

### 3 GENERAL DESCRIPTION OF THE PROJECT

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3.1	GENERAL.....	2
3.2	SCOPE OF WORKS .....	2
3.3	MODIFICATIONS.....	3
3.4	BASIS OF DESIGN .....	3
3.5	INCOMING ELECTRICITY SUPPLY .....	3
3.6	MAINS DISTRIBUTION GENERAL .....	3
3.7	SUB MAIN DISTRIBUTION .....	4
3.8	NEW DISTRIBUTION BOARDS .....	4
3.9	CONTAINMENT & SUPPORT SYSTEMS .....	5
3.10	SMALL POWER INSTALLATION .....	5
3.11	INTERNAL LIGHTING & LIGHTING CONTROLS.....	6
3.12	EMERGENCY LIGHTING INSTALLATION.....	7
3.13	EXTERNAL LIGHTING.....	7
3.14	FIRE DETECTION & ALARM SYSTEM.....	8
3.15	REFUGE ALARM.....	8
3.16	LIGHTNING PROTECTION SYSTEM .....	8
3.17	MODIFICATION TABLE .....	10

## 3.1 General

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This section of the manual confirms the extent of the Electrical Engineering works carried out under this contract. It also confirms any design criteria followed and provides a general description of each service installed or altered during the works and details of plant/equipment. The description should be read in conjunction with the record drawings, installed equipment details and manufacturer's literature.

## 3.2 Scope of Works

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The electrical installation was designed by Paine Manwaring Ltd on a contractor design and build basis.

The electrical systems described herein were supplied, installed and commissioned by Paine Manwaring Ltd and its specialist subcontractors.

The Electrical Services Installation provided under this contract comprised:

- Mains Distribution
- Sub-main Distribution and Metering
- Installation of new Distribution Boards
- Installation of cable containment systems
- Final Circuit Wiring
- Small Power Installation
- General Lighting Installation including supply of luminaires
- Emergency Lighting Installation
- External Lighting Installation
- Refuge Alarm Systems
- Fire Detection & Alarm System
- Lightning Protection System
- Solar Photo Voltaic Installation
- Earthing & Bonding
- Testing & Commissioning of completed Works

## 3.3 Modifications

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To ensure the safety and integrity of the installation is maintained it is essential to keep a record of any modifications carried out.

At the end of Section 3 a 'modification table' is provided that should be completed whenever the installation is modified by the engineer carrying out the modification.

## 3.4 Basis of Design

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A performance specification detailing the Employers Requirements was issued by the Client. The electrical installation design specification, drawings and equipment schedules were then produced by Paine Manwaring.

The design concept was to provide an installation complying with all latest British Standards and best practice guides, demonstrating intelligent design, whilst bearing in mind the need for minimisation of energy use and the adoption of sustainable construction wherever practicable, within the project budget.

The general design objectives are summarised below:

- To provide good quality, reliable plant and equipment
- To use energy efficient plant and equipment to minimise energy consumption
- To meter energy consumption in compliance with Part L2 of The Building Regulations
- To provide flexibility with regard to comfort, control of plant and future use
- To consider ease of maintenance
- Installation to comply fully with BS7671 17<sup>th</sup> Edition of the IET Wiring Regulations.

## 3.5 Incoming Electricity Supply

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Refer to Drawings:  
**EC4495-E800 – Ground Floor Electrical Services**

The incoming supply enters the building via the Ground Floor electrical riser cupboard and terminates into the panelboard.

## 3.6 Mains Distribution General

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The new building is provided with a system of new LV main and sub-main distribution in compliance with BS7671, BSEN60947, BSEN 60439 and other British Standards and Building Regulations.

The system includes a new distribution board, circuit protection devices, metering of outgoing supplies, cable containment, cable cleats, cable glands, circuit cabling, final connections and testing/commissioning as necessary to provide a complete working system.

## 3.7 Sub Main Distribution

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Refer to Drawings:

**EC4495-E800 – Ground Floor Electrical Services**

**EC4495-E801 – First Floor Electrical Services**

**EC4495-E802 – Second Floor Electrical Services**

Sub-main cables run from the main panel board to the distribution boards shown on the drawings and test certification.

The cable is a multicore XLPE/SWA/LSF secured using proprietary cable cleats where exposed.

Sub-main cables are labelled at either end to confirm the cable size/cores/type where it is served from and the equipment the cable serves.

## 3.8 New Distribution Boards

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Refer to Drawings:

**EC4495-E800 – Ground Floor Electrical Services**

**EC4495-E801 – First Floor Electrical Services**

**EC4495-E802 – Second Floor Electrical Services**

New Miniature Circuit Breaker (MCB) Distribution Boards have been installed to serve the new units as shown on the drawings and detailed on both the Equipment Schedule in Section 6 and the Electrical Installation Test Certificate.

The distribution boards installed on this project are manufactured by the Wylex chosen from the NH range of distribution boards. For more specific details refer to the equipment schedule in Section 6.

Each board is fitted with a 125Amp switch disconnecter (mains switch). The boards are of welded 'case end' metal construction with removable gland plates to BS EN 60439 part 1 & 3, and are provided with an integral door latch and lock such that it can only be opened by authorised personnel.

In accordance with good practice each board has spare capacity to enable additional circuits to be installed and is fitted with integral isolators, appropriate proprietary blanks, an engraved laminate label indicating the board's reference details and a locally mounted typed circuit chart contained in a clear plastic wallet or picture frame.

Final outgoing LV circuits are protected using MCB/RCD/RCBOs with solid neutral, sized according to load and generally selected as Type B for utility power and Type C for lighting. Reference should be made to the Electrical Installation Certificate provided in Section 7 to confirm the specific protective device type, characteristics and size.

## 3.9 Containment & Support Systems

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Refer to Drawings:

**EC4495-E800 – Ground Floor Electrical Services**

**EC4495-E801 – First Floor Electrical Services**

**EC4495-E802 – Second Floor Electrical Services**

A complete system of new support systems and containment was installed throughout the building such that the new cabling systems are enclosed within a containment system as required by the BS7671, The IET Wiring Regulations and BS EN 50174.

### **Steel Basket**

Generally cabling leaves the local distribution board as show on the drawings and extends under the floor.

## 3.10 Small Power Installation

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Refer to Drawings:

**EC4495-E800 – Ground Floor Electrical Services**

**EC4495-E801 – First Floor Electrical Services**

**EC4495-E802 – Second Floor Electrical Services**

A new Small Power installation was provided to the building including supplies to all sockets, fixed equipment and final outlets as shown on the drawings.

The complete installation was carried out in compliance with BS7671 the 17th Edition of the IET Wiring Regulations and the Building Regulations.

In general, power circuits are wired from the local distribution board and routed via the containment system to final outlets and equipment.

Standard switched socket power outlets, connection units etc are all manufactured by MK Electric from the MK LogicPlus range.

Powertrack mounted under the floor serves floor boxes in the main areas.

Further clarification of circuit wiring and protective device ratings is detailed on the Electrical Installation Test Certificate in Section 7 however general comments are as follows:

Miscellaneous Equipment – 13 Amp switched and unswitched fused connection units and flex outlet plates installed and provided with supplies as indicated on drawings to enable specialist sub contractors to install a complete working system e.g Fire Alarm etc

## 3.11 Internal Lighting & Lighting Controls

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Refer to Drawings:

**EC4495-E800 – Ground Floor Electrical Services**

**EC4495-E801 – First Floor Electrical Services**

**EC4495-E802 – Second Floor Electrical Services**

A complete system of internal lighting is installed to the new building incorporating a 100% LED luminaire lighting scheme with energy efficient lighting controls appropriate for each area. Refer to drawings and cross reference with the luminaire schedule in Section 6.

Luminance and glare levels have been designed to comply with the requirements of the CIBSE Code for Interior Lighting, Part L of the Building Regulations, BSEN 12464 and Layouts and Dimensions 4 – Lighting Systems in Schools amongst other guides and regs.

Lighting circuits are wired from the distribution board as radial circuits using 1.5mm<sup>2</sup> PVC Low Smoke and Fume (LSF) BASEC approved and marked 624B (twin and earth) cables.

Circuit wiring leaves the distribution board and is then routed through the containment system to either centralised Lighting Control Modules or Plug-In Ceiling Roses depending on location.

The distribution system utilises Standard Lighting Control Modules installed in the ceiling void into which luminaire, sensor and switching leads are plugged.

Elsewhere in adjacent smaller rooms and store cupboards final connection of luminaires is achieved using 'plug-in' ceiling roses to allow easy disconnection for maintenance. The final cable between the luminaire supply terminals and the plug is in 1.5mm<sup>2</sup> heat resistant 318B LSF flexible cable.

### **Lighting Controls**

As mentioned above the building is provided with energy efficient lighting controls.

- Lighting is controlled generally by PIR absence detection that turn the lights on when occupied and off when unoccupied. The PIR controls are adjustable for sensitivity and time delay.
- External lighting is controlled via a timeclock and photocell. The photocell holds the lighting off until the daylight levels decrease to a point at which the external luminaires are required.

The entire lighting installation was tested, commissioned and demonstrated on completion with certification provided in Section 7.

## 3.12 Emergency Lighting Installation

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Refer to Drawings:

**EC4495-E800 – Ground Floor Electrical Services**

**EC4495-E801 – First Floor Electrical Services**

**EC4495-E802 – Second Floor Electrical Services**

Emergency lighting provision, complying fully with the latest BS5266 requirements and European Standards is achieved using a combination of maintained emergency luminaires, standalone emergency luminaires, maintained illuminated exit signage and normal service luminaires fitted with emergency battery/inverter modules and a green LED to provide clear indication that the mains are healthy and charging the unit.

The electrical supply for both the emergency luminaires and the battery/inverter modules is from a live connection point on the local lighting circuit to which the normal service luminaires are also connected.

Each circuit incorporating emergency luminaires has been provided with an Emergency Key test switch, mounted within a grid switch arrangement adjacent the local distribution board, to enable mandatory routine testing.

All emergency luminaires and emergency exit signs provide illumination of 3-hour duration in the event of failure of the mains power supply. Emergency luminaires are generally indicated on the lighting drawings and luminaire schedule with an 'E' suffix.

The installation was completed and tested in accordance with BS 5266 and a certificate of completion is provided in Section 7.

## 3.13 External Lighting

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Refer to Drawings:

**EC4495-E800 – Ground Floor Electrical Services**

**EC4495-E801 – First Floor Electrical Services**

**EC4495-E802 – Second Floor Electrical Services**

External lighting is provided as follows:

Emergency bulkhead luminaires are fixed to the exterior façade adjacent to all exits from the building to illuminate escape routes on power failure and to cover any further pathways as required by building control.

General lighting to provide security around the building perimeter is provided by LED wall mounted luminaires.

### **External Lighting Controls**

External lighting controls are operated by an analogue time switch working in conjunction with a dawn to dusk photocell mounted at high level on the exterior building façade.

## 3.14 Fire Detection & Alarm System

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Refer to Drawings:

**EC4495-E800 – Ground Floor Electrical Services**

**EC4495-E801 – First Floor Electrical Services**

**EC4495-E802 – Second Floor Electrical Services**

A new Fire Detection and Alarm System has been installed consisting of break glass call points, smoke detectors, heat detectors, sounders and a single loop control panel.

The system has been installed and commissioned by the specialist: Southern Fire Alarms.

The system has been designed in accordance BS5839 Part 1:2002 and the design category L1.

The main central Fire Alarm Panel installed in the 'first floor' entrance is an MxPro4 analogue addressable panel manufactured by Advanced Electronics.

The system was cabled using FP200 fire alarm cable installed on dedicated cable basket and clipped direct to the building fabric where it leaves the basket.

New automatic smoke detection, heat detection, manual callpoints, visual alarm devices (VADs) and audible alarm warning devices from the Apollo Discovery and XP95 ranges are installed as indicated on the drawings.

Power to the fire alarm system is provided by means of 24-volt batteries and a charger unit mounted integrally within the fire alarm panel. The batteries can maintain the fire alarm systems operation for 24 hours and allow the audible alarms to sound for 30 minutes thereafter.

The installation was commissioned at completion by the specialist with certification provided in Section 7.

## 3.15 Refuge Alarm

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Refer to Drawings:

**EC4495-E800 – Ground Floor Electrical Services**

**EC4495-E801 – First Floor Electrical Services**

**EC4495-E802 – Second Floor Electrical Services**

A refuge alarm has been installed with outstations on the first and second floor.

## 3.16 Lightning Protection System

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The lightning protection specialist Orion Lightning Protection was employed to install a lightning protection system in accordance with BS EN 62305.

At completion the installation resistance was tested at each earth point with the complete system not exceeding 10 ohms. The resulting Test Certificate complying with BSEN 62305 is provided in Section 7.



