GENERAL SPECIFICATION

1.01 General

The electrical installation shall be to a good standard suitable for a public building or as otherwise stated in the Specification or shown on the Drawings and all installation work and testing shall be undertaken by an NICEIC registered or equally approved Contractor.

1.02 Definitions

The following definitions apply for the Electrical Works:

'Engineer' shall refer to the Electrical Designer or persons authorised by the Electrical Designer or Client.

'Plant' shall mean cables, luminaires, switchgear, apparatus, materials, articles and things of all kinds incorporated in the Works.

'Works' shall mean all Plant to be provided and work to be done by the Contractor.

'Specification' shall mean this General Specification, together with the Particular Specification and the Tender Drawings and, subject to the Engineer's approval, the completed schedules as annexed hereto.

The term 'provide' and its derivatives shall mean the design procurement, delivery, installation, testing and commissioning of the Works, inclusive of such ancillary services as inspection and witnessed testing at the places of manufacture, workshop and site painting, handling on site, site trials, and of all such other services as are noted in the Specification or reasonably necessary for the safe, reliable and efficient completion of the Works.

1.03 General Design

All component parts shall be manufactured to a strict system of limits and complete interchangeability of similar parts shall be achieved. Uniformity and interchangeability as regards components and accessories which are common to different parts of the Works shall also be achieved as far as practicable.

Except as otherwise prescribed or approved, all apparatus and components thereof which comprise the Works shall be of tried and proved design and construction which experience has shown to be entirely suitable for service according to the Contract with a design life of 25 years in the environment described in the Specification.

All design criteria determined by the Contractor shall be to normally accepted commercial and industrial standards in the UK and as a minimum requirement shall satisfy all current statutory and legal requirements for a building of this nature.

1.04 Workmanship, Material & Provisions of Everything Necessary

The workmanship afforded and materials used throughout the Contract shall be the best available and commensurate with the standards generally required for work in the Public Sector. In addition, they shall take account of the existing installations on the Site and the overall operational requirements.

The Plant shall, as far as possible, be of United Kingdom or European Community origin, design and manufacture.

Plant that is specified in the Specification by a manufacture's name and/or type designation, shall be specifically purchased and used in the Works unless otherwise approved.

The Specification and Tender Drawings are to be read together and in the event of any discrepancy the order of precedence shall be: -

Tender Drawings

Particular Specification

General Specification

If doubt exists, the matter should be referred to the Engineer whose decision shall be final.

The Tender Sum shall be deemed to include all items of works or labour not specifically mentioned herein but which may

1.05 Compliance with Specifications, Regulations and Standards

The installation shall comply with all relevant statutory instruments, regulations and standards current at the date of tender (unless otherwise indicated) and in particular with the following: -

Factories Act 1961

Electricity at Work Regulations 1989

IET Regulations for Electrical Installations (BS 7671)

The Building (Amendment) Regulations 2001 & Building Regulations 2000

All Statutory Regulations

Latest editions of British Standards, Codes of Practice, IEC Standards and internationally approved and recognised Standards

1.06 EMC

The complete installation and its components shall be designed and installed to comply with the EMC Regulations

The complete 'Assembly' shall comply with the requirements of The Electromagnetic Compatibility Regulations Statutory Instruments SI 1992 No. 2372, SI 1994 No. 3080, SI 1995 No. 3180 and subsequent applicable Instruments.

The following Directives shall apply in the construction of the assembly and components shall carry the CE mark and where there is no applicable standard then the appropriate generic standard shall apply.

Low Voltage Directive	73/23/EEC
EMC Directive	89/336/EEC. 92/31/EEC and 93/68/EEC
Machinery Directive	89/392/EEC

1.07 Design of Electrical Works

The Specification and Drawings provide information on the size and rating of plant and equipment sufficient for tender purposes. The Contractor shall prepare working drawings and wiring diagrams for manufacture and installation of the services and submit the drawings to the Engineer for approval.

The drawings shall be in sufficient detail to remove any ambiguity between the information presented and that finally installed on site.

Approval of the drawings will not relieve the Contractor of design responsibility when the installation on site is found to be unsatisfactory or fails to perform its duty satisfactorily.

1.08 Cables

1.081 Power and Control Cables

Multicore armoured cables shall comply with the requirements of BS 5467 XLPE insulated steel wire armoured with LSF sheath.

Copper conductors shall be used made up from plain annealed high conductivity copper wires in accordance with BS 6360. Reduced size neutral conductors shall not be used.

Unless otherwise specified, the wiring of small power circuits and luminaires shall be by means of single core LSF insulated cable to BS 7211 enclosed throughout its length in trunking or conduit or LSF sheathed MICC cable to BS 6207.

Final flexible connections where required shall be ethylene propylene circular rubber insulated and sheathed cable, dimensions to BS 6500 Table 9 or single core cables in flexible conduit.

Special consideration shall be given to the correct selection and protection of cables and equipment to suit the environment in which they will operate.

In particular:

Heat

High humidity

Mechanical damage

Flexibility

1.08.2 Circuitry and Wiring

Final circuits shall originate at MCB distribution boards. The Contractor shall provide distribution board schedules to an approved format listing the circuit breaker ratings, circuits controlled, cable sizes and connected loads on each phase.

Cables shall be sized in conformity with the requirements of BS 7671 in respect of:

Voltage drop at point of utilisation

Earth loop impedance

Resistance of earth return path

Cable de-rating for bunching

1.08.3 Segregation of Circuits

The installation of cables supplying different services shall be segregated strictly in conformity with the requirements of BS 7671.

1.09 Cable Joints

Permanent cable joints shall not be permitted unless otherwise required in the Specification or shown on the drawings.

1.10 Armoured Cable Termination

Armoured cable glands shall be manufactured from brass, each gland shall be supplied and installed complete with shrouds, brass earth tag and brass locknuts. All earth tags shall be bolted to the gland plate or separately earthed.

Armoured cable glands shall comply with the requirements of BS 6121: Class EIW.

1.11 Cable Numbering

The term 'Power cables' denotes any supply cable fed from a distribution system. Multicore power cables shall carry a number at each end of the cable and at 10m intervals, the number being a unique safety number for the device it is supplying.

The term 'control cables' denotes any cable that is not a power cable. Multicore control cables shall carry a number at each end of the cable and at 10m intervals.

The number shall be a unique safety number consisting of two sections. The first number shall identify the device or panel from which the cable originates. The second number shall be derived from the cable schedule or installation drawings provided by the Contractor. The number shall be black on a white background.

Cable numbering markers shall be of Critchley manufacture on a carrier strip, attached on the cable by means of cable ties.

1.12 Cable Supports and Containment

1.12.1 Cable Trays

Unless otherwise specified, cable trays shall comply with the following: -

Trays including all bends, tees and fixings shall unless otherwise agreed be obtained from a proprietary manufacturer of this type of equipment. They shall be heavy gauge and made of perforated sheet steel to BS EN 10143. Trays shall have wide re-entrant type side flanges. Where required trays shall be fitted with non-ventilation covers.

Trays and baskets shall be galvanised after manufacture to provide a uniform coating thickness; any cut edges shall be treated with cold galvanising.

All necessary supports shall be supplied and fixed and shall be spaced at intervals of not more than 1800mm. The spacing shall be approved in accordance with the manufacturers' recommendations.

Any sharp edges which are exposed after the tray has been erected shall be removed so that damage to cable sheaths cannot occur.

1.12.2 Cable Trunking

The space factor within each trunking section shall conform to the requirements of BS 7671, with 25% of the available space in each trunking run reserved for future wiring installation without exceeding the permitted space factors. All space factor calculations shall be approved.

Trunking shall be manufactured to BS 4678: Part 1. Class 3 for galvanised steel to BS EN 10143.

Where connections are made to the front lid the lid shall be cut either side and separately fixed.

Where wiring or several circuits occupies the same trunking, the cables of each circuit shall be grouped together by clips or other approved means. Circuits shall be further grouped to provide easy means of identification. In each instance the spacing of clips shall not exceed 2000mm.

Internal fire barriers shall be provided to comply with BS 7671 and Clause 1.35. Barriers shall also be fitted in trunking immediately before it connects to any distribution board, switchboard or isolator and the like. Fire barriers shall be made of approved non-combustible material.

1.12.3 Conduit Installation

Unless otherwise specified all wiring cables shall be installed in accordance with the requirements of the distribution circuit schedules within heavy gauge seam welded steel conduit having screwed joints or uPVC conduit detailed in the Particular Specification.

The size of all conduits shall conform strictly to the requirements of BS 7671 with 25% of the available space in each conduit reserved for future wiring installations without exceeding the permitted space factors. The smallest size of conduit shall be 20mm. All space factor calculations shall be approved.

No prefabricated bends, elbows or tees (solid or inspection type) shall be used in the installation unless authorised. All bends shall be formed on site using suitable bending tools and shall conform to BS 7671.

All conduit and conduit fittings shall conform to BS 4568 and shall be heavy duty Class 4 hot dip galvanised.

Internal fire barriers shall be provided in conduits to comply with BS 7671. Fire barriers shall be made of approved non-combustible compound or dry fire resisting material.

1.13 Switchgear, Control Gear & Components

1.13.1 Enclosures

Enclosures shall be dust and damp protected with a degree of protection of at least IP42 to EN 60529 minimum and shall be vermin-proof and the Tenderer shall include details of switchboards that do not comply with the requirements.

The enclosure shall be constructed from sheet steel or minimum 2mm thickness to form rigid structures, removable access panels fixed by screws shall be used where necessary to ensure satisfactory sealing.

All ferrous metal parts shall be grit blasted to SA2 and anti-corrosion treated before painting. The final paint finish shall be suitable for a marine type environment without further treatment throughout the life of the switchboard. The manufacturer's method of corrosion inhibition and paint application shall be fully detailed in the Tender. The external paint finish shall be light grey semi-gloss to BS 381 C-631.

1.13.2 Switches and Fuse-switches

Switches and fuse switches shall comply with BS EN 60947-3 Category AC23 and shall be make-fault, load breaking rated.

All contacts of switches and fuse-switches shall be shrouded so that when the cover and the switch is open there is no live metal exposed to touch. The mechanism shall ensure positive movement of the switch contacts over their full stroke in opening and closing independently of any accelerating springs employed. Unless approved in writing, springs shall not be used in tension.

In the open position, the contact separation shall be adequate for safety isolation purposes.

Where the position of the switch operating handle does not give immediate and clear indication of the switch position at all times, the switches shall be fitted with a mechanically operated switch position indicator showing a green and red sign lettered OFF and ON respectively.

Provision shall be made for padlocking the operating handle of each switch in the OFF position.

1.13.3 MCCBs

Moulded case circuit breakers shall comply with the requirements of BS EN 60947-2 Category P1 16kA with adjustable thermal protector 70-100% and instantaneous trip 6 to 10 In. Where specified adjustable earth integral or separate earth fault protection shall be provided with selectable definite minimum times from 10ms to 5 sec.

1.13.4 Fuses and Links

Each switch and fuse-switch shall be designed for a supplied complete with fuse-links conforming to BS 88: Part 2: Class Q1, 80kA at 415V c.c. of a rating normally equal to or less than that of the switch or fuse-switch, except where larger fuses than the continuous rating are specified for motor starting duties.

Each switchboard shall be supplied complete with one set of installed fuses.

Where switches are specified, bolted copper links shall be provided in place of fuse-links.

Main fuses shall be arranged so that with the switch in the OFF position both ends of the fuse-links are dead and can be withdrawn and replaced in safety when the busbars and the outgoing circuits are live without the exposure of live metal to touch.

Control fuse-links shall be mounted in insulated, withdrawable carriers containing fuses to BS 88: Class Q1; control links shall be mounted in insulated carriers which shall not be interchangeable with any fuse carrier.

1.13.5 Mechanical Interlocks and Padlocks

Padlocks or other approved locking arrangements shall be provided for locking switches in the isolated or service position. All padlocks shall be of an approved type.

Covers of switches shall be mechanically interlocked so that they cannot be opened unless the switch is open, and the fuses or links in the switch thereby isolated from the busbars and the feeder. It shall not be possible to close a switch with the cover open except by intentional defeat of the interlock.

1.13.6 Cable Entries

Provision shall be made for cable entry at the top and/or bottom of cubicles & panels and substantial, undrilled gland plates shall be provided; sufficient space shall be allowed in the design to accommodate the size and bending radius of the largest cable appropriate to each circuit rating.

Gland plates shall be easily removable and they shall be earthed by solid and effective connection to the switchboard earth bar.

Cable glands will be supplied under a separate contract.

Cable entries shall be arranged to maintain the necessary degree of protection to the equipment.

Cable entries shall be arranged to maintain the necessary degree of protection to the equipment.

1.13.7 Terminations

All external incoming and feeder circuit cables will be insulated, SWA and sheathed overall. Removable, undrilled gland plates shall be provided for mechanical type glands.

Terminals shall be provided for all external connections and shall be easily accessible when the covers of the switchgear cable compartments have been removed.

Main terminals shall have stud pattern terminals suitable for compression lugs which will be supplied under a separate contract.

Control and instrumentation cable terminations shall be mounted in terminal blocks with identification labels and shall be either: -

Stud type or approved size and design, with washers, nuts and locknuts

Clamp type, of approved size and design so arranged that the conductor is gripped between two faces which shall be locked in the compressed condition by the action of a screw.

Pinch type connectors, where the locking screw bears directly on the conductor, shall not be used.

All control terminals shall accept up to two 2.5mm5 conductors and not more than two connections shall be made in any one terminal way.

1.13.8 Circuit and Terminal Segregation

Each switch and its cable connections shall be segregated and partitioned so that each circuit is isolated by earthed metal or approved rigid insulation from other circuits and the busbars which shall be totally enclosed.

Instruments shall not be mounted on, and auxiliary cables shall not enter, other enclosures of other circuits except with mechanical segregation arranged to allow work to be done or wiring to be modified or replaced without shutting down circuits other than that associated with the cabling.

All terminals which are intended for the termination of external cables shall be so arranged and segregated in an approved manner that the termination of a cable to any circuit switch can be carried out without interference to other circuits and without danger of touching any 'live' parts.

All metal barriers shall be connected to the main switchboard earth bar.

1.13.9 Protective Bonding Conductors on Cubicles

The cubicles and panels shall be fitted with a copper earth stud which shall be effectively connected to the framework and enclosure of each section and all metal parts not intended to be live and arranged in such a position that cable glands and armour clamps can be readily bonded to it.

No soldered joints shall be used in the earth connections.

All hinged doors with electrical equipment installed shall be separately cross bonded to the switchboard frame. All connections to earth shall be made within the switchboard enclosure.

1.13.10 Identification

Conspicuous circuit labels shall be fitted to non-detachable parts of the front and back of the enclosure.

A circuit label of approved design with the circuit designation shall be provided on a non-removable part at the front and adjacent to the outgoing terminals of each switch or fuse-switch.

Separate labels shall be provided to indicate the function of all ancillary apparatus, instruments, relays, fuses and the like; the rating of the fuses shall be indicated.

All labels shall be mechanically fixed; self-adhesive labels shall not be used.

1.14 Distribution Boards

1.14.1 Distribution Boards (MCB)

Unless otherwise specified the quantity, type and rating of all distribution boards shall be as shown on the drawings and schedules. All spareways shall be equipped with MCB's.

MCB distribution boards shall be to BS 5486: Part 12 with enclosure classification IP54 to IEC 598.

All contacts, busbars and connections within distribution boards shall be fully insulated or shrouded to enable circuits to be wired with adjacent circuits in service.

The neutral and earth bars shall have the same number of outgoing connection points as there are single phase live connections.,

Cases shall be constructed of Zintex steel, fabricated to form a rigid enclosure to IP54 standard. No glass shall be incorporated. Three phase distribution boards shall be fitted with removable gland plates at the top and the bottom of the case.

The front cover of each distribution board shall be hinged and fitted with sealing gaskets, padlocking facility and approved fasteners for closing. Key operated locks shall be provided. All locks shall be capable of being opened with the same key.

Unless otherwise stated each distribution board shall be controlled on the incoming supply side by an air-break switch-isolator integral with or adjacent to the distribution board. Cable termination boxes shall be provided where deemed necessary for the size of cable to be terminated.

An internal circuit reference label shall be provided for each single phase fuse or circuit breaker way, irrespective of whether the way is used as a single, double pole or 3 phase circuit.

An identification label shall be permanently fixed to the front of each distribution board showing the board reference, origin of power supply and supply cable size and number.

Each distribution board shall be fitted with an A4 or A3 size fixed circuit list in a plastic envelope in which the circuit list has been placed. The circuit list shall be legibly typed and all additions and amendments shall be incorporated in the list before completion of the installation.

1.15 Ease of Maintenance

The Contractor shall at all times give proper consideration for the future maintenance of the electrical installation and shall include for such component parts as are provided by the manufacturer of equipment and plant for this purpose.

1.16 Fire Resistance

All materials used in connection with or part of the installation shall be incapable of spontaneous combustion, nor shall they support combustion once ignited.

1.17 Fire Hazard

The Contractor will be responsible for ensuring that proper precautions are taken to protect the building and its contents where naked flame is used in the course of the installation, commissioning or testing.

The Contractor shall ensure that fire extinguishers are available in areas where such hazards exist.

1.18 Protection

From the time that material is delivered to Site until the actual installation is taken over by the Employer, the Contractor will be held responsible for the proper protection of all stored, unfixed and fixed material, plant and equipment, from damage by damp, rain, frost, construction debris, paint or any other cause. The Contractor shall be responsible for cleaning down all parts of the installation prior to commissioning the plant, particular care being taken to ensure that all concrete and decorating material are removed.

1.19 Painting

Generally, all plant and equipment shall be delivered to site having received the finishing paint usually applied by the manufacturer at works.

All iron work within false ceilings, floor ducts, chases, etc., and all exposed ironwork shall be painted two coats of chromate paint.

Owing to the problem of paint flaking off galvanised steel, the following procedure shall be adopted when painting materials with galvanised finish.

Wash with neutral liquid detergent and warm water to remove all surface contamination, rinse with clean water and allow to dry.

1 - coat of two-pack etch primer obtained from the manufacturer of the intermediate primer below 1 - coat of zinc phosphate intermediate primer

1 - undercoat approved by the Architect/Engineer

1 - finishing coat of hard gloss paint approved by the Architect/Principal Building Surveyor.

It may be noted that, owing to the limited number of zinc phosphate intermediate primers approved, it is not at present possible to require that the primer, undercoat and finish be from the same manufacturer.

1.20 Fixing to the Building Structure

The Contractor shall mark out the position of fixing of all built-in brackets. The brackets will be built-in by the Principal Contractor, but the (Electrical) Contractor will be responsible for ensuring that these brackets are built-in correctly. Wood screw and raw bolt fixings shall be undertaken by the Contractor, however, drilling, shot firing, etc., shall not be undertaken without the express authority of the Structural Engineer.

Holding down bolts, construction of concrete bases for plant etc., will be undertaken by the Principal Contractor to detail drawings provided by the (Electrical) Contractor. The Contractor will be responsible for ensuring that the bases are correctly constructed and the holding down bolt properly set. The same principle will apply to any special plant or equipment fixing.

The drilling of beams, steelwork, etc., shall not be undertaken without the express authority of the Structural Engineer.

Damage to any part of the building arising from neglect by the Contractor shall be made good at the expense of the Contractor.

1.21 Holes through the Structure

All major services holes in the structure will be arranged during the design period, the Contractor will be responsible for checking that sufficient holes have been arranged and that these are incorporated into the structure.

All other service holes required by the Contractor shall be set out on a Builder's work drawing by the Contractor and he shall be equally responsible that these holes are correctly incorporated into the structure.

Holes of 50mm or less shall be formed by the Contractor under this section of the Works.

1.22 Identification

All equipment to be operated and maintained shall be adequately labelled to cross reference with the Record Drawings and O&M Manuals.

Every fuse switch, isolator, distribution mcb board or panel shall be labelled to show the part of the building served in accordance with single line diagram drawings.

Distribution boards shall be provided with typewritten circuit lists, on white card and contained within a rigid frame of clear Perspex and fixed adjacent to the equipment.

Safety and Danger instruction labels shall also be provided as above, where required by BS 7671 or called for in the Specification. A shock treatment poster shall be provided in all Plant and Switch rooms and a rubber mat placed in front of switchboards.

Each item of Plant and each sub-assembly forming part thereof and for which spare parts may be required shall have attached to it an untarnishable metal or equal approved form of plate showing clearly the manufacturer's name, serial number and basic information as to rating, speed, etc. in sufficient detail to allow the component or assembly to be readily identified in correspondence when ordering spare parts. The foregoing information shall be engraved or of equal permanent form.

1.23 Labels

Labels shall be either reverse engraved plastic or triple plastic laminate, bevelled at the edges with 4mm minimum height lettering in black on a white background.

They shall be laid out neatly, symmetrically, and of such size to allow a minimum of waste space, of minimum size for the application as far as practicable whilst allowing labels on the same panel etc. to match type by type.

The Contractor shall provide the Engineer with one sample of each type and size to be used in the Works, for approval.

All labels shall be screwed in place with non-ferrous screws. Soft headed rivets and self-tapping rivets will not be accepted. Safety and instruction labels shall also be provided as above, where required by the Regulations, or called for in the Specification.

1.24 Mounting Heights

Generally, wall mounting switchboards, distribution boards, etc. shall be installed so that any items to which easy access is required, such as fuses, instruments, etc. are not more than 2 metres above finished floor level. In all cases, care must be taken to ensure that adequate space is left below and above the equipment for manipulating incoming and outgoing cables.

Unless otherwise stated on the drawings or Room Data Sheets, all outlets shall be mounted at the following heights from finished floor level to the centre of the appliance.

Dado trunking 800mm above FFL or 50mm above desk height

Socket outlets (General) 450mm above FFL} except above

Fused spurs & isolators (General)450mm above FFL} worktops/benches

Switches 900mm above FFL

Distribution Boards 1800mm to bottom of board in utility areas or as otherwise shown on the drawings

Telephone 900mm above FFL

1.25 Fire Barriers

Permanent fire barriers shall be installed before completion. During the course of the work, temporary fire barriers shall be installed and maintained effective at all openings in fire rated floors, walls and partitions.

The fire stopping works include for items of making good to apertures in walling, whether adjacent to services or simple holes. The Contractor is permitted to use his discretion and expertise in carrying out such fire stopping; small gaps of up to 25mm depth may be tightly packed with mineral wool or proprietary fire rated filler strips; larger openings in brick or blockwork to be infilled with matching material. Where metal pipes, cables or cable tray pass through such apertures, pipes to be sleeved with proprietary filler strip prior to infilling, refer to detailed drawings. All cables treated as shown on the drawings and otherwise specified. Holes and apertures in concrete slabs and walls are to be made good in concrete. All infilling to solid walls or slabs is to be carried out to the full thickness/depth of the wall/slab. Make good all disturbed finishes and decoration to match existing.

Proprietary fire seals shall be utilized as supplied by Nullfire or shall be equal and approved.

1.26 Record Drawings

On completion of the installation the Contractor shall provide all necessary drawings and diagrams of the 'as installed' works as are required for record and the care, maintenance, repair, etc. purposes and these shall include, insofar as is reasonably relevant to the Works.

Arrangement drawing of each complete installation to a scale of not less than 1:50.

Detailed schematic and wiring diagrams for the electrical and electronic equipment and control, together with terminal marking schedules etc.

Cable schedules and diagrams for cable, wiring etc. installations.

The foregoing drawings may include those submitted and approved as Working Drawings and revised in accordance with the site modifications.

Two prints of each drawing shall be submitted to the Engineer for approval, and upon approval, the following copies shall be supplied to the Engineer's instructions: -

One copy: on disk AutoCAD Release 13 or above

Two copies: full size paper prints - minimum A3 size included in the O&M Manuals

The Works shall only be considered to be complete when the full requirements of this clause have been met.

1.27 Operating & Maintenance Manuals

The Contractor shall prepare comprehensive maintenance and operation manuals and shall obtain from the manufacturers of all equipment supplied under his contract and equipment supplied by Others, all the instruction manuals necessary for the correct maintenance and operation of that equipment. The manuals shall include a complete diagram of all internal and external mechanical, electrical and other services connections with a parts list identifying all components.

The Manuals shall be comprehensive and prepared in accordance with the requirements of BS 4899 and as a minimum include the following:

Full description of each system

Method of manual and automatic operation

Procedures in case of faults

Emergency procedures.

Recommended maintenance requirements with details of lubricants etc.

Schedule of spares

Full technical data including drawings of plant and circuit diagrams.

The Contractor shall submit 2 copies of the Operation and Maintenance Manuals for all of the mechanical and electrical services for review by the Engineer not less than 4 weeks before final testing and commissioning.

A certificate of Practical Completion will not be issued until the final copies of the O&M manuals have been provided.

1.28 Commissioning

Not less than 2 weeks before the commencement of any commissioning works, the Contractor shall submit a method statement for review by the Engineer.

All commissioning shall be undertaken after testing and in accordance with the requirements of the Specification, and with any special requirements of the manufacturer of the systems supplied.

1.29 Tests and Certificates

Tests shall be carried out periodically by the Contractor during the course of construction and/or manufacture of the Works. Test instruments shall be provided and operated by the Contractor whose personnel shall be competent and fully conversant in the use of the instruments. They shall be correctly calibrated and certified for the limits of accuracy required, and the Contractor shall provide the Engineer with evidence that the instruments have been calibrated by an approved authority not more than three months prior to being used. Should the Engineer consider the instrument to be suspect, the Contractor shall have the instrument recalibrated by an authorised standardising laboratory at this own expense.

All cables shall be insulation tested after installation, but before connection, at 500 volts between conductors and between conductors and earth.

When the Contractor considers that the works or part of the works is complete, he shall carry out Tests on Completion in the manner required for witnessed site tests and prove compliance with the Specification to his own satisfaction.

Subsequently, and prior to commencement of the maintenance period, the Contractor shall carry out witnessed site tests in the presence of the Engineer, or his representative to demonstrate compliance with the Specification. Tests shall be in accordance with the IET Regulations for Electrical Installations, BS 7671, Fire Detection and Alarms BS 5839 Part 1, Emergency Lighting BS 5266 Part 1 and Lightning Protection BS 6651 as appropriate. As many of these tests as, in the opinion of the Engineer, are practicable shall be carried out consecutively.

Within fourteen days following witnessed tests of part or the whole of the works, the Contractor shall forward to the Engineer, a typed Inspection Certificate which shall be in the form set out in the British Standards and shall clearly indicate the results of all the tests carried out, together with any defects or omissions revealed by the inspection.

After final inspection and acceptance of the works, or part of the works, the Contractor shall issue Completion Certificates, which shall take the form set out in the British Standard. The Certificates shall be completed in duplicate, signed by the Contractor and endorsed by the Engineer in whose presence the inspections and tests were made.

1.30 Publications & Photography

CES are deemed to have the right to produce articles and photographs for internal and external publications of the design & installation unless the client objects in writing before the end of the contract.

1.0 *INSTRUCTIONS TO TENDERERS*

Note: Failure to comply with these instructions may render the Tender invalid.

1. The Tender shall be submitted on the Form of Tender with the completed Schedules. All words and figures shall be typed or legibly written in ink. The item prices of the Price Schedules shall be summarised and taken to the Form of Tender.
2. Tenders shall be open for acceptance for a period of 90 days from the date of the tender and shall be a fixed price for the stated duration of the contract.
3. Each Tender submission shall be sent to the Client. The form of tender and schedules shall be scanned after signing for electronic transmission.
4. Should doubt exist in the interpretation of the Specification, the Tenderer shall set out his interpretation in the writings submitted in support of the Tender. Should there be a conflict between the Tender Drawings, Particular Specification and the General Specification the Tender Drawings will usually take precedence then the Particular Specification. Any material discrepancy should be referred to the Engineer for resolution.
5. The Tenderer shall price the scheme as specified but is invited to indicate where, in his view, savings may be made without significantly affecting standards of the design and these shall be explained and described in the writings submitted in support and amplification of the Tender but shall not be binding on the Employer unless and until they shall have been approved by the Engineer. Alternative tenders will not be considered unless they accompany a Tender conforming to the Specification.
6. It is a specific contractual requirement that the Contractor shall have inspected the Site at the time of tendering and shall have fully informed himself as to all matters, difficulties etc., concerning the execution of the Works thereon and which may not be referred to in the Specification.
7. Access to the Site will be afforded during normal working hours, after application, in advance.
8. Works shall be carried out during normal working hours unless stated otherwise in the Tender Documents.
9. The Employer is not bound to accept the lowest or any tender, nor be responsible for, nor pay for expenses or losses which may be incurred by any Tenderer in the preparation of his tender.
10. The Employer reserves the right to award separate contracts in respect of any individual sections or delete particular sections of the Works where these are not declared to be indivisible at time of Tender.
11. The Tenderer whose Tender is accepted will be required to enter into a formal contract agreement with the Employer.