HM Coastguard, Crosby

Electrical Specification

1752 S001-E T2

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Crookes Walker Consulting
The Plaza, Old Hall Street, Liverpool
T-0151 600 5409

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Introduction

1.1 General

This specification details the Electrical Services works associated with the refurbishment of an existing HM Coastguard Building in Crosby, Liverpool.

The Contractor shall be responsible for the detailed design development, installation, testing and commissioning of Electrical services installation, in accordance with the requirements of this specification, CIBSE and BSRIA guides and manuals, and all relevant British and European Standards and codes of practice.

This specification shall be used to define the requirements for the buildings. The design of the project shall consider the environmental impact and where appropriate use energy efficient technology systems and materials from sustainable sources.

The Contractor shall be responsible for demonstrating and achieving Building Regulations compliance as part of the contract.

This specification is complimented by the Crookes Walker Consulting set of Standard Specifications which detail the quality of materials and workmanship.

In addition, this specification shall be read in conjunction with the main contract preliminaries.

The Contractor shall complete in its entirety the Tender Summary and return with his tender submission. Failure to do so will render the tender submission invalid and shall not be considered.

1.2 Design Drawings

The Contractor shall be responsible for the production of detailed design and working drawings which accurately show the proposed services & shall include for updating these as necessary as the design is developed to ultimately turn working drawings into 'as fitted' drawings.

These drawings shall be submitted for comment to CWC prior to works commencing on site.

1.3 Additional Information

The Contractor shall be responsible for procuring any additional architectural or structural information required to undertake the design, installation and co-ordination of services.

1.4 Site Visit

The Contractor is advised to visit the site to establish the full extent and nature of the works and site to fully acquaint themselves with the site conditions and the extent and routing of all the Electrical and Mechanical Services prior to submitting their tender. There shall be no variations to the contract due to lack of knowledge of the existing site and its condition.

The site address is Hall Road West, Crosby, Liverpool. L23 8SY.

Access shall be arranged through Hartnell Taylor Cook LLP.

1.5 M&E Obsolescence

The Contractor shall ensure all M&E equipment supplied for this project shall continue to be supported by the supplier for a minimum of 10 years & shall be the most recent version of the equipment offered.

'Supported' shall mean that spare parts, consumables, software support, technical literature etc., shall be available for at least 10 years following completion of the project.

2.0 Electrical Design and Installation Parameters

The Contractor shall be responsible for: -

- Final detailed design and installation of the complete Electrical Services Installation
- Coordination and Liaison with the Main Contractor
- Coordination and Liaison with Any Specialist Sub-Contractors
- Liaison with the Architect and Structural Engineer
- Coordination and Liaison with the Client and/or his representatives regarding the final positioning of all Specialist Equipment and any associated electrical attendances

2.1 Associated Documents

The complete Electrical Services installation shall be designed, supplied, installed, tested and commissioned by the Contractor.

The following associated documents shall be utilised, but shall not be limited to, when carrying out all aspects of the design and installation:

- All relevant British and European standards
- Non-Domestic Building Services Compliance Guide 2013
- All CIBSE Codes of Practice and Design Guidance Notes
- BS 7671 Regulations for Electrical Installations (the 18th Edition of the IEE Wiring Regulations).
- Health and Safety at Work Act 1974.
- Electricity at Work Act 1989.
- Electricity Authority local and general regulations.
- Construction, Design and Management Regulations (CDM).
- Asbestos Regulations.
- Control of Substances Hazardous to Health Regulations. (COSHH)
- The Building Regulations.
- Fire Prevention on Construction Sites
- The Department of Environment's Energy Efficiency Best Practice Programme (BRECSU).
- British Council for Offices (BCO) Guidance
- BS 5839-1:2017 Fire Detection and Fire Alarm Systems for Buildings – Code of Practice for System Design, Installation, Commissioning and Maintenance
- BS 5266-1:2016 Emergency Lighting – Code of Practice for the Emergency Escape Lighting in Premises

In all instances, the latest revision and/or amendments to the above publications/regulations/recommendations shall be utilised.

The Contractor shall refer to the Electrical Services Performance Drawings for further details of the project.

2.2 Design Documentation

The Contractor shall be responsible for the provision of all final design documentation necessary to enable the Engineer/Client to carry out a comprehensive appraisal of their design.

This documentation shall include, but shall not be limited to, the following: -

- Comprehensive Schedule of All Plant and Equipment
- Confirmation of all Specialist Suppliers and Sub-Contractors
- Coordinated M&E Reflected Ceiling Plan Layouts
- Fire Alarm Cause & Effect Schedule
- Asset Register of all plant and equipment

All drawings shall be submitted in AutoCAD electronic format and all calculations shall be carried out using appropriate and recognised computer software packages; e.g. Hevacomp, Amtech, Dialux, etc.

The Contractor shall issue a file containing all documentation to the Consulting Engineer allowing enough time for review and comment, and in accordance with the overall programme.

Note: The additional requirements associated with the necessary provision of Electrical Working Drawings and Builders Work Drawings are detailed elsewhere in this specification.

3.0 Electrical Services

3.1 Lighting Installation

The Contractor shall include for the supply, installation, connection, testing and commissioning of a completely new LED lighting installation within the areas shown on the lighting layout drawings.

The lighting installation shall comply with BS EN 12464-1:2011 Lighting of Indoor Work Places & CIBSE Code for Interior Lighting.

All lighting fittings shall be carefully installed in a manner appropriate to their nature and method of fixing. The metal work of lighting fitting shall be efficiently earthed.

Existing final circuits off the local distribution boards NESS1 and NESS2 will be reconfigured to accommodate the new lighting layouts.

New lighting controls shall be arranged to comply with building regulations part L2A.

3.2 Emergency Lighting Installation

The Contractor shall include for the supply, installation, connection, testing and commissioning of a completely new emergency lighting installation within the areas shown on the lighting layout drawings.

The installation shall consist of emergency luminaire units and maintained illuminated "EXIT" signs including over escape route doors and final exits.

All exit signs shall be c/w appropriate European style legend. The contractor shall be responsible for ensuring all additional escape signage required is supplied, installed and adequately lit my local emergency luminaires.

All emergency luminaires shall have a three-hour battery capacity and feature self-test technology.

The supply to all lighting circuits shall be taken via a key switch from the unswitched live side of an adjacent lighting circuit. The key switches shall be located adjacent to the emanating distribution board to facilitate testing of the emergency luminaires and shall be suitably engraved.

The entire emergency lighting installation shall be installed, commissioned and tested in accordance with BS 5266-1:2016, and copies of the appropriate Test Certificate shall be handed over to the engineer prior to practical completion of the work.

Each emergency fitting shall be fitted with a typed address label and corresponding test sheets shall be included in the Operation & Maintenance Manual, in the form of an 'Emergency Test Log'.

3.3 Fire Alarm Installation

The Contractor shall reconfigure the exiting fire alarm system throughout project areas in order to accommodate new ceilings and room layouts.

New interfaces will be provided to facilitate automatic release of access-controlled doors in the event of a fire evacuation alarm.

This shall include for the development of a revised cause & effect schedule.

The entire (existing and new) completed system shall be commissioned, tested and certified to comply fully with the requirements of BS 5839-1:2017.

All materials used in the fire alarm installation shall comply with BS 5839.

The system shall be commissioned in accordance with the requirements of BS 5839 Code of Practice for Installation and Servicing of Fire Detection and Alarm Systems in Buildings, and shall include the following: -

1. Electrical Tests
2. Operation of each Device
3. Audibility Tests
4. Checks on all Control Panel Facilities
5. Checks on all labels and Equipment

At completion of the tests and before handover, the Contractor shall provide the Engineer with a signed certificate indicating that the system has been designed, installed, commissioned and that test results have been satisfactory. All tests shall be carried out in the presence of the Engineer.

The Contractor shall arrange for the Specialist Supplier to provide a demonstration and instruction to the Client's Representative regarding the operation of the installation.

3.4 Distribution Board Installation

The Contractor shall include for the supply, installation, connection, testing and commissioning of new circuits from existing distribution boards.

New miniature circuit breakers will comply with BS EN 60898.

New final circuit wiring will be routed through ceiling and floor voids and carried out in multicore PVC/LSF cables on cable basket trays.

Revised permanently fixed circuit labels and charts will be provided inside the distribution board hinged cover lid. The distribution charts will provide the following information as a minimum:

- Distribution board reference and description
- Supply Cable size and type
- Supply Origin reference and description

- Circuit reference and phase for each individual outgoing circuit and spare way
- Circuit protective device size, type and setting (if adjustable) for each individual way
- Circuit Type and description
- Phase/Neutral conductors and cpc cables sizes and types for each individual circuit

Final circuit protection is to be afforded by a system of RCBOs having a minimum M16 category of duty and characteristics suitable for each application, i.e.:

Type B- Small Power Circuits. (Non-inductive)
Type C- Lighting and lightly inductive loads.
Type D- Transformers, Motors etc.

All final legs to points of connection shall be installed concealed within the building fabric and protected from mechanical damage in accordance with BS7671.

3.5 General Power Installation

The Contractor shall supply and install power supplies to all points of utilisation throughout the works as illustrated on the drawings.

This includes the following:

- General purpose socket outlets
- Power supplies to hand dryers
- Power supplies to FCUs and HRUs
- Power supplies to access control
- Power supplies to CCTV installation
- Power supplies to local extract fans
- Electric panel heater and supply
- Supply to new saniflow unit

3.6 System of Wiring

All wiring systems shall be of an approved BASEC type cable.

New final circuit wiring shall utilise stranded copper LSF cables to BS 7211 (twin and earth).

The fire alarm system shall be wired using an enhanced soft skinned cable i.e. FP200 Enhanced with a red LSF outer sheath.

Cables are to be sized to provide the following:

A. Current carrying capacity to the full rating of the protective device (including derating for grouping and the method of installation.

B. Circuit impedance shall permit the protective device to operate within 0.4 or 5 seconds, as appropriate for the circuit designation, under phase to phase, phase to neutral, and phase to earth fault conditions at the furthest point of the circuit.

C. Voltage drop at the furthest point on each final circuit shall not exceed the maximum possible under full load conditions.

D. 20% spare capacity above the design loads shall be included for distribution boards, sub main cables, and all containment systems.

Full discrimination is to be achieved with the upstream protective devices within the demise.

3.7 Containment System Installation

The contractor shall provide primary containment throughout the floor voids to facilitate the new electrical services installations.

Existing containment within the ceiling voids will be reconfigured to facilitate the new lighting installations.

The new proposed primary containment shall comprise of metallic cable baskets with proprietary junctions.

New cables rising and dropping to points of utilisation shall be routed within flush installed galvanised conduits.

Containment shall be supported using a Unistrut bracket arrangement comprising 8mm diameter, galvanised threaded rod hangers and Unistrut brackets. Brackets shall be provided at a minimum spacing of 1200mm along the containment routes or as recommended by the manufacturer for the intended load plus an additional 50%.

All metallic containment shall be suitably bonded with copper joints/saddles used at each junction.

Proprietary internal fire barriers shall be used where containment passes through fire-rated compartments.

Where services pass through walls and partitions, the contractor shall ensure that the aperture is suitably fire stopped to maintain the minimum fire rating of the wall.

3.8 Access Control System

This work shall be undertaken by a trade body approved specialist.

The contractor shall allow for access control to all doors illustrated on the drawings.

The door access control and entry systems shall be designed, supplied, installed, tested and connected by an approved installer to CPNI approved Class 2.

Video entry door control panels shall be provided to the new secondary entrance and linked to the new local reception and MCA office.

Maglocks shall be provided by contractor including wiring and power supplies for the maglocks.

The Contractor shall provide unswitched fused connection units at each of the door access and entry system power supply units. These PSU's shall be positioned in accessible locations; i.e. ceiling voids and store cupboards.

The system shall be fully integrated with the fire alarm system to ensure that all doors open fail safe in the event of a fire condition in accordance with the building regulations.

3.9 CCTV System

This work shall be undertaken by a trade body approved specialist.

The contractor shall allow for the removal of the existing CCTV system and installation of a new system in accordance with the layout drawings.

The system will continually record images from all cameras. Hard drive storage would be sized to provide one-month of storage which would be overwritten on a loop cycle.

HDD data storage will be housed within a secure cabinet located within the new reception.

Recorded material will be suitable for evidential use as required by courts to be admitted as evidence in accordance with BS 8495.

Camera and lens selection will be based upon an image detail for the 'recognition' of targets. This can be increased to an 'identification' level for additional capital expenditure.

Low light infrared cameras will be provided externally to negate the need for additional external lighting coverage.

Cameras will be a minimum of 4MP resolution providing high-definition images.

Cameras will have IP based technology interconnectivity and connected to outstation equipment via Category 5e cabling.

Cameras will be bullet type units installed on wall mounted brackets.

The new system will be designed to the following standards:

British Standard on the minimum requirements for a Video Surveillance System (BS EN 62676-1-1)

British Standard on requirements for the selection, planning, installation, commissioning, maintaining and testing of CCTV systems (BS EN 62676-4)

British Standard on security, performance and connectivity of video transmissions (BS EN 62676-1-2)

British Standard on the design, installation, commissioning, maintenance, operation and remote monitoring of detector-activated CCTV (BS8418)

3.10 Mechanical Wiring Installation

The contractor shall provide all necessary power supplies required for items of mechanical equipment including fans, VRF systems pumps and ventilation systems.

The Contractor shall include for all necessary containment associated with the Mechanical Wiring installation, to meet the requirements.

Mechanical power supplies shall be arranged as radial circuits wired from the local distribution board/Main LV Panel and shall be protected via a suitable protective device.

Local isolation points shall be provided for each item of equipment using electrical power, rating as indicated.

3.11 Earthing & Bonding Installation

The contractor shall provide a complete earthing and bonding system as required by BS 7671 18th Edition and BS 7430 Code of Practice for Earthing.

Supplementary bonding shall be carried out utilising 2.5 mm2 PVC green and yellow copper conductors protected to the point of termination. Where unprotected, the supplementary bonding conductors shall be 4 mm2 with a green and yellow PVC sheath.

The hot and cold supplies and wastes to all sinks shall be cross-bonded along with metal sink units. All suspended ceiling grids and raised access floors shall be cross-bonded and all supplementary bonding shall be connected to the nearest circuit protective conductor.

Care shall be taken to ensure that all joints are properly made and bonded to ensure continuity. The main equipotential bonding conductors shall be connected to the earth bar mounted adjacent to the main switchboard.

All electrodes and connections to the earth bar shall have test links and cables.

The earthing installation shall comprise all conductors, conduits, trunkings, cross bonds and separate individual circuit protective conductors to form the complete system.

3.12 Structured Cabling

The contractor will provide a new category 6 structured cabling installation between the Radio Room and the outlets shown on the layout drawings.

The structured cabling system will support voice, data and wireless network applications within the building.

The structured cabling installations shall be completed in accordance with the drawings, and this specification and shall meet the following standards and be installed to the satisfaction of the Clients IT Consultant:-

- British Approvals Board for Telecommunications.
- Relevant Oftel and DTI Regulations.
- BS 6701: Codes of Practice for the Installation of Apparatus Intended for Connection to certain telecommunications Systems.
- BS 6301: Specification for Electrical Safety requirements for Apparatus Connected to Telecommunications Networks.
- BS 7718 (1996): Code of Practice for the Installation of Fibre Optic Cabling.
- BS EN 50173: Information Technology - Generic Cabling Systems for Customer Premises Cabling.
- ISO IS 11801: Information Technology - for Customer Premises Cabling.
- ISO 8877: Connector Specification for Basic rate ISDN.
- IEC 874-13: SC-D Connector for Optical Fibre Cabling.
- IEC 793, 794, 332 (part 3), 754 (part 2), 1034.

All telecommunications connecting hardware and cable must be made by an ISO 9001 Certified Manufacturer.

The supply, fixing, testing and commissioning of the structured cabling installation shall be completed by a specialist installer.

The Contractor shall be responsible for the management of the nominated specialist, the contractor shall ensure that they work in accordance with the site management systems employed in this site in terms of Health and Safety and meet the requirements of the construction programme.

The cabling infrastructure shall support both voice and data services using standard UTP category 6 LZH structured cabling techniques.

Outlets will be in the form of flush RJ45 CAT 6 sockets located within back boxes. Existing skirting and dado trunking will be reconfigured to accommodate the removal of existing outlets and the provisions of new outlets.

As defined in the ISO IS 11801 standards specification and shall have spring loaded shutters to prevent the ingress of dirt and dust.

All eight conductors in each cable shall be connected to a single RJ45 socket at the wall box outlets and to the patch panels, located in the local distribution rooms cabinet(s). The construction of the RJ45 socket and termination practices shall be such that the twists in each UTP wire pair are maintained to within 12mm of the termination. The outer sheath of the cable shall also only be stripped back for the minimum distance required to terminate the cable.

Strain relief shall be provided for each cable at the wall boxes and patch panels such that strain on the cable conductors is avoided.

Pinning and pairing of the terminations shall be in accordance with IS 887. Numbering and colour coding of the wire pairs shall be as defined in EIA/TIA 568 using the T568B option. The standard used shall be stated and shall be common throughout the installation.

Cabling will be installed on new dedicated cable trays routed through the floor voids. Care shall be taken to avoid kinking cables or bending them at sharp angles (i.e. less than the minimum bend radius specified for the particular type of cable). Cable ties shall not be tightened so as to distort the outer sheath of the individual cables.

All cables shall be labelled to indicate their corresponding individual source and destination outlet number.

Each wall box face plate outlet shall be labelled and this shall correspond with the building labelling scheme.

The Specialist shall agree with the client the method of the labelling scheme, these shall be issued to the Services Consultant for approval.

The cabling installation shall be thoroughly tested to confirm that components and installation practices meet the defined standards. Tests shall be carried out in accordance with the agreed test methodology. Full records shall be maintained of all testing carried out and the results of those tests.

The test methodology shall identify:

i. the manufacture, type and model of all test equipment to be used.
ii. the procedures to be employed for carrying out tests.
the format of test results produced by the test procedures.

Each item of test equipment shall be appropriate to the tests for which it is to be used. Each item of test equipment used to measure performance data shall be accompanied by a valid calibration certificate. UTP test equipment shall be identified as reaching the Level 1 or Level 2 accuracy specifications as defined in ELAITIA TSB67

The Engineer shall witness test 10% of the outlet connections (randomly selected). If any of these tests fail to meet the required standard, then a further 10% shall be checked. If repeated failures occur during witness testing, then the full cabling installation shall be re-tested by the Contractor.

All horizontal and riser cables shall be tested, following installation, for:

i. Pair polarity
ii. Crossed pairs
iii. Continuity
iv. Short circuits

In addition 20% of the UTP horizontal cables will be tested for:

i. Attenuation

ii. Cross talk
iii. Length

The results for attenuation, cross talk and attenuation/cross talk ratio (ACR) shall comply with the requirements of ISO IS 11801 clause 6, for class D links. Each pair in each link shall be tested from both ends and the worst pair results shall be used as a measure of compliance.

All results which fall into the area of uncertainty between the accuracy of the test equipment and the specified limits of Class D shall be marked as suspect in the test schedules.

The cabling installation shall carry a warranty for at least 15 years from the date of acceptance. The warranty shall cover components and system performance to the required standard for all elements of the cabling system.

Limits to and exclusions from the warranty shall be identified.

A description of the repair service, reporting methods, repair times and escalation procedures shall be included within the Contractors proposal document.

As-built drawings shall be supplied by the contractor showing the locations of and identifiers for all:

Horizontal cable routing and terminations
Telecommunications outlets/connectors
Backbone cable routing and terminations

The contractor shall remove the existing data installations within the new tenancy demise. This will include the removal of cabling and blanking of vacant back-boxes.

3.13 Intruder Detection & Alarm System

This work shall be undertaken by a trade body approved specialist.

The contractor shall allow for the removal of the existing intruder alarm system and installation of a new system in accordance with the layout drawings.

The new system shall provide detection and control to a Grade 3 security level system.

The new system will comply with:

DD243 - Code of Practice for installation and configuration of intruder alarm systems designed to generate confirmed alarm conditions.

BS8473:2006 - Code of Practice for Intruder and hold-up alarm systems – Management of false alarms

BSEN50131Series - European Standards on Intruder Alarms

PD6662:2004 - Guideline for the implementation of BS EN 50131-1:2004

The new installation shall consist of:

- 1 No. central control panel that can accommodate inputs from detectors and provide relay outputs for sirens etc that are hard wired to the central control panel itself and which also includes an on board communicator which allows alarm conditions to be forwarded via the telephone network to an alarm monitoring company.
- 1No. code pad which provides a user interface with the alarm system.
- intrusion detectors.
- External door contacts.
- 2No. external sounder units.
- 2No. internal sounder units.

The central control panel will be located within the Radio Room. The code pad will be located in the new reception area.

The control panel will incorporate at least the following features. It will:

be micro-processor controlled and capable of monitoring at least 256 individual zones.
in an event memory be capable of reviewing the last 1000 events (which will include all alarms and keypad entries),
be capable of having a minimum of 5 user keypads connected
have code pads capable of giving plain English descriptions of all alarms ie PIR Administration Office

Tenderers shall submit comprehensive details of the proposed alarm control panel together with a comprehensive list of similar installation and proof of experience and competence in the installation and maintenance of the control panel.

The purpose of the system is to detect encroachment, and the change of state of any other detection devices connected to the system, and advise "alarm" conditions to selected monitoring locations.

The system is to be supplied with sufficient inputs to meet the requirement for each sensing device in the system to be separately identified by number and text and to be capable of being programmed independently. These inputs are generally referred to as "zones".

Individual input **"zones"** shall be capable of being assigned to **"areas"** which have common security attributes and which can be identified by an "area number" and "area name", allowing multiple inputs to be set/unset simultaneously by operator control of the area rather than operator control of each individual input.

Remote user keypads shall be supplied and installed at each of the locations described in the Site Specific Information. The remote arming stations are the user interface with the intruder alarm system and they have been positioned to provide convenient access to the intruder alarm system. Security functions able to be performed at the remote arming stations are:

a) system set-up or servicing programming,
b) user set/unset of areas,
c) display of alarm conditions by "area" and by input, and
d) user acknowledging of alarms by "area" or by input.

Remote user keypads shall visually display via LED or LCD display, the current set or unset status of any of the areas, and allow LCD display of the sealed/unsealed status of any of the inputs.

Remote user keypad functions able to be performed by users generally are restricted to those functions required for the normal execution of their duties. Typically users will be able to set/unset the intrusion detection system in areas where they work or are required to visit at times that the system is normally set, and to acknowledge and clear alarms that they have responded to.

All zone isolation will be carried out at the remote user keypad. The control panel shall be configured so that it is not possible to "auto-isolate" zones or areas, ie at each subsequent resetting of the control panel any zone or area previously isolated will auto de-isolate.

Ancillary equipment used for interfacing with the system, ie power supplies, siren and strobe connections, alarm input boards, relay output cards etc, shall be approved by the manufacturer as acceptable for the purpose. Written confirmation will be required stating:

a) type of ancillary equipment approved, and
b) intended purpose.

Panels shall be of sufficient capacity to provide for individual connection of all intruder detectors required for complete coverage of each area plus 25% spare capacity.

LAN cabling shall be as recommended by the equipment manufacturer, and for at least twisted spare cores, LAN cabling shall be shielded.

The terminals will be so arranged that movement of the connectors is limited and in the event of a conductor breaking away or becoming detached from a terminal, bare parts cannot come into contact with uninsulated parts with different voltages.

Batteries shall:

a) be sealed lead acid type batteries which are rechargeable and sized to provide specified mains failure stand-by capacity capable of operating the system in quiescent state for a minimum period of eight hours,
b) be mounted correctly on their base and not in a vertical plane, ie in end or edge, and
c) be from the same manufacturer and have the date of installation clearly marked on them.

Control panel power supplies will not be used to supply power to output devices (eg sirens) except as provided for external sirens.

Siren power supplies shall be sized to provide full alarm load plus 10% to allow for battery charging and shall be independent of fire alarm siren power supplies. They will provide an output signal to indicate battery low/mains fail.

All detectors, control panels and equipment housings and terminating junction boxes shall be fitted with anti-tamper devices. They shall be wired in such a manner that any attempt to compromise the system will give a tamper indication when the system is unset and an alarm indication when the system is set.

All new detectors supplied will meet or exceed the following minimum criteria:

a) have a 15 metre minimum detection distance and be highly reliable. Smaller detection ranges are acceptable if they are adequate for the area being protected.
b) have more than 40 detection zones in a standard lens.
c) have digital signal processing to reduce false alarms.
d) have sealed optics.
e) have selectable one zone (two pulses) or two zone (four pulses) pulse count.
f) have an LED indicator for alarm testing which can be switched off or covered
g) have a tamper circuit.

The layout plan(s) in the Site Specific Information indicate the areas to be protected. Detectors are to be installed in the most technically appropriate position with due regard to the manufacturer's recommendations and code requirements. Special attention is drawn to those areas which have louvre windows where adjacent curtains and hanging objects may be susceptible to draughts and areas that may be subjected to sudden changes of temperature. Avoid positioning detectors where they may cause a false alarm. To allow for future possible curtains, PIR's are to be located a minimum of 300mm from the corner of the window area.
Each PIR installed shall provide the manufacturers specified coverage of the room or area in which it is installed. The detector installed shall be chosen to provide optimum coverage for the area.

Due consideration shall be given to avoid the siting of PIR's in close proximity to "permanent magnet" devices such as "cone" type speakers. The minimum separation between PIR's and these types of devices is to be 300mm.

Failure to achieve the coverage so indicated on the layout plans will require the security contractor to install additional detectors as may be required to achieve the indicated coverage, at no additional cost to the contract.
All cable entry points and other openings are to be sealed with neutral cure silicone rubber or other suitable sealant to prevent entry of dust or insects. The sealant used will not adversely affect the device.

Allow to supply, install and connect magnetic proximity devices to the intruder alarm system where specified in the site specific Information.

All magnetic proximity devices (reed switches) for hinged doors shall:

a) have the magnetic portion of the device recessed into the head of the door, not more than 75mm in from the outer (handle) edge of the door.
b) have the reed switch portion recessed in the head of the door frame and aligned with the magnetic portion of the device.
c) the hole size drilled will be such that the devices are a tight press fit and cannot be easily removed.

Unless otherwise specified, all new security systems will have installed the following sounders:

Internal Intruder Activation Signal. Sounder to be a Piezo type siren mounted on a standard size single blank plank. The siren is to be recessed into either the ceiling or the top of the wall, no closer that 300mm to a passive infra red detector. The colour is to be white. Intruder alarm system sirens must sound distinctively different to fire alarm sirens.

External Intruder Activation Signal. Siren enclosures shall be of full stainless steel construction and double skinned, have integral rechargeable batteries with charger and be tamper protected front and rear, have a blue strobe light that will upon receiving an alarm condition will continue to flash until the alarm panel has been reset, have a siren that will upon receiving an alarm condition sound until manually reset or for a maximum period of 8-10 minutes before ceasing, shall be connected directly to the control panel and not to an auxiliary power supply.

External audible alarms should be sited prominently, out of normal reach and in a position carrying minimal risk of accidental or intentional damage to the device or connections. Cables to the siren shall be given mechanical protection to ensure that no accidental mechanical damage is likely to occur. Refer to the Site Specific Information for location for external audible alarms.

In the event of an activation, by the Intruder Alarm System all sirens of that system will sound in all areas.

Adequate warning signs are to be fitted to all buildings advising the public that an alarm is fitted. Signs should be visible from all external areas and should not be less than 150mm diameter/diagonal.

The intruder alarm system shall be remote monitored. Intruder alarm panels shall incorporate on-board communicators (diallers) supporting Contact ID communication of alarm conditions at a 24 hour alarm monitoring company, ie any alarm activation or operator activity from the system shall identify the precise input and the input description or the operator action at the alarm monitoring company.

The communicator shall report to the primary telephone number at the 24 hour monitoring company and report to a different back-up number in the event that the primary number is unavailable.

The communicator shall attempt to report a minimum of 8 times to both the primary and back-up numbers.

Each zone shall report an alarm activation and alarm restore conditions to the monitoring company when the alarm is set. The restore will not constitute a cancel of the alarm condition until the system is disarmed on site.

Each zone shall report a "trouble" or "tamper" signal to the monitoring company immediately (and be connected as a 24 hours input circuit) in the event that physical tampering occurs with an input device, input enclosure or cabling. The restore signal shall be sent upon restoral of that input but shall not constitute a cancel until the system is disarmed on site.

"Bypass" of a zone(s) and "bypass" restore conditions shall be reported to the monitoring company. The bypass shall be set up so that all bypasses are removed on disarming of the system (or area). The system should report bypassed zones on each occasion that the panel is armed.

Where the system is partitioned, the set/unset reports shall identify the area and user information

"Mains failure" and "battery low" alarm and restore conditions are to be reported to the alarm monitoring company. The restore signals will constitute a cancel of the event.

All alarm conditions reported to the monitoring company require an alarm response procedure to be programmed into the monitoring company computers such that the actions to be taken by the monitoring company for the alarm received are automatically presented at their PC's whenever that alarm is received.

Typically, alarm monitoring company response procedures are required for:

a) intruder alarm activated,
b) intruder alarm not set when it should be,
c) intruder alarm system defect,
d) intruder alarm system tamper,
e) mains fail,
f) battery low.

The Installer shall allow to liaise with the Security Consultant and the Client to determine the procedures to be followed in the event of the typical alarm activations, ie who is to be contacted and who is to respond. The installer shall develop a series of procedures such that each alarm being reported off-site can have assigned to it the required response procedure. Note: Response procedures vary between school hours and after hours.

The Installer shall provide this information to the alarm monitoring company for their programming into the system and request a printout from the monitoring company computers once they have input the information. The Installer shall confirm that site requirements have been input correctly. Both the Installer's information and the alarm monitoring company printout shall be available for inspection by the Commissioning Inspector.

The Installer shall confirm that alarm activations on site are accurately represented at the monitoring company and the correct alarm response procedures for the type of alarm received are available to the alarm monitoring company operator.

Unless otherwise specified nominal 0.5mm^2 stranded security cable is to be used, cable of a cross sectional area less than 0.44mm^2 will not be acceptable. Untinned copper wire is permissible however due consideration will be given to the environmental conditions prevailing in certain areas. If untinned copper wire is used it is not permissible to make external connections or joints.

Where recommended by the manufacturer 0.2mm^2 screened data cable may be used in the installation of keypads, terminals, or expanders/DGP's. The LAN cable will be "Daisy chained" configured. It will provide reliable protection against static and lightning protection against lighting induced transient if requested in the Site Specific Information.

Except where the manufacturer recommends otherwise, all data information cable and cables in areas subject to high "electrical noise" interference are to be screened.

Wiring to output devices (e.g. sirens etc.) will be separate to wiring used for input devices (e.g. PIR's, etc.). Output devise wiring need not be shielded. It is not permissible to include output and input devices in the same multiwire.

All wiring will be concealed where practical and be neatly clipped in position to prevent damage.

In the case of internal cabling where cables are surface run they will be concealed and protected in neat cap which is securely fastened. Due consideration will be given to the aesthetics of the location.

Under no circumstances will it be acceptable to attach cables and/or conduit directly to uninsulated heating pipes or other service fittings.

Under no circumstances shall any cables be jointed. All cables shall be terminated at each device.

4.0 Testing & Commissioning

All testing and commissioning shall be carried out in accordance with BSRIA and CIBSE Commissioning Codes, together with test procedures defined within British Standards and Standard Specification Clauses.

The entire (new and existing) electrical installation shall be tested, inspected and certified upon completion of the works in accordance with BS7671.

Any departures and non-compliances in the existing installations will be recorded and reported to the consultant.

4.1 Visual Inspection

A visual inspection shall be made to verify that all installed electrical equipment is –

- In compliance with the applicable British Standards and European Standards
- Correctly selected and erected
- Not visibly damaged

4.2 Electrical Testing

The following items shall be tested in the sequence indicated following the standard methods of testing as prescribed in the IEE Regulations.

- Continuity of ring final circuit conductors
- Continuity of protective conductors
- Insulation resistance
- Insulation of non-conducting floors and walls
- Polarity
- Earth fault loop impedance
- Operation of residual current devices

4.3 Certification

Following the inspection and testing, Completion and Test Certificates shall be handed over to the Engineer.

The Electrical Completion Certificate shall take the form of that prescribed by the 17th Edition of the IEE Regulations and a comprehensive set of tabulated circuit test results shall also be handed over based on the Electrical Contractors Association Standard Form.

All electrical services certificates shall be bound together into a manual for presentation to the Client following verification by the Engineer.

4.4 Commissioning

The Contractor shall be responsible for ensuring that all items of plant and equipment are commissioned and certified by suitably qualified persons.

Prior to commissioning the Contractor shall give the Engineer two weeks written notice so that arrangements can be made for the Client's Representatives and the Engineer to witness the commissioning, if so desired.

4.5 Building User Manual

The Contractor shall allow providing a Building Regulations Part L log book.

4.6 Induction & Training / System Demonstrations

The Contractor shall be responsible for ensuring that the following elements of the Electrical Services Installation are fully demonstrated to the Client.

- Lighting Controls
- General Electrics

These demonstrations shall be separate to the witness testing of the services installations carried out for the Engineer.

All demonstrations shall be carried out prior to handover, by suitably qualified personnel (including the various Specialist Sub-Contractors), in the presence of the Tenant for the purposes of training (and/or his nominated representative) and the Engineer.

The Contractor shall submit a fully detailed schedule of all system demonstrations to the Engineer for consideration well in advance of the proposed dates/times.

4.7 Provision of "As Installed" Drawings & "O&M" Manuals

When the completed Works covered by the Specification have been taken over by the Client, the Contractor shall hand over to the Engineer 2No. paper prints of each one of a set of Drawings prepared by the Contractor, the set being known as the "As-Installed" Drawings. These Drawings shall record all details relating to the complete electrical installation within the premises.
All As-Installed drawings shall be completed on AutoCAD DWG format files. All files shall be copied onto Disks, for presentation to the Client. Exact file format version, Disk format shall be agreed with the Client before presentation.

At the time of handover, the Contractor shall provide 2No. Lever-arch maintenance manuals for each of the new units. These shall detail materials, operation certificates and operation manuals relevant to the installations.

4.8 Provision of Builders Work and Coordinated Drawings

The Contractor shall be responsible for the preparation of fully detailed and dimensioned drawings to show the full extent of all Builders Work associated with the Electrical Services Installation.

The drawings should detail, (but should not be limited to,) the following:-

- Holes through floors/slabs
- Holes through internal/external walls

- Backboard/running board supports
- Foundation/base details
- Ancillary structural steelwork
- Tracking/recesses
- Boxing-out/painting of exposed services

The Contractor shall be fully responsible for both the accuracy and the completeness of the Builders Work drawings, and for ensuring that all attendances are carried out on site to his requirements, to the satisfaction of the Engineer.

The Contractor shall likewise by responsible for the preparation of fully co-ordinated Electrical Working drawings prior to the commencement of the installations.

The drawings should be prepared in conjunction with the architectural, structural, civil, mechanical and other sub-contract packages, for a complete integration of services, and to demonstrate a full appreciation of same. The Contractor should contact each member of the design/construction team directly to acquire the necessary information to enable the preparation of all drawings.

A full set of installation drawings shall be retained on site, updated to reflect any design revisions and to record deviations as the work proceeds.
Note: All drawings shall be prepared in AutoCAD format.

The Contractor shall submit both the "Builders Work" Drawings and the "Co-Ordinated Working" Drawings to the Engineer to afford comment (and to the Main Contractor) prior to the commencement of the installation.

5.0 Materials & Workmanship

The Contractor shall ensure that all materials and equipment shall be new and of the best quality, most suitable for the purpose specified and shall comply with all relevant British and European Standards Specifications. They shall be fully capable of withstanding variations of temperature and humidity arising under normal working conditions without distortion or deterioration or the setting up of undue stress in any part, and without affecting the suitability of the various parts of the works with which they must perform.

The Engineer reserves the right to reject any part of the installation, which is of inferior quality/standard, and/or does not comply with the complete specification, in which case the Contractor shall carry out the necessary remedial work at his own expense, and without delay to the contract.

The complete works shall be carried out with due regard to the needs of inspection, cleaning, repair, replacement and the satisfactory operation under sudden variations of temperature, loading etc., as may be met under normal working conditions.

The Contractor shall be responsible for the adequate storage and protection of all materials and equipment supplied to and by him under the Contract, until the installations have finally been accepted.

Any damaged plant or materials shall be removed from site and replaced at no time or monetary impact to the contract.

During the defects liability period, the Contractor shall be responsible for the proper performance of the installations provided under this contract.

Any defects due to design, workmanship or equipment by revision of its selection, manufacture, operation or application shall be rectified by the Contractor without cost to the Client.

The defects liability period shall be 12 calendar months from the date of issue of the practical completion certificate.