2 Extra low voltage signifies any voltage not exceeding 50V a.c or 100V d.c eithier between conductors or between conductors and earth.

3 Low voltage signifies any voltage exceeding extra low voltage but not exceeding 1000V a.c.. or 1500V d.c..

2.3 British Standards and Codes of Practise

Comply with all British Standards and Codes of Practise current at the time of Tender, whether stated or not, together with any amendments. Obtain approval for any deviations from the Supervising Officer in writing before installation.

References to B.S. and C.P. in this specification means British Standards and Code of Practise respectively as published by the British Standards Institute.

References to H.V. and L.V. signify High Voltage and Low Voltage respectively.

Reference to IEE signifies the Institution of Electrical Engineers

SECTION B - GENERAL TECHNICAL REQUIREMENTS

2.4 Accuracy of Setting Out the Works

Ensure the Services installations are set out to the following degree of accuracy:
Linear dimensions:

+5mm up to and including 5 m,
+10mm and over 5m and up to and including 30m, over 30m Pro Rata

Angular Dimensions

+40 sec (10mm in 50m).
Vertically: 5mm in 50m
Levels: 5mm per single site of 60m

Notify the Supervising Officer of Work which fails to meet the specified levels of accuracy and submit proposals for rectification before proceeding. Do not rectify without approval.

2.5 Drilling and Cutting of Structural Steelwork

Apply in writing with sketch drawing, if drilling or cutting of structural steelwork is required and obtain written approval before cutting or drilling any structural steelwork

2.6 Arrangement of Equipment on Walls and Ceilings

Take particular care to obtain uniform and tidy arrangements of wall mounted equipment.

If a detailed drawing is not provided showing the precise grouping of two or more items of equipment whether electrical or mechanical or both, which are to be erected on the same wall or ceiling, or which will be otherwise visually close to each other, arrange them in a neat and symmetrical group. Obtain symmetry of arrangement by horizontal or vertical alignment through the centre lines and not the edges of the equipment. For this purpose the mounting heights stated in the specification or on the drawings maybe varied slightly.

In the planning of arrangements co-operate as necessary with both the main Contractor and any other Contractors concerned. Mark on the walls and obtain the written approval of the Supervising Officer for the proposed arrangements showing the outlines of all the Electrical and Mechanical Equipment in each group before any holes or chases are cut.

2.7 Galvanising

Galvanising where specified, including zinc spraying and other approved finishes applies only to components of ferrous construction. Components manufactured from a corrosion resistant alloy maybe supplied as an alternative to galvanising when approved by the Supervising Officer.

Ensure all ferrous fittings and equipment supplied for use outside the buildings or in an exposed position are galvanised unless otherwise agreed.

Ensure that when galvanised conduits are specified, all accessories, switch boxes and other apparatus are similarly treated.

Ensure galvanising is carried out on both the inside and outside surfaces.

SECTION B - GENERAL TECHNICAL REQUIREMENTS

3.0 INSPECTION AND TESTING

3.1 Scope

In addition to the site testing specified elsewhere in this specification conduct tests during and at the completion of the installation as and when required by the Supervising Officer to demonstrate compliance with this specification, the I.E.E. Regulations for the Electrical equipment of buildings, Regulations for Health and Safety, the Electricity supply Regulations, the Petroleum Regulations, Factories Acts and all Local Bye-laws.

Give 10 days clear notice of intention to commence any of the tests and do not commence the completion tests until the programme has been agreed with the Supervising Officer.

3.2 Site Testing

Carry out the following tests on site after the equipment has been completely erected and connected. Prior to making the test, and putting the equipment into operation, check the correctness of, and make any corrections necessary to, all connections of cables made between equipment supplied under this contract and equipment supplied by others.

1) Repeat all routine tests noted elsewhere at the works and when appropriate at the full test voltage.

2) Insulation resistance tests on all cables utilising a 1000V intrinsically safe metering device.

3) Verify that all equipment supplied and interconnected performs and operates satisfactory.

4) Tests as called for in other parts of this specification.

5) Verify the stability and satisfactory operation of earth fault protection.

Before undertaking any tests, ensure that the area in which the installation is situated is gas free i.e. non hazardous. Where it is not possible to ensure this take special precautions as detailed elsewhere in this document.

3.3 Insulation Testing

Carry out insulation resistance tests as follows:-

1) Measure insulation resistance of all LV main and sub-main cabling installation and LV switchgear by means of a 1000V insulation tester.

2) Measure insulation resistance of all lighting, general purpose single phase and 3 phase power final sub-circuits and cabling associated with electronic based equipment, and miscellaneous services by means of a 500V insulation tester.

3) Make tests of insulation resistance between conductors, between each conductor and earth and neutral.

4) Ensure a minimum insulation resistance of 10 megohms is achieved for each final sub-circuit.

SECTION B - GENERAL TECHNICAL REQUIREMENTS

3.4 Earth Electrode Resistance and Earth Continuity Resistance Tests

Carry out these tests in accordance with British Standard Code of Practise CP1013, prior to commissioning the whole or part of the installation.

3.5 Earth Loop Impedance Tests

Measure the Earth Loop Impedance of the respective systems and circuits by means of a direct reading current injection a.c. earth loop impedance tester.

3.6 Testing Apparatus and Procedure

Provide all the necessary testing apparatus and any supplies required to carry out site testing and agree with the Supervising Officer the detail of the respective tests before they are carried out.

3.7 Labels and Identification

Permanently mark all switchgear, distribution boards, etc., with the voltage and current rating, together with the manufacturers name or distinguishing mark. Label items associated with supplies other than 415/240V, 50 Hz accordingly.

Mark all switchgear, distribution boards, etc., by means of a label to show the service controlled, the voltage and phasing, and the frequency when this is different from the normal supply. Ensure labels are non-inflammable, engraved and securely fixed to the front of the equipment by means of screws. Use black engraved lettering on a white background and in the case of warning labels ensure they are yellow and the lettering filled black in accordance with BS 5378 Part 1 unless otherwise stated. Where voltage in excess of 250 Volts is present ensure the label reads "WARNING 415 VOLTS".

Provide circuit schedules for all distribution boards, the schedules clearly describe the nature and position of the load connected to each circuit, viz: number of points, lighting and power sockets, motors, machines, telephones, contacts, etc., together with power rating and location. Label the individual ways within the distribution boards to identify and relate them to the drawings and circuit schedules.

Provide and fix in the electrical cupboard doors neatly typed, stencilled or printed circuit schedules mounted on stout cartridge paper on smooth faced 3mm thick cardboard, secure by clips and protected in a polythene envelope.

SECTION B - GENERAL TECHNICAL REQUIREMENTS

4.0 CONDUIT SYSTEMS

4.1 Installation - General

Erect conduit in straight lines with easy sets or bends.

Erect surface conduit in lines in truly vertical and horizontal, or parallel to the building lines.

Cold bend conduit, without altering its section using a bending machine complying with BS 4568 Part 1.

Ensure no part of the conduit system is under mechanical stress.

Ensure the conduit system is self draining.

Do not use conduit less than 20mm diameter.

Do not use conduit bearing traces of rust or damage.

Do not use inspection tees or elbows and factory made bends with internal threads. Inspection bends on surface work will only be permitted in conduit of 32mm diameter.

Ensure the live and neutral conductors of the same circuit or circuits, in all cases are drawn into the same conduit.

Provide a draw box in all conduit runs at intervals of not more than 12m or in any length containing more than two right angled bends.

Avoid drawer boxes in floors unless specifically indicated on the drawings.

Ensure conduit is cleaned and free from oil before erection and swabbed out after fixing and immediately prior to the cables being drawn in.

Do not draw in cables until erection of the system is complete and the engineer has approved the conduit work.

Isolate all conduits passing through the external building fabric or between two areas of different temperature and other situations likely to lead to condensation from the remaining conduit system by means of an accessible conduit box. Fill the box after wiring, with an inert, high insulation value, permanent plastic compound.

Galvanise and have two coats of bitumastic paint applied over conduit buried in the ground for its complete length, prior to installation, and to a distance of 200mm beyond the point where it emerges from the ground.

4.2 Terminations : General

Ensure conduits terminate in conduit and accessory boxes provided with tapped spouts are threaded for the correct length to ensure a tight full length connection in the spout with no exposed thread.

Ensure conduit terminations to loop-in boxes consist of a screwed coupling and smooth bore the terminations must consist of a flanged coupling, lead washer and smooth bore brass bush.

4.3 Terminations to Motors and Removable Equipment

Unless otherwise specified utilise flexible metallic conduit from a conduit box, to motors and equipment which will be required to be removed for maintenance or inspection purposes, or subject to vibration.

For motors or other power consuming equipment, ensure that the box contains loops of cable of sufficient size to enable "tong-test" readings to be taken.

4.4 Fixings

Fix conduits by means of conduit fixing components complying with BS 4568. Ensure the type of fixing used and the fixing intervals are in accordance with the following Schedule:

Location of Conduits	Type of Conduit Fixing	Fixing Intervals
Buried in plaster or cement/sand wall finishes	Crampets saddles	150mm from each accessory box and at intervals not exceeding 1800mm
Floor screeds	Saddles	150mm from each accessory box and
Above false ceilings	Spacer-bar saddles	at intervals not exceeding 1200mm for 16, 20 and 25 and
Surface	Distance saddles	1800mm for 32mm conduit

Fix saddles in accordance with the following schedule:

Type of Structure	Type of Fixing
Concrete, brick or building blocks	"Rawlplugs" and sheradised or cadmium plated steel screws.
Hollow blocks or pot	Sheradised or cadmium plated butterfly spring toggle bolts or gravity bolts.
Steelwork	Sheradised or cadmium plated steel set screws nuts.
Structural steelwork	Purpose made clamps of a type to be agreed with the Supervising Officer
Patent steel channels	Patent sheradised steel

Individually fix all boxes, except loop-in boxes in concrete floors direct to the structure.

Where conduits are to be cast in concrete, securely fix to prevent movement prior to pouring and ensure a minimum of 40mm cover over their entire length is provided.

If in any location, conduits have to be fixed to materials not listed in the previous schedule, advise the Supervising Officer in writing and obtain approval of the proposed method of fixing.

4.5 Expansion Joints

Where conduits cross building expansion joints, terminate 300mm either side of the joint and install adaptable boxes. Make interconnections between the boxes using flexible conduit covered with a PVC shroud.

Leave loops of cables in each box to absorb expansion movements and separate earth conductors run internally and connected on the inside of each box to a suitable terminal.

4.6 Earthing and Bonding

Ensure conduit systems are mechanically and electrically continuous, and earthed.

Carry out all bonding to conduits using earthing clamps complying with BS 951 and copper tape or wire.

Make a permanent bond between conduit and any structural steelwork where they are, or maybe, in contact.

Install at least 150mm from gas pipes and other services. Where this clearance cannot be maintained permanently bond the other service pipes to the conduit system.

4.7 Painting

For galvanised conduit all joints and exposed threads and minor damage to the finish is to be painted with two coats of zinc chromate paint and finished in an approved air drying metallic paint.

For black enamel conduit paint all joints and exposed threads and minor damage with two coats of good quality, air drying, black enamel.

Apply the protective paint immediately after erecting the conduit or after the damage occurs.

Remove all grease, oil, dirt and rust before applying the protective paint.

Report serious damage to the finish to the Supervising Officer who will decide whether it shall be repaired or the length of conduit replaced.

4.8 Provision of Draw Wires

Where conduits are installed to provide for the installation of a future system or wiring, provide PVC draw-wires between every draw-in point.

Use heavy gauge welded steel tubing screwed jointed to BS 4568 Part 1 Class 4 for galvanised conduit.

Use heavy gauge welded steel tubing screwed jointed to BS 4568 Part 1 Class 2 stove enamelled for black enamelled conduit.

Ensure conduit fixings have the same classification of protection as the conduit.

4.10 Conduit boxes - Materials

Ensure boxes conform to the requirements of BS 4568.

Ensure boxes for use with black enamelled conduit have the same type and standard of finish.

Ensure boxes for use with galvanised conduit have the same type and standard of finish.

Where used at outlet positions ensure conduit boxes of grey cast iron type and complete with an internal earthing terminal.

Ensure that adaptable boxes are of the grey cast iron type for galvanised conduit. However, adaptable boxes maybe cast steel for black enamel conduits.

In external situations, use galvanised weatherproof boxes with a neoprene gasket under the lid.

Ensure boxes are complete with lids which are interchangeable for similar sized boxes.

Ensure lids for galvanised conduit boxes and cast adaptable boxes are heavy gauge secured by brass or cadmium plated steel screws.

Ensure lids for black enamelled conduit boxes and steel adaptable boxes are steel secured by steel screws.

Where boxes are flush with the surface finish provide overlapping cover-plates.

4.11 Flexible Conduits

Ensure flexible steel conduit and adapters comply with BS 731, part 1, type B or C as appropriate, having a finish to BS 4568 part 1 class 4.

Type B conduit maybe used in the majority of locations but type C must be used externally, in areas with dust laden atmospheres or in areas which will be subject to hosing down.

Use adaptors of the clamp type.

Install an earth conductor within the conduit and connect to an earth terminal at each end.

4.12 PVC Conduit

Ensure PVC conduit and fittings comply with BS 4607, high impact type, and installed in accordance with the Manufacturers recommendations.

Where conduits are concealed in wall chases, ensure they are securely fixed with crampets with due care being taken to avoid compression of the conduit.

Where conduits are installed on the surface ensure they are fixed by means of spacer bar saddles which are of the sliding fit type and expansion joints are installed at intervals of not

Where PVC conduit boxes support lighting fittings, use the manufacturers steel insert clips to ensure that the weight of the fitting is supported by the building structure and not the box.

4.13 Capacity of Conduit

Pay particular attention to the number of cables drawn into a conduit. Under no circumstances exceed the number specified in tables B.5M and B.6M of the IEE Regulations.

5.0 CABLE TRUNKING

5.1 Steel - General

Use cable trunking of the surface mounting steel type with steel covers and comply with BS 4678, Part 1 class 4 protection (hot dip galvanised or zinc plated finish) in areas where galvanised conduits are specified. Elsewhere use trunking with an enamelled finish to an approved BS colour.

Ensure trunking with steel cover plates with returned edges is used and covers are secured to the trunking by means of button spring and locking bar quick release fastening's or 2 BA screws located in bushes set in the edge trims of the trunking.

Use the trunking manufactures "Standard" right angled bends, 45 degree angle bends and tee junctions where required and minimise the use of site fabricated trunking offsets. No short lengths of trunking lid shall be used in locations where two equal lengths could be used to achieve symmetry of installation.

Couple lengths of trunking, bends, tee sections and offsets together by means of fish plates and trunking manufacturers cadmium plated steel set screws, nuts and shake-proof washers.

Maintain continuity at each joint in the trunking, by means of tinned copper links. Secure tinned copper links bridging the joint by means of the trunking manufacturers standard earthing link securing screws, nuts and shake-proof washers.

Fit blanking off covers to units terminating a trunking run which are readily removable to permit extension of the trunking.

Where multi compartment trunking is called for on the drawings maintain segregation between the compartments throughout the entire trunking system including at multiple junctions and bends. Extend the segregated barriers the full depth of the trunking so that when the lid is in position full segregation is achieved between adjacent compartments.

Where the trunking has not been dimensioned on the drawings, size it for the present cable requirements plus 20% extra for the future requirements whilst ensuring that the IEE Regulations concerning space factors are not exceeded when the future cables are installed.

Ensure all conduit terminations in the trunking consist of a flanged coupling, inverted trunking lead washers and smooth bore brush.

Before cables are drawn into the trunking ensure that all sections of trunking are free from sharp edges, burrs and weld spots which could cause damage to the insulation of cables. Make good any damage to paint-work or galvanising of the trunking before installing the cables.

SECTION B - GENERAL TECHNICAL REQUIREMENTS

5.2 Cable Retaining Straps and Supports

Where there are removable lids to gain access to the cabling in the trunking use cable retaining straps installed at 1000mm intervals within each compartment.

Where cables are installed in vertical trunking and which have a greater length than 2500mm support by an approved method fitted within the trunking.

5.3 Fire Barriers

Install fibreglass or other approved fire barriers in the trunking, where it passes through floor slabs or through walls between one area of the building and another as shown on the architects drawing.

5.4 Expansion Joints

Use expansion couplings at position where the trunking crosses building expansion joints

Ensure expansion couplings are factory made by the trunking manufacturer.

5.5 Fixings

Securely fix the trunking to the structure and/or to supports at intervals not exceeding 2500mm by means of fixings as specified for the surface mounted conduits. Ensure trunking and trunking fixings are capable of supporting the weight of the trunking, wiring and components and of supporting any superimposed loads applied during servicing the cabling or installing additional cables.

5.6 PVC Trunking

Ensure trunking is manufactured from high impact resistant PVC and where visible coloured white with a matching clip lid and the trunking route as shown drawing SO182 is to be of the heavy duty type.

Fix trunking at intervals not exceeding 1000mm. Where trunking is fixed direct to walls, soffits, etc., carry out this by means of sheradised wood screws with brass washers through the back of the trunking. Where trunking must be suspended, use purpose made PVC brackets.

PVC Mini trunking may be utilised for minor additions or alterations, where minimum making good is required.

Install all PVC trunking using manufacturers accessories, i.e. bends, tees, etc.

No short lengths of trunking lid shall be used in locations where two equal lengths could be used to achieve symmetry of installation.

SECTION B - GENERAL TECHNICAL REQUIREMENTS

6.0 CABLE TRAY

6.1 Installation - General

Use cable tray of the perforated type not less than 16 gauge mild steel hot dip galvanised finish.

Use cable tray of sufficient width to take the cables without crowding and allow for future additions to the proportion of 25% of present requirements. Double stacking of cables will not be accepted.

Securely bolt each length of tray to an adjacent length with sufficient overlap to prevent sagging and twisting.

Fix cable tray to purpose made galvanised steel brackets which in turn are fixed to the structure. Hot dip galvanised brackets after manufacture and after all holes have been drilled.

Ensure fixing brackets rigidly support the cable tray, and provide a clear space between the structure and/or obstructions and the back of the cable tray as detailed below:

Tray size	Minimum between structure or obstructions and back of cable tray.
Up to 75mm wide	25mm
Tray size	Minimum clearance between structure or obstructions and back of cable tray.
76mm to 150mm wide	50mm
151mm to 450mm wide	75mm
Larger than 450mm wide	100mm

Fix cable tray to the brackets by means of steel set studs and nuts, and fix brackets to the structure as follows:

Type of Construction	**Type of Fixing for Cable Tray**
Concrete, Brick or Building Blocks	Steel "Rawlbolts" or "Red Head" Fixings
Hollow building blocks or pot floors	Butterfly spring toggle bolts or gravity toggle bolts
Structural steelwork	Steel set screws and nuts
"UNISTRUT" or Similar Patent Channel Fixings	"UNISTRUT" or Patent Spring Loaded Nuts and Set Screws

The use of shot fired fixings will not be permitted.

For cable trays of 150mm and wider use the return flange type.

Fix all nuts and bolts through the trays with washers, suitable plated to prevent corrosion.

For cut or damaged galvanised cable tray, the relevant area is to be painted with two coats of zinc chromate paint.

7.0 CABLES

For intrinsically safe circuits please refer to the particular requirements contained within the relevant clauses on Section C.

7.1 PVC/SWA/PVC Multi-core Cables

For PVC Insulated single wire armoured and PVC Sheathed multi-core cables use copper conductors of 600-1000V grade, manufactured in accordance with BS 6346.

Use extruded type bedding for insulated conductors. Tape bedding will not be accepted.

Use cable sizes as indicated on the drawings. Do not use a conductor of less than 1.5mm^2 in cross sectional area.

7.2 PVC/SWA/PVC Cable Glands

Terminate PVC/SWA/PVC cables to equipment with mechanical type compression glands manufactured in accordance with BS 4121 of the moisture proof seal type.

For cables up to and including 35mm^2 cross section area, bond cable armouring to equipment by means of brass slip-on earthing tags and earth conductors sized as indicated on the drawings and/or as specified elsewhere within the tender documentation.

For cables with conductors larger than 35mm^2 cross section area, bond cable armouring to equipment by means of glands with integrally cast earth lugs and copper tape sized as specified elsewhere in this Specification.

Carry out all bonding at the time of making the joint.

Provide PVC shroud of the appropriate rating and colour for each gland.

7.3 Cross Linked Polyethylene Insulated Multicore Armoured Cables (XLPE)

Ensure cross linked polyethylene insulated multicore cables are manufactured in accordance with IEC Recommendation 502-1978 and with BS 5467 where applicable.

Use conductors of circular stranded copper complying with BS 6360 of 600/1000 Volt, or 8700/ 15000 Volt grade as, appropriate.

Use insulation of cross-linked polyethylene compound complying with BS 5468 and the over-sheath of an extruded layer of PVC complying with BS 6746 or XLPE.

Ensure all cables are steel wire armoured.

Make terminations are using only approved termination kits.

For PVC insulated PVC sheathed single core cables use copper conductors of 600/1000 Volt grade, manufactured in accordance BS 6346.

Ensure the core insulation of the respective cables is coloured to identified the phases, the neutral and earth conductors in accordance with IEE Regulations for the Electrical Equipment of Buildings.

Do not use cable conductors less than 1.5mm^2 cross sectional area.

7.5 Single Core Unarmoured Cables with Thermosetting Insulation

For single core cables with thermosetting Insulation use copper conductors complying with BS 6360 of 600/1000 Volt grade. Ensure the manufacturer is based on BS 5467 which refers only to armoured cables and to IEC Recommendations.

Use insulation of a cross-linked polyethylene compound complying with BS 5368 and the over-sheath of an extruded layer of black synthetic material suitable for the operating temperature of the cable. If PVC is used, ensure that it complies with BS 6746.

Ensure cables are suitable for operating at a maximum sustained conductor temperature of 90 Degrees Centigrade.

Use cable sizes as indicated on the drawings.

Run cables in trefoil formation throughout their length.

7.6 PVC Insulated Single Core Cables

For PVC insulated cables use copper stranded conductors of 450/750 Volt grade manufactured in accordance with BS 6004

Use cable sizes as indicated on the drawings. Do not use cable conductors less than 1.5mm^2 cross section area.

Ensure the colour identification of PVC insulated cables is coloured throughout in accordance with the appropriate Table of the Institution Engineers Wiring Regulations, where applicable.

In addition, ensure PVC insulated cables for ancillary services have distinctive colours in accordance with the IEE Regulations and all relevant British Standards, e.g. BS 5345

7.7 Two Core and Earth PVC Insulated and Sheathed Cables

Ensure these cables comply with BS 6004 of 600/1000 Volt grade.

Use cable sizes as indicated on the drawings. Do not use cable conductors of less than 1.5mm^2 cross section area.

Ensure cable cores are colour coded as detailed above.

7.8 Metallic Flexible Armoured Cable and Flexible Cord

For metallic flexible armoured cable use multi-core 600/1000 Volt grade complying with BS 6004 where applicable.

where applicable.

Use PVC sheathed cables with a galvanised steel spiral interlocking corrugated armouring applied over the PVC sheath.

Secure cables to equipment by means of armoured flexible cable gland with suitable armour clamps.

Provide earthing to cable armouring but ensure that this is not the sole means of providing earth continuity and that the earthing provided by the armouring is supplemented by an earth conductor in the multi-core cable.

7.9 Flexible Cords for Flexible and Final Connections

Ensure all flexible cords used for final connections between fixed wiring and heating and cooking apparatus and for final connections to lighting fittings are silicone rubber insulated glass braided multi-core circular cable manufactured in accordance with BS 6007.

Where flexible cords are used for inspection lamps, and for final connections between fixed apparatus not subject to a temperature exceeding 55 degrees Centigrade use multi-core PVC insulated PVC sheathed cables manufactured in accordance with BS 6500.

Do not use flexible cords less than 0.75mm^2 cross section area.

7.10 Mineral Insulated Cables (MICS)

Ensure mineral insulated cables, referred to hereafter as MICS cables, are to BS 6207 and are light or heavy duty as called for in the tender documentation.

Ensure all mineral insulated cables installed in internal locations have a PVC over-sheath.

Use light duty cables unless otherwise stated in instructions from equipment manufacturers, within this Specification, or on the drawings. Ensure cables serving 3 phase motor supplies are heavy duty unless specified otherwise.

7.11 Mineral Insulated Copper Sheathed Cables - Glands and Seals

Terminate mineral insulated copper sheathed cables in brass cable gland and seals of the same manufacture.

Use externally threaded glands for all terminations in hazardous areas.

Use cables seals, insulating sleeving, discs and sealing compound of the following types:

For a maximum operating temperature of up to 105 degrees Centigrade.

a) Use a seal comprising a brass screw - on pot, with integral earth tail where required, RXM compound sealant, a plastic stub cap and RZP PVC sleeving.

b) For larger (32 and 40mm) pot sizes, use a resin fabric disc and RZD headed PVC sleeving.

For maximum operating temperature of up to 150 degrees Centigrade.

a) Use seal comprising a brass screw - on pot, with integral earth tail where required, RMX compound sealant, a special plastic stub cap and RZPS silicone elastomer coated glass sleeving.

b) For larger (32 and 40 mm) pot sizes, RZHT headed PTFE sleeving and a glass fabric disc shall be used.

For a maximum operating temperature of up to 250 degrees Centigrade.

a) Use a seal comprising a brass screw - on pot, glazing flux RMG sealant, a ceramic cap and RZPT PTFE sleeving.

b) This sseal is only available in the 20mm size without an earth tail.

Increased Safety Seal (Up to 100 degrees Centigrade)

a) Use a seal comprising a brass screw-on pot, with integral earth tail where required, epoxy putty sealant, a plastic disk cap and RZHT PTFE sleeving.

b) This seal is suitable for type of protection 'e' in potentially explosive atmospheres.

Ensure cable glands and seals for PVC covered mineral insulated copper sheathed cables are as specified in the preceding paragraphs, but fitted with brass adaptors and impact resistant PVC shrouds.

Ensure cable junction boxes for low voltage systems comprise of a steel or impact resistant moulded plastic enclosure, providing a degree of protection compatible with IP 54 as a minimum complete with rail mounted type terminal blocks as specified in schedule of supplies.

7.12 General Installation of Cables

Cable routes are indicated on the drawings for tender purposes, agree the exact final routing with the Supervising Officer before commencing installation.

Include for the supply and installation of all cable supports, steel racking and tray, and making all necessary cable joints and connections. Install and test cables in strict accordance with the appropriate clauses of the IEE Regulations, BS 6480 and BS 6346, as applicable. No jointing of cables will be permitted.

Handle cables at all times with care and make every effort to avoid damage. Ensure unloading, rolling into position and mounting off cable drums are carried out efficiently and carefully in the recognised manner. Pull cable from the top of the drum and avoid twisting at all times.

Installation of PVC Insulated or sheathed cables is not permitted when the temperature is at or below 0^{o} Centigrade.

Use adequate numbers of drum jacks, rollers and other handling accessories. Do not drag cables over concrete or other surface and ensure cables are adequately supported on rollers or manhandled into position.

Take particular care to avoid damage to other services which may run adjacent to or across the route of the cable installed.

Install cables with a minimum of 300mm clearance from any equipment or pipework including lagging associated with other services. Where this condition is unavoidable, or difficult to maintain, inform the Supervising Officer prior to the installation being commenced, otherwise be responsible if called upon to divert or adjust the route of any cable so affected.

Install waterproof, oilproof and flameproof transit cable seals in the floor trenches and walls of the HV and LV switch rooms, transformer bays and/or elsewhere in the positions as shown on the drawings.

Tightly wrapped cables passing through structural floors with fireproof tape and grout in with a hardwood filling shaped to suit the cables passing through.

Where multiply cables are installed on the underside of structural slabs, along walls and up rising ducts, fix to cable racking formed from continuous sections of galvanised rolled steel channels utilising galvanised steel brackets fixed to the building structure. Secure cables to the cable racking by means of metal cable cleats. Single runs of cables maybe fastened with cleats directly to the building surface.

Where cables are run vertically and are not enclosed exclusively in an electrical rising duct, use heavy gauge sheet metal guards fixed to the wall and /or racking to a maximum height of 1.5 metres above floor level.

Secure cables installed in trenches by metal cable cleats, to cable racking formed from continuous section galvanised rolled steel channels.

Submit detailed drawings for the cable racking and cable guards for the Supervising Officers approval.

7.13 Cable Supports

Support PVC insulated PVC sheathed cables, PVC insulated armoured cables and XLPE armoured PVC sheathed cables in all locations except in pipe type ducts, by cleats spaced in accordance with the IEE Wiring Regulations or the cable manufacturers recommendations as appropriate for the type and size of the cable to be supported.

Where two or more cables follow a common route, fix the cleat to galvanised rolled steel channels of continuous section. Fix the channels to galvanised steel brackets and ensure that these in turn are fixed to the structure as follows:

Type of Construction	**Type of Fixing to be Provided**
Concrete, brick and block-work	Sheridadised steel masonry fixings
Structural Steelwork	Sheradised steel set studs and nuts
Cast in-situ rolled steel channel concrete inserts	The channel manufacturers sheradised steel spring loaded nuts and set studs

Support single cables by cleats fixed direct to the structure using fixings as specified for the rolled steel channel.

The use of shot fired fixings will not be permitted.

Use aluminium alloy cable cleats selected such that they can be tightened down without exerting undue pressure or strain on the cables.

Use cable cleats for fixing steel channels of the interlocking pattern type.

In the case of vertical cables use cleats designed and of sufficient number to grip the cable firmly to prevent creeping. Do not install cable without fixings and all cable cleats and racks are to be approved by the Supervising Officer prior to installation. Where cable routes are subject to numerous changes in level and direction, use additional cable hangers provided to satisfactorily negotiate all such obstructions.

Under no circumstance fix copper sheet cables to galvanised cable trays, galvanised or sheradised steel brackets or galvanised structural steelwork.

Where cables are installed vertically provide protection to a height of 1500mm above floor level by means of a heavy gauge galvanised sheet steel guards fixed to the structure such that there is a minimum clearance of 20mm between the cables/cable fixing and the guard.

7.14 Low Voltage Cable Junction Boxes

For intrinsically safe circuits please refer to the particular requirements contained within the relevant clauses of section C.

Ensure cable junction boxes for low voltage systems comprise of a steel or impact resistant moulded plastic enclosure, providing a degree of protection compatible with IP 54 as a minimum complete with rail mounted type terminal blocks as specified in the schedule of supplies.

Use rail mounted terminal blocks moulded from high grade non-hygroscopic melamine, having all live parts fully shrouded and complying with BS 3042.

Use terminals with clamp type connectors and of adequate current rating and suitable for the size and type of cables used both on the incoming and outgoing side. Ensure all current carrying parts are constructed from brass or copper and be tin or lead electroplated.

Assemble terminals in banks, each complete with marking tags to fit into moulded tag slots.

Ensure each terminal assembly is steel hot dipped zinc coated after manufacture.

7.15 Installation of Mineral Insulated Cables (MICS)

Treat and seal the ends of the cables with the correct accessories supplied by the cable manufacturer and fitted by workman trained and skilled in the use of such accessories. Do not seal lengths of cable until an insulation resistance test has been carried out and an infinity reading obtained.

Fix cables by means of PVC coated saddles with brass screws. Ensure fixing is in accordance with IEE Regulations.

Fit all MICS cables with PVC shrouds over the glands. Where cables are not terminated at a fixed gland plate, fit "earth pot" terminations with an "earth tag" to ensure good earth continuity between the sheath of the MICS cable and the apparatus served by the cable. Do not use clamps around the copper sheath of the cable for earthing purposes.

Form tails for the cores of the cable through the seal to the terminals of the connected apparatus and fit with the correct size and grade of insulating sleeving, coloured to denote the polarity of the core, or comply with the IEE Regulations.

In general, ensure terminations and sleeving are to 150 degrees C temperature grade. For connections to equipment subject to high temperatures, use appropriate temperature grade terminations.

Protect MICS cables from the effects of vibration. Where cables are connected to motors, machines or any equipment to movement, or vibration, provide one complete unsecured loop in the cable.

Ensure the minimum radius of bends in cables is in accordance with Table 52C of the IEE Regulations.

Fit surge suppressors to all circuits feeding discharge lighting and elsewhere, where recommended by the manufacturer.

7.16 Fixings for Mineral Insulated Copper Sheathed Cable

Fix mineral insulated copper sheathed cables by means of copper saddles. Install the fixings 75mm either side of a fitting, accessory or right angled bend and subsequently spaced as follows:

Overall Diameter of Cable	Max Spacing of Saddles Horizontal	Vertical
Not exceeding 9mm	300mm	400mm
Exceeding 9mm and not exceeding 15mm	450mm	600mm
Exceeding 15mm not exceeding 20mm	800mm	900mm

Where mineral insulated copper sheathed cables are fixed direct to the structure, ensure the fixings are as follows:-

Type of Construction	Type of Cable	Type of Fixing
Concrete, brick, building blocks	PVC over-sheathed PVC	covered copper saddles nylon "Rawlplugs" and brass screws
Hollow building	PVC over-sheathed PVC	covered copper saddles "Rawlnuts" or "rawlanchors" and brass set screws
Structural Steelwork	PVC over-sheathed PVC	covered copper saddles and brass set, screws and nuts

Where mineral insulated copper sheathed cables are fixed to cable trays make fixings by means of PVC covered copper saddles and brass set screws.

Install multiple runs of cables, compromising of four or more single core or multi-core cables, on cable tray. Fix cables to the cable tray in groups comprising of not more than eight cables. Do not stack cables with a PVC over-sheath. Fix single core cables comprising a circuit of two, three or four cables as a group.

Where cables are installed vertically provide protection to a height of 1500mm above floor level by means of a heavy gauge galvanised sheet steel guards fixed to the structure. Such that there is a minimum clearance of 20mm between the cables/cable fixings and the guards.

7.17 Cables and Connections to Apparatus

For connection of mineral insulated copper sheathed cables of 6mm^2 cross section and larger to apparatus use cone grip type cable lugs.

Where this is not practicable, advise the Supervising Officer in writing and obtain his decision regarding the type of connection to be provided.

Take MICS cables used for connecting motors direct to the motor connecting box and include for an adequate vibration loop. In the case of machines driven by V-belts, provide sufficient cable to allow for belt adjustment. Leave a sufficient length of conductor at either the starter or motor terminal box, to permit "Tong-Test" ammeter readings to be taken.

Terminate single core MICS cables on equipment manufactured from ferrous metal in the following manner:

1) Cut a hole in the equipment of sufficient size to allow a clearance of not less than 25mm between any cable gland and the ferrous metal of the equipment at the point of entry.

2) Ensure cables are glanded to a brass glanding plate not less than 2mm thick, using standard MICS cable glands and brass nuts. Split the glanding plate on the centre line of the cable gland holes and fix to the equipment by means of brass set studs and nuts.

3) In situations where direct termination to the brass glanding plate does not provide sufficient clearance between live conductors or other obstructions and the cable pots, provide a spreader box in addition to the brass glanding plate.

Under any circumstances do not terminate single core MICS cables direct onto equipment manufactured from ferrous metal, or terminate via sockets or flanged couplings manufactured from ferrous metal.

Where non-ferrous glanding plates cannot be provided on equipment or apparatus, advise the Supervising Officer in writing and obtain his decision regarding the method of terminating the cables.

7.18 Installation of Two Core and Earth PVC Insulated and Sheathed Cables

Install cables throughout in an orderly manner on cable tray and clipped securely in all locations except where the cables are enclosed in conduit or trunking.

Provide cable supports at regular intervals not exceeding the spacing's as set in the current edition of the IEE Regulations.

Cables may be installed in voids within partitioning or behind wall cladding. Arrange runs in an orderly manner with cables installed vertically from accessory boxes into ceiling voids.

Unless otherwise unavoidable, do not turn PVC insulated and sheathed cables for any significant length under thermal insulation or within wall cavities filled with insulation. Where cables are run in such locations, ensure the cable rating, after allowing for all other de-rating factors, is further de-rated by a factor of 0.5.

Where PVC insulated and sheathed cables used for lighting circuits are required to drop in, or on, brick or plaster walls ensure they are enclosed in PVC conduit, install from the switch box to the ceiling void.

Do not run cables in close proximity to heating or hot water pipes and under any circumstances do not connect such cables direct to heating equipment, lamp-holders and tungsten luminaires.

7.19 PVC Cable Connections to Apparatus

For connections to apparatus with PVC insulated armoured and non-armoured cables with copper or aluminium conductors of 10mm^2 cross section and larger, use a system of compression jointing to BS 4579.

7.20 Core Identification Sleeves of PVC insulated and MICS Cables

Provide cable core identification sleeves at points of connection for cables used in control wiring and all multi-core cables having more than four cores unless stated elsewhere in the tender documents.

Install cable identification sleeves in accordance with the terminal identification of all apparatus and/or wiring diagrams. Ensure that the lettering and/or numerology used in identifying the conductor is incorporated on all wiring diagrams forming part of the record documentation.

7.21 Main Cable Identification Labels

Attach identification labels to all XPLE insulated cables, PVC insulated PVC sheathed cables, PVC insulated armoured cables, MICS cables and multi-core control cables installed within the building.

Attach the labels to cables at intervals not exceeding 12 metres, at all cable trench entry and exit positions, either side of cable transit frames and all cable terminations.

Use machine engraved discs from non-deteriorating black laminated plastic or similar materials displaying white engraving indicating the design voltage, the designation of load, and the number and cross sectional area of the cores and the cable identification reference.

Ensure that the characters are not less than 3mm high and are clearly legible.

7.22 Sealing of Cable Ducts

Seal all cable ducts including spare-ways and where entering the building with Hilti Foam, plastic compound or other approved sealing substance to the satisfaction of the Supervising Officer. Ensure that the minimal amount of sealing agent is used to enable easy removal of the compound to facilitate the installation of further cables if required in the future.

SECTION B - GENERAL TECHNICAL REQUIREMENTS

7.23 Wiring in Trunking and Conduit Systems

Carry out the wiring in trunking and conduit systems for lighting and power installations in PVC insulated single core cables. Use cable colours in accordance with the Regulations and a minimum conductor size of 1.5mm2 for lighting and control sub-circuits, and a 2.5mm2 for power **unless otherwise stated.**

Install wiring in such a way that any looping of connections made from the accessible terminal of accessories and apparatus. Ensure wiring enters and leaves fluorescent luminaires by the same conduit box. Cable joints will not be acceptable except where specifically called for on the drawings or in this specification. Make cable joints by means of approved terminal blocks as detailed in the schedule of suppliers.

Ensure the installation of cables feeding different services complies strictly with Part 2 and section 525 of the IEE Regulations. Do not run cables connected to emergency or independent sources in the same conduit as other services. Do not run telemetry, telephone and control cables in the same conduit or trunking as any other services.

8.0 Cartridge Fuses

Use fuses of the 500V cartridge type complying with BS 88, parts 1 and 2.

Ensure the rated braking capacity of the cartridge fuse at the system voltage is 80KA.

Ensure general purpose fuse links have a fusing factor Class Q1 unless specifically noted otherwise on the drawings.

Fuses and fuse carriers will be of different sizes for the respective ratings of distribution boards. Ensure that these are not interchangeable (i.e. cartridge fuses for boards rated at 30 amps shall not be interchangeable with those of the 15 ampere boards). Ensure all fuse fittings are in accordance with BS 88, Part 2. Provide one neutral terminal for each single pole fuse way.

Where motor circuit fuses are used, ensure these are of the dual current rated type. Where the lower rating signifies the continuous current rating of the fuse link and the higher rating signifies the current rating of the fuse link with respect to its time/current characteristic which lies within the time/current zone associated with the higher current rating.

Ensure the dimensions and current ratings of all fuse holders and fuse bases are in accordance with Table 2 of BS 88, Part 1. Ensure the dimensions of fuse links for bolted connections also comply with this Table.

Ensure each fuse is complete with an indicating device to indicate when the fuse has operated.

The normal current ratings of fuse links for all main, and sub-main and final sub-circuits are as shown on the drawings.

Use all fuses of the same manufacturer throughout.

SECTION B - GENERAL TECHNICAL REQUIREMENTS

9.0 INDIVIDUALLY MOUNTED LV EQUIPMENT

9.1 LV Isolating Switches

Use all individually mounted LV isolating switches of the air break type complying with BS 5419 having an uninterrupted rated duty, a utilisation category AC 23, a mechanical endurance not less than the values stated in the British Standard and an electrical endurance of not less than one-twentieth of the number of no load operating cycles corresponding to the mechanical endurance.

Use metal clad isolating switches providing a degree of protection compatible with IP 31 where they are installed inside buildings, excepted as stated elsewhere in the tender documentation or on the drawings, and IP 55 as a maximum where they are installed outside buildings and in plantrooms.

Ensure isolating switches controlling motor circuits are duty rated, or in excess of, the kilowatt rating of the motor controlled.

9.2 Miniature Circuit Breaker Distribution Boards

Use SPN or TPN distribution boards as called for on the drawings suitable for accepting single, double or triple pole circuit breakers.

Ensure boards comply with BS 5486 parts 12 or 13 and have a conditional short circuit rating of not less than 15KA.

Ensure the neutral bar has the same number of ways as there are spaces for single pole MCBs.

Boards to be equiped with a double or triple pole isolating switch to BS 5419 Part 1, capable of short circuit withstand current of 9KA.

Use boards rated at 100A or 200A as required.

Fit blanks to all spare ways.

9.3 Miniature Circuit Breakers

Use miniature circuit breakers (MCBs) that comply with BS 3871 Part 1/ BSEN 60898. Ensure the short circuit rating is not less than M9 for both single and triple pole types.

Ensure the dolly is up for ON and is trip free.

Use circuit breakers of Type B, C or D, as appropriate and in accordance with BS 3871 Part 1/ BSEN60898.

9.4 13 Ampere Switch Socket Outlets

Use all 13 ampere switch socket outlets of the shuttered pattern type manufactured to BS 1363.

Use outlets comprising a 15 ampere micro gap switch controlling a 13 ampere shuttered socket outlet. Ensure the finish and thickness of the front plate is similar to that of the lighting switches.

For flush installations use a cover plate of the overlapping type.

Contain the assemblies in sheet steel boxes.

Where surface pattern accessories are required in Plant Rooms, Switch Rooms etc., use metal front-plates.

Provide neon indicators with moulded red lens where indicated.

Submit a sample of each accessory to the Supervising Officer for approval on request.

9.5 Switched Fused Connection Units (Spur Outlets)

Use switched fused spur points comprising of 13 ampere double pole switch controlling a single fuse spur unit.

Fit the fuse unit with a white bakelite cover and with a fuse link manufactured to BS 1362.

Contain the assembly in a malleable iron or sheet steel box and provide with a front plate to match that of the lighting switches.

Where required to be fitted with pilot light, ensure the units are as described above, incorporating a neon indicator lamp fitted behind a moulded red lens.

9.6 Flex outlet Plates

Ensure flex outlet plates used for connection to equipment are complete with three pairs of terminals and a cord grip contained in a sheet steel box with a cover plate to match other cover plates.

9.7 15 to 30 AMP Double Pole Switches

Ensure switches are individually rated as called for on drawings, comply with BS 3676 and have metal rocker bars to match the cover plate.

Mount each switch on an adjustable steel grid enclosed in a pressed steel box finished with an electrolytic zinc plate.

Use switches complete with a neon indicator behind a moulded plastic "Red" lens. Which illuminates when the switch is in the 'ON' position.

Use cover plates which match plates of other accessories.

9.8 Contactors

Use low voltage a.c. contactors which comply with BS 5424, Part 1 of the air break type having an uninterrupted rated duty, an electrical endurance of not less than 50,000 operating cycles, and a rated operational current as shown on the drawings.

Use contactors that have a utilisation category AC3 where controlling fluorescent or discharge lighting, and AC3 or 4 where controlling all other inductive loads. Where stepping, inching or reversing motor applications are concerned use AC4 units.

Use contactors that are electro-magnetically operated, with contactor coils suitable for a 240V a.c. supply, unless otherwise stated within the tender documentation.

Protect the contactor coil circuit by means of a cartridge fuse or by a separate MCB at the local distribution board.

Use contactors of the single, double, triple pole type with neutral link, or four pole, as indicated on the drawings, with normally open main contacts and at least one set of normally open and normally closed auxiliary contacts suitable for 240V a.c. circuits.

Fix individually mounted contactors with in-built isolating switches having rated duty, a load rating and utilisation category compatible with the respective contactor.

House individually mounted contactors and their associated control operating components in pressed steel or impact resistant moulded plastic enclosures.

Ensure that enclosures for contactors installed inside the Building provide a minimum degree of protection compatible with IP 31 and enclosures in plantrooms and for use externally provide a minimum degree of protection compatible with IP55.

9.9 Emergency Stop Push Buttons

Use emergency stop push buttons of the mushroom actuator type, coloured red and complying with BS 4794 with a latching action released by turning.

Use units that are suitable for surface mounting, or flush mounting with overlapping plate to match other accessories.

SECTION B - GENERAL TECHNICAL REQUIREMENTS

10.0 LIGHTING INSTALLATION

10.1 Luminaires - General

The luminaires are as shown on the drawings. Ensure that these comply with BS 4533 and that luminaire components comply with BS 2818, BS 4017 and BS 4782 as applicable.

Use luminaires as detailed in the Schedule of Luminaires and provide complete with lamps.

Provide all fluorescent luminaires complete with the necessary low cost control gear, including power factor correction and radio interference capacitors. Provide fluorescent units with individual cartridge fuses to BS 1362 and a three-way terminal block.

Ensure all fluorescent luminaires have a power factor of not less than 0.85 lagging and the control gear is non-current consuming in the event of a fluorescent failure.

Where luminaries are tube suspended, support by means of ball and socket fittings. Provide earthing of the luminaries by separate earth wire and not by use of the non-rigid support.

For luminaries used externally or in damp situations, ensure these are weather proofed to IP 55 and for fittings used in corrosive atmospheres, ensure these are protected by or manufactured from a corrosion-resistant material.

10.2 Emergency Lighting

Supply and install as necessary and where called upon, a system of emergency stand-by lighting. This installation can be clearly divided into 2 parts;

1) Residential (occupied areas)

2) Maintenance (un-occupied areas)

For item 1) A 1 hour self contained, non-maintained emergency luminaire is appropriate.

For item 2) A 3 hour self contained, maintained emergency luminaire is appropriate.

Each of the 2 areas must be controlled via a key-switch arrangement (operating with discretion), local to each emergency luminaire circuit . This key-switch will be used for test purposes and shall be marked such, with an engraved plate.

The emergency lighting systems must operate when at any point, if a local lighting circuit is interrupted, the stand-by system must operate immediately, illuminating the interrupted area.

All design and installations shall be in accordance with BS. 5266, and shall be passed with any local authority for approval before installation.

The emergency lighting system shall:

a) Indicate clearly and un-ambiguously the escape routes, generally by the use of illuminated pictorial exit signs.

b) To provide illumination along the escape routes in safety using luminaires spaced at appropriate distances according to BS. 5266, and to illuminate fire alarm call points and fire fighting equipment.

c) To permit safe occupation of the building - where the provision of standby lighting is required.

d) To prevent injury to persons or threats to property - where the provision of security lighting is required.

10.3 Lamps

Supply lamps of the type and power as Section C

10.4 Lighting Switches - Metal Rocker Bar Adjustable Grid Type

Use switches rated at 15/20 amperes, complying with BS 3676 with metal rocker bars finished to match the lighting switch plates.

Mount switches on adjustable steel grids enclosed in cast iron or pressed steel boxes having the same finish as the conduit used for the particular installation.

For flush installations use switch cover plates having radius corners and edges of the overlapping type.

Provide an earthing terminal in each switch box.

Select enclosures to suit the environment in which the switches are sited.

10.5 Time Switches

Use time switches of the electronic type incorporating a 100 hour continuously charged Nickel cadium battery reserve.

Use switches rated at not less than 20A resistive.

Use indicator dials of a circular analogue 24 hour type, incorporating an auxiliary digital display of time, date, month and am/pm where called for elsewhere in the tender documentation.

Where necessary use time switches of the 7 day programmable type with not less than 4 ON/OFF periods per day.

Provide an override button.

Use time switches of the single or multi-channel type as required.

Unless otherwise specified incorporate independent drive and switching circuits.

Where a solar dial unit is required, ensure this is equipped with an automatic daylight saving change over device to suit the geographical location in which the switch is installed.

Use all time switches suitable for a 240V, 50Hz operation in ambient temperature ranges of 10 degrees C to +50 degrees C.

Mount switches in a dust proof enclosure.

SECTION B - GENERAL TECHNICAL REQUIREMENTS

11.0 EARTHING

11.1 General

Earth and bond all non-current carrying metalwork of electrical equipment and the complete installation effectively in accordance with this specification, the IEE Regulations and British Standard Code of Practise CP 1013.

11.2 Earthing Cables

Install earthing cables between the main earth bar and main switchboards, control panels and incoming services. Use cables of high conductivity standard copper conductors with green/yellow PVC insulation. Run earthing cables in ducts and trenches and on cable tray or racking as described elsewhere for single core power cables. Single cable runs may be clipped direct.

11.3 Earthing Armoured Cables

Bond cable armouring and the cable glands of all armoured cables to the main earthing bar and/or the earthing terminal of the equipment served by means of PVC insulated copper earthing cables complying with BS 6004.

Size the earthing/bond tapes and earthing cables used for connections between the cable armouring/cable glands and the equipment in accordance with IEE Regulations as follows:-

Cable Size and Type	**Size of Earthing/Bonding Tape or Cable**
Multi-core PVC/SWA/PVC Cables up to 2.5mm^2 cross section.	PVC insulated copper earthing cable sized as the multi-core cable conductors.
PVC/SWA/PVC cables with conductors larger than 2.5mm^2 up to 6mm^2 cross section.	4mm^2 PVC insulated copper earthing cable.
PVC/SWA/PVC cables with conductors larger than 6mm^2 up to 10mm^2 cross section.	6mm^2 insulated copper earthing cable.
PVC/SWA/PVC cables with conductors larger than 16mm^2 up to 50mm^2 cross section.	Minimum 16mm^2 PVC insulated copper earthing cable or 20mm x 2mm copper tape.
All PVC/SWA/PVC cables with conductors cross section.	20mm x 3mm copper tape.

11.4 Earthing/Bonding Metal Pipes

Provide earthing bonds between the following service pipes/structural steelwork and the main earthing terminals of equipment:-

1) between the main earth bar and the incoming water main.

2) between the main earth bar and the incoming gas main.

Ensure earthing/bonding connections to metal pipes and ductwork comply with the IEE Wiring Regulations.

11.5 Earthing Conductors in Trunking Systems

Install separate earthing conductors through all trunking systems and conduit systems.

Bond conductors at all outlet boxes etc.

11.6 Labelling

Fit labels reading "Safety Electrical Earth Do Not Remove" to all earthing and bonding connections. Use earthing/bonding labels of non-ferrous metal which are permanently legible.

SECTION C

PARTICULAR TECHNICAL REQUIREMENTS

SECTION C - PARTICULAR REQUIREMENTS

For the electrical refurbishment to 85 Centre Point House,
15a, St Giles Street, London WC2

Works comprising,

1) Rationalisation of Electrical supplies to 36 no Flats.

2) Renewal/Modification of UKPN/EDF service cabling and cutouts where necessary.

3) Replacement of Distribution Equipment

4) Renewal of Sub-Main cabling to 36 no Domestic Flats

5) Temporary Lighting

6) Lighting Upgrade to Corridors and Stairs

7) Upgrade to Small Power in Corridors.

8) Relocation of Consumer Metering Equipment.

9) Works to Existing Smoke Detectors in Corridors.

10) Approvals.

11) Building works clients regulations.

SECTION C - PARTICULAR REQUIREMENTS

1.0 Rationalisation of Flats and Associated Supply locations.

1.1 All electrical installations to be read in conjunction with Appendix A of this document.

1.2 All design and installation must take into account location of distribution equipment and the conformity of feeding the appropriate consumers from the correct distribution location.

1.3 Contractor to liaise with estate management with respect to notification to consumers of any changes or alterations to the electrical supply, cabling or shut-down times.

2.0 Renewal/Modification of UKPN/EDF service cabling and cutouts.

2.1 Contractor to liaise with UKPN/EDF to determine if any modifications to either supply cabling or service cutouts are needed as part of planned maintenance or system up-grades, prior to any works commencing.

2.2 Contractor to liaise with UKPN/EDF to determine metering requirements for any up-grade to Distribution equipment.

2.3 Contractor to include in his costs, any further costs which may become apparent from any supply authority for any of the above works.

2.4 Contractor to gain written consent to modify any part of the distribution system up to and including consumer metering stage.

3.0 Renewal of Distribution Equipment

3.1 Contractor to determine exact quantities, specifications and positions for all distribution equipment for sub-main Distribution of power to domestic flat consumers

3.2 Contractor to include for the removal and making safe of all existing and redundant distribution equipment relating to this refurbishment.

SECTION C - PARTICULAR REQUIREMENTS

3.3 To include the provision for;

a) **New Main Switchgear in Basement Switchroom.**

(Drawings ref SB/CPH/1&8)

The existing supplies to residential flats, comprises of 3no 315a Fused switches fed directly from individual UKPN service heads.

From these cut outs MICC cables run within the faric of the building to serve distribution boards supplying 36 flats on the 3rd,5th and 7th floors.

It is proposed to utilise these existing service heads to supply three new Ryefield Distribution boards located on staircases adjacent to these floors.

From these Distribution boards XLPE/SWA/LSE cables will be run to flats via a new false ceiling

i) Allow to replace the existing Fused Switches (3no) which currently serve the Residential block with 315amp TP& N Fused Switch units as Eaton/MEM ref 403GNC.

ii) Install Surge Protection Devices to the above as Ryefield ref SPD-TPN 1/2TNF

.

iii) From the above Fused Switch units connect to New Ryefield Distribution Boards using 120mm^2 XLPESWA/LSE cable.

iv) Contractor to include for the removal of all existing and redundant cabling, conduits and switchgear.

3.3 (cont)

b) **New Sub-main Fuseboard ref DB/SM/A located on 3rd floor**

(Drawing ref SB/CPH/2)

i) 1 no 15w Way TP&N metal clad distribution board rated at 25kA with ingress protection to at least IP30,complete with 100amp single pole cartridge fuse as 'Ryefield Engineering Company Ltd' ref TP15 AHS 100. Distribution Board to be fitted with L&F type ZA locks.

ii) Install Surge Protection Device to Distribution Board as Ryefield ref SPD-TPN/2F

iii) Supply and fix Electrical Shock Resuscitation and Electricity Regulations Charts.

iv) Supply and fit fuse charts for all circuits.

v) Label switchgear and circuits inside panels.

vi) Contractor to include for the removal of all existing and redundant cabling, conduits and switchgear.Also making good and decoration where necessary.

c) **New Sub-main Fuseboard ref DB/SM/B located on 5th floor**

(Drawing ref SB/CPH/E/3)

i) 1 no 15w Way TP&N metal clad distribution board rated at 25kA with ingress protection to at least IP30,complete with 100amp single pole cartridge fuse as 'Ryefield Engineering Company Ltd' ref TP15 AHS 100. Distribution Board to be fitted with L&F type ZA locks.

ii) Install Surge Protection Device to Distribution Board as Ryefield ref SPD-TPN/2F

iii) Supply and fix Electrical Shock Resuscitation and Electricity Regulations Charts.

iv) Supply and fit fuse charts for all circuits.

v) Label switchgear and circuits inside panels.

vi) Contractor to include for the removal of all existing and redundant cabling, conduits and switchgear.Also making good and decoration where necessary.

3.3 (cont)

d) **New Sub-main Fuseboard ref DB/SM/C located on 7th floor**

(Drawing ref SB/CPH/E/4)

i) 1 no 15w Way TP&N metal clad distribution board rated at 25kA with ingress protection to at least IP30,complete with 100amp single pole cartridge fuse as 'Ryefield Engineering Company Ltd' ref TP15 AHS 100. Distribution Board to be fitted with L&F type ZA locks.

ii) Install Surge Protection Device to Distribution Board as Ryefield ref SPD-TPN/2F

iii) Supply and fix Electrical Shock Resuscitation and Electricity Regulations Charts.

iv) Supply and fit fuse charts for all circuits.

v) Label switchgear and circuits inside panels.

vi) Contractor to include for the removal of all existing and redundant cabling, conduits and switchgear.Also making good and decoration where necessary.

e) **Upgrade to Existing Common Parts Distribution Boards**

i) Supply and Install 1 no 36way and 12way MCB Boards to replace the existing located on the 4th Floor adjacent to the Laundry Room as Merlin Gerin 'Prisma' range fitted with Integral 100 amp Main Isolator.

ii) Supply and Install 1 no 36way and 12way MCB Boards to replace the existing located on the 6th Floor adjacent to the Laundry Room as Merlin Gerin 'Prisma' range fitted with Integral 100 amp Main Isolator.

Distribution boards to be complete with MCB's and all necessary accessories. Supply & Install 30mA RCBO's for Existing socket outlet circuits.

iii) Allow to fit 30mA RCBO's' to circuit controlling New socket outlets.

vi) Supply and fix Electrical Shock Resuscitation, Electricity Regulations Charts and warning labels.

SECTION C - PARTICULAR REQUIREMENTS

4.0 Renewal of Sub-Main Cabling

4.1 Contractor to liaise with supply authority to determine approved types and specifications of all sub-main cabling.

4.2 Contractor to determine cable routes and obtain written approval from the landlords, submitting full route details with the aid of a tender stage drawing, prior to works taking place.

4.3 Contractor to include for the removal of all existing and redundant cabling,conduits and switchgear related to this refurbishment.Also making good and decoration where necessary

4.4

i) Contractor to include for efficient installation of sub main cabling to all flats as detailed in Appendix A .

ii) New sub-main cabling to sub-main boards to be run and fixed in accordance with section B of this specification.

The existing sub-main supplies to flats consists of old, cables run within the fabric of the building to existing consumer units in individual flats.

It is proposed to run PVC/SWA/PVC cables from the new distrbution boards to flats. (Drawings SB/CPH/E/1-4)

New sub-main cables to be run on steel cables trays in corridor false ceilings

The contractor is to allow to replace the existing 100amp isolators to each flat with 100amp units.

The contractor is to allow to install a House Service Cut Out before each flat meter. Units to be as Henley Ltd Series 6 ref 54361-01

Note:

The contractor is to agree the exact route of these cables with the consultant prior to installation.

SECTION C - PARTICULAR REQUIREMENTS

5.0 Temporary Electrical Supplies.

5.1 **Temporary Lighting.**

i) The contractor shall allow to provide temporary lighting to the staircase, corridors and main switchgear areas as necessary,for the duration of the works.

6.0 New Lighting to Corridors and Stairs

6.1 **3rd Floor Corridor and Stair Lighting** (Ref Drawing SB/CPH/E/5)

i) Supply and install 15 no LED wall mounted light fittings as Tamlite 'Elegance' Cat No EL17/LED/ 2LNW/M3/HFSD/HFSD/WW complete with3hr integral emergency battery pack. Allow to wire in 1.5mm^2 FP200 cables including a separate CPC, within the new false ceiling and flush within walls as necessary .

ii) Supply and install 15 no LED ceiling mounted light fittings as Tamlite 'Elegance' Cat No EL17/LED/ 2LNW/M3/HFSD/HFSD/WW complete with3hr integral emergency battery pack. Allow to wire in 1.5mm^2 FP200 cables run surface .

The above light fittings have individual Microwave movement detectors and Automatic timed dimming facility.

iii) Circuits to be fed from 10amp RCBO units in Upgraded Common Parts Distribution Boards on 4th and 6th floors.

vi) Lighting circuits to be provided with a test switch facility adjacent to local DB.

v) Fit heat resistant sleeving over final cable sections to fittings.

SECTION C - PARTICULAR REQUIREMENTS

6.0 New Lighting to Corridors and Stairs (cont)

6.2 **5th Floor Corridor and Stair Lighting** (Ref Drawing SB/CPH/E/6)

i) Supply and install 15 no LED wall mounted light fittings as Tamlite 'Elegance' Cat No EL17/LED/ 2LNW/M3/HFSD/HFSD/WW complete with3hr integral emergency battery pack. Allow to wire in 1.5mm^2 FP200 cables including a separate CPC, within the new false ceiling and flush within walls as necessary .

ii) Supply and install 9 no LED ceiling mounted light fittings as Tamlite 'Elegance' Cat No EL17/LED/ 2LNW/M3/HFSD/HFSD/WW complete with3hr integral emergency battery pack. Allow to wire in 1.5mm^2 FP200 cables run surface .

The above light fittings have individual Microwave movement detectors and Automatic timed dimming facility.

iii) Circuits to be fed from 10amp RCBO units in Upgraded Common Parts Distribution Boards on 4th and 6th floors.

vi) Lighting circuits to be provided with a test switch facility adjacent to local DB.

v) Fit heat resistant sleeving over final cable sections to fittings

6.3 **7th Floor Corridor and Stair Lighting** (Ref Drawing SB/CPH/E/7)

i) Supply and install 15 no LED wall mounted light fittings as Tamlite 'Elegance' Cat No EL17/LED/ 2LNW/M3/HFSD/HFSD/WW complete with3hr integral emergency battery pack. Allow to wire in 1.5mm^2 FP200 cables including a separate CPC, within the new false ceiling and flush within walls as necessary .

ii) Supply and install 13 no LED ceiling mounted light fittings as Tamlite 'Elegance' Cat No EL17/LED/ 2LNW/M3/HFSD/HFSD/WW complete with3hr integral emergency battery pack. Allow to wire in 1.5mm^2 FP200 cables run surface .

The above light fittings have individual Microwave movement detectors and Automatic timed dimming facility.

iii) Circuits to be fed from 10amp RCBO units in Upgraded Common Parts Distribution Boards on 4th and 6th floors.

vi) Lighting circuits to be provided with a test switch facility adjacent to local DB.

v) Fit heat resistant sleeving over final cable sections to fitti

Note:

Light fitting mounting Heights and final locations to be agreed with the Project Management.

SECTION C - PARTICULAR REQUIREMENTS

7.0 Upgrade to Small Power in Corridors

7.1 i) Supply and install 9 no single gang switched socket outlets in corridors.(Ref Drgs SB/CPH/E/5-7)

Socket outlets to be as Hamilton ltd 'Hartland' Range Satin Chrome finish installed flush located adjacent to Flat Meter cupboard.

ii) Feed new ring main or radial circuits from 32amp MCB with 30mA RCD in Upgraded Common Parts Distribution Boards on 4th and 6th floors.

Allow to wire these circuits using 2.5mm^2 FP200 PVCPVC cables run flush within the fabric of the building.(Cables to be protected by suitable metal capping and 30mA RCD's.)

8.0 Re-location of Consumer Metering Equipment.

7.1 Contractor to liase and obtain written consent to modify any electrical works from consumers and supply authority.

7.2 All sub main links from any new external metering position shall be conducted in such a manner to be mechanically and electrically protected, to 18th edition IEE Wiring Regulations, and to be aesthetically pleasing to the consumer.

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9.0 Works to Existing Smoke Detectors in Corridors

Note :

There are currently Smoke Detectors mounted on the existing ceiling.

These detectors will need to be removed to allow the new false ceiling to be installed and then re-instated in the same locations on the new ceiling.

The Contractor is to allow a PC sum for these works

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SECTION C- PARTICULAR REQUIREMENTS

10.0 Approvals

8.1 All works shall be tendered for in such a manner as to take account of all specification conformities set out in this document.

9.2 All design and approvals shall be copied to the supervising officer and to the management agents for approval, prior to any works taking place.

9.3 The contractor must note, the tender document produced shall, by means of production and receipt by the management agents, act as full adherence to this specification and constitute acceptance of the conditions of works to be undertaken, as set out in this specification

11.0 Building Works - Clients Regulations

Hours of Work

Week days	-	8.30am to 5.30pm
Saturdays	-	8.30am to 12 noon
Sundays & Bank Holidays	-	No Working.

Any work involving the structure and/or which is noisy should be limited to hours of 10.30am to 4.30pm on week days only with breaks of at least 30min after each two hours work.

NB: Contractors must be off site by 5.30pm on weekdays and 12 noon on Saturdays.

Liasion
Contractors shall liaise with the head porter regarding all works.

Security
The contractors shall take all measures to safeguard as far as possible the security of the building and to prevent access to the building of unauthorised persons both during and after working hours,

Access
There is no vehicular access or parking in Centre Point House
Contractors must use the Basement entrance for labour, plant and materials
Workmen must sign in and out with the hall porter every day.

Storage
Contractor to agree storage arrangements with the building manager.