

Electrical Services Specification

READING INTERNATIONAL LOGISTICS PARK

GENERAL LIGHTING

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1.0 Performance Objectives

To provide a complete internal artificial lighting system throughout each unit (excluding the warehouse), that will meet the design criteria and reflect the architectural and aesthetic requirements of each area and location respectively.

To ensure the internal lighting system solution and installation provides a safe, comfortable, balanced and interesting visual environment. To consider the vertical illuminance of surfaces within an environment, in conjunction with, the recommended horizontal working plane illuminance.

To achieve good quality colour appearance and colour rendering.

To achieve the recommended levels of illuminance and luminance by selection of particular luminaire, lamp source and optical control, together with the selection and recommendation of the associated environmental reflectance properties.

To ensure that all luminaires and ancillary controls are suitably selected to be compatible with the environment in which they are installed.

2.0 Design Parameters

Comply fully with the edition (including amendments) of each of the following, current at the time of tender:

- BS 7671 Requirements for Electrical Installations. IET Wiring Regulations
- The Building Regulations – Part L – The conservation of fuel and power
- The Building Regulations – Part M – Access and facilities for disabled people
- Health and Safety (Display Screen Equipment) Regulations. (SI 1992/2792 and HSE L26)
- Requirements of the Building Control and Fire Officers
- 2000/55/EC Directive of the European Council – Energy efficiency requirements for ballasts for fluorescent lighting.
- BS 67 Specification for ceiling roses
- BS 136313 A plugs, Socket-outlets and adaptors
- BS 5266-1 Emergency lighting Part 1: Code of practice for the emergency lighting of premises
- BS 5588 Fire precautions in the design, construction and use of buildings
- BS 6387 Specification for performance requirements for cables required to maintain circuit integrity under fire conditions
- BS 6500 Electric cables. Flexible cords rated up to 300/500V, for use with appliances and equipment intended for domestic, office and similar environments
- BS 6972 Specification for general requirements for luminaire supporting couplers for domestic, light industrial and commercial use
- BS 7211 Electric cables. Thermosetting insulated, non-armoured cables for voltages up to and including 450/750V, for electric power, lighting and internal wiring, and having low emission of smoke and corrosive gasses when affected by fire

- BS 7346-6 Components for smoke and heat control systems Part 6: Specification for cable systems
- BS 9999 Code of practice for fire safety in the design, management and use of buildings
- BS EN 81 Safety rules for the construction and installation of lifts
- BS EN 12464-1 Light and lighting. Lighting of work places Part 1: Indoor work places
- BS EN 12464-2 Lighting of work places Part 2: Outdoor work places
- BS EN 55015 Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment
- BS EN 60079 Explosive atmospheres
- BS EN 60529 Specification for degrees of protection provided by enclosures (IP code)
- BS EN 60598 Luminaires
- BS EN 60901 Specification for single-capped fluorescent lamps. Performance specifications
- BS EN 60929 A.C. supplied electronic ballasts for tubular fluorescent lamps. Performance requirements
- BS EN 60947 Low-voltage switchgear and control gear
- BS EN 61000-3-2 Electromagnetic compatibility (EMC) Part 3-2: Limits. Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
- BS EN 61000-4-5 Electromagnetic compatibility (EMC). Part 4-5: Testing and measurement techniques. Surge immunity test
- BS EN 61347 Lamp control gear
- BS EN 61558-2-1 Safety of power transformers, power supplies, reactors and similar products Part 2-1: Particular requirements and tests for separating transformers and power supplies incorporating separating transformers for general applications
- BS EN ISO 9241 Ergonomics of human-system interaction
- CIBSE Code for Lighting
- CIBSE SLL Lighting Guide 7 – Office Lighting
- CIBSE Commissioning code L – Lighting

Design Criteria

Achieve the average maintained illuminance values for the particular areas of the building as specified below:

- | | |
|----------------------------|----------------------------------|
| • External Car Parks | – 10 lux average at Ground Level |
| • Lorry Parking (Low Risk) | – 20 lux average at Ground Level |
| • Loading Door Area | – 50 lux average at Ground Level |
| • Office Areas | – 400 lux average at 0.75m AFFL |
| • Reception | – 300 lux average at 0.75m AFFL |
| • Circulation Areas | – 150 lux average at Floor Level |
| • Stairs | – 150 lux average at Tread |
| • Toilets | – 150 lux average at Floor Level |
| • Cleaners Rooms | – 100 lux average at Floor Level |

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- Plant Rooms – 200 lux average at Floor Level
 - Warehouse Areas – Emergency lighting at exit doors only
 - Offices Uniformity – 0.6+ (Limiting glare rating 19)
 - Stairs Uniformity – 0.5+
 - External Areas Uniformity – 0.25+

3.0 System Description

External lighting systems

The Contractor or his appointed sub-contractor shall design, supply, install, commission and set to work a complete external lighting installation in line with the drawings.

Allowance shall be made for the supply and installation of external lighting as detailed within the electrical drawings and the external works package of works.

To achieve good quality colour appearance and colour rendering.

To achieve the recommended levels of illuminance and luminance by selection of a particular luminaire, lamp source and optical control, together with the selection and recommendation of the associated environmental reflectance properties.

To ensure that all luminaires and ancillary controls are suitably selected to be compatible with the environment in which they are installed.

Locations and quantities of all lighting controls as shown on the layouts are indicative. The electrical trade contractor shall ensure locations and quantities are based on specific manufacturers requirements.

HOLOPHANE Luminaires as schedules on the lighting drawings – These have been submitted as part of the planning application and may be subject to a planning condition. Provide fuse cut-outs in all external columns.

External Plant

IP65 Circular surface mounted (Whitecroft KOLO IP65)

Surface mounted circular IP65 LED bulkhead luminaire in 400mm diameter. Polycarbonate opal diffuser and trim ring or an equal and accepted alternative.

General Internal lighting systems

General Lighting

The Contractor or his appointed sub-contractor to provide a complete internal artificial lighting system throughout the building, that will meet the design criteria and reflect the architectural and aesthetic requirements of all areas.

To ensure the internal lighting system solution and installation provides a safe, comfortable, balanced and interesting visual environment. To consider the vertical illuminance of surfaces within an environment, in conjunction with, the recommended horizontal working plane illuminance.

To achieve good quality colour appearance and colour rendering.

To achieve the recommended levels of illuminance and luminance by selection of a particular luminaire, lamp source and optical control, together with the selection and recommendation of the associated environmental reflectance properties.

To ensure that all luminaires and ancillary controls are suitably selected to be compatible with the environment in which they are installed.

The Electrical Trade Contractor shall install lighting, wiring and associated controls as defined on the accompanying layout drawings - refer to the luminaire schedules and drawings provided.

Locations and quantities of all lighting controls as shown on the layouts are indicative. The electrical trade contractor shall ensure locations and quantities are based on specific manufacturers requirements.

The Electrical Trade Contractor shall note that all light switches are to be rated at 20A minimum.

The Electrical Trade Contractor shall install all luminaires with local plug in connection boxes or ceiling roses to allow for maintenance, removal and replacement, unless noted otherwise below. Generally, all lighting accessories and containment systems shall be concealed within the building fabric throughout. The exception is plant areas and service risers where surface mounted equipment is acceptable.

All luminaires throughout ensuring luminaires are flat and level.

All luminaires, associated control gear, battery packs etc. are installed with fixings independent of the ceiling finishes.

The provision of Gripple (or similar) independent supports in all areas and shall not rely on the ceiling system (if present) to support the weight of luminaires and any associated equipment, control gear etc.

All wiring for lighting systems shall emanate from the relevant lighting final distribution board as shown on accompanying drawings. Wiring to all lighting shall be via multicore FP200 white cabling on basket trays back to relevant source distribution board.

New small power and lighting distribution boards shall be installed throughout as denoted on accompanying GA layouts and schematic drawing. New lighting circuits will be taken from the nearest dedicated lighting distribution boards as required. All lighting and power circuits will be metered centrally at distribution point and clearly labelled.

All luminaires are to be circuited back to the distribution board and a schedule provided clearly indicating the rooms served.

Office areas

Module 600x600 LED fittings (Whitecroft Tegan Slim).

Slim line edge lit LED luminaire with quadraprism diffuser for optimum light diffusion and glare control. Slimline steel frame finished white.

Luminaire Efficacy = 100lm/w or above

Electrical contractor to ensure compatibility with ceiling.

Staircases

Wall Mounted circular LED Fitting (Whitecroft Bayon)

Suspended architectural LED luminaire with direct: indirect lighting ratio of 60:40. Advanced Hexaprism optic providing glare control and maximum diffusion. For continuous or standalone configuration. Luminaires can be connected continually without infills for a seamless aesthetic or an equal and accepted alternative.

Toilets

Recessed Circular LED (Whitecroft Mirage)

Recessed LED downlight with cast aluminium body, white polycarbonate bezel and integral 1100 / 2000 / 3000 lumen light engine. For ceiling thicknesses of 5-50mm or an equal and accepted alternative.

Luminaire Efficacy = 100lm/w or above

Risers

IP65 surface mounted (Whitecroft ACL)

IP65 LED anti-corrosive luminaire with GRP body and high impact polycarbonate injection moulded opal diffuser. One piece seamless gasket for increased life and protection or an equal and accepted alternative.

4.0 Control Requirements

External Lighting

External lighting mounted on the building is to be wired in FP200 cable. External lighting remote from the building is to be wired in underground ducts provided by the main contractor using XLPE/SWA/PVC cable. Control of the external lighting is by a photocell and time switch arrangement.

Additional lighting control shall be provided to the so that building mounted external lighting along sensitive buffer zones are activated by PIR (presence detectors).

General requirements

Supply and install the lighting system controls and control equipment of the type and manufacture as indicated on the drawings. Lighting control to be a Honeywell EXOR solution or an equal and accepted alternative.

Install lighting controls and equipment within the locations and at the positions indicated on the drawings.

General Office

Utilise Whitecroft/ Organic Response equipment (presence detectors, absence detectors), to automatically operate the luminaires upon movement of occupants in each such space, and to de-energise the luminaires after a pre-determined time delay period, unless reset upon detection of continuing or further movement of occupants. Daylight shall be used to adjust luminaire output within each of the office areas.

The office lighting control is to be networked together using an Organic Response system from Whitecroft through a combination of organic response equipped fittings and organic response detectors.

Staircases

Supply and install ceiling mounted presence detectors to automatically operate the luminaires upon movement of occupants in each such space, and to de-energise the luminaires after a pre-determined time delay period, unless reset upon detection of continuing or further movement of occupants.

Ensure that all such presence detectors are suitably located to effectively detect normal movement of people throughout such spaces.

Toilets

Supply and install ceiling mounted presence detectors to automatically operate the luminaires upon movement of occupants in each such space, and to de-energise the luminaires after a pre-determined time delay period, unless reset upon detection of continuing or further movement of occupants.

Ensure that all such presence detectors are suitably located to effectively detect normal movement of people throughout such spaces.

Plantrooms and Risers

Supply and install, locally wall mounted, manually operated lighting control switches, at the positions indicated on the drawings.

Ensure that all such switches are wired and connected as one-way and two-way lighting control circuits and located at every entry and exit door of such rooms.

5.0 Scope of works

Responsibilities

The Electrical Trade Contractor shall be responsible for all aspects of the general lighting system installation. The electrical installer's responsibilities include, but are not limited to, those described in this clause. Install a lighting system comprising final circuit's distribution, control devices and equipment, luminaires and optical accessories, throughout all areas and locations of the building.

Electrical Trade Contractor is to install all mains cables, conduits, trunking, final connections, etc. for lighting from distribution boards to final locations.

Supply and install luminaires of the type and manufacture indicated on the Schedule of Symbols drawing and as particularly detailed under the Schedule of Luminaires detailed within the specification.

Install all luminaires complete with fixings, suspensions, glassware, louvres, diffusers, reflectors, optical controllers and control gear, together with all required ancillary components, accessories and attachments, as described within this specification and as detailed on the drawings, and connect them to the final lighting circuits.

Install luminaires throughout the building within locations and at the positions indicated on the drawings, including: recessed and semi-recessed type luminaires within suspended ceiling areas, (comprising either a removable lay-in tile or a plasterboard sheet with plaster skim finish); ceiling mounted surface luminaires, in plant rooms and stores, etc; and wall-mounted luminaires of both the decorative and functional type.

In plant rooms ensure the luminaires are positioned to coordinate with the layout and installation of all mechanical plant and associated equipment.

Wire and connect all luminaires to final radial circuits emanating from local distribution boards.

All required builders work will be coordinated with the Mechanical Trade Contractor and rationalised where possible. The Electrical Trade Contractor will be responsible for making good where they cut the fabric.

Testing and Commissioning of final lighting installation.

Permit to work

Prior to commencement of work, and where appropriate, arrange for the issue of a permit to work.

Warning signage

Where necessary for high level overhead work, ensure that safety warning signs are erected and that adequate safety space is left below the point of work, to alert and offer protection to all personnel including site operatives.

6.0 System Components

Cable tray/basket system

Install cable tray/basket systems for the fixing of all multi-core insulated and sheathed, armoured and screened soft skin lighting final circuit cables.

Provide the cable tray/basket comprising steel galvanised finish, medium or heavy duty, with a 100mm return flange or as particularly indicated on the drawings.

Install the cable tray/basket containment system, concealed within suspended ceiling voids, along the routes indicated on the design drawings.

Wiring system.

Wire and connect the lighting installation throughout using multicore FP200 White insulated cables.

Run cables enclosed within a ceiling void mounted galvanised cable baskets extending to luminaire, controls and switch locations.

Make final connections to luminaires using 6A (min.) 3 or 5 pin plug-in ceiling roses, with self-retaining plug and socket as appropriate, with 5 core 1.5mm² insulated and sheathed LSF heat resisting 850C high temperature flexible cable.

Mount such plug-in ceiling roses direct to the associated cable basket.

Ensure containment and accessories are installed at a suitable height, within the ceiling void, to facilitate future access for maintenance, from the office floor.

Within plant rooms and certain semi-exposed and external locations, install the lighting system using surface mounted galvanised conduit, IP rated luminaires and accessories.

Luminaires

Where luminaires are supported directly from the ceiling T bar grid, ensure adequate additional fixings are provided by the ceiling installer to support the entire weight of every such luminaire and its attachments, without causing any distortion to the ceiling line or level. In addition, provide a direct single fixing from the body of every such luminaire to the structure, using gripple suspension wire.

Ensure that ceiling and wall mounted luminaires, where installed to plasterboard surfaces, are fixed via conduit boxes installed flush with the ceiling/wall face, with the conduit boxes supported directly from the conduit/trunking system or structure.

Liaise as necessary with the luminaire and ceiling tile manufacturer, together with the ceiling installer, to ensure compatibility between the luminaire and the ceiling systems for proper installation.

Ensure all recessed luminaires maintain the ceiling fire barrier rating and integrity of the respective fire compartment or area. Provide proprietary fire rated canopies for recessed luminaires where necessary.

Ensure luminaires specified with thermoplastic diffusers comply with Category Tp (a), as defined in the Building Regulations. Provide copies of manufacturer's test certificates to verify compliance.

Ensure that all suspended luminaires utilise propriety 'cable drop' accessories for final connection.

Ensure that every luminaire is accurately aligned, to fit flush and square against adjacent/ abutting structures or surfaces to provide a neat straight and true appearance in their relation to the building structure.

Set out the lighting system installation in accordance with the co-ordinated reflected ceiling plan drawings and the Architect's detailed room loaded layout drawings. Check the positions of all windows, door swings, roof lights and fitments etc., before commencing the installation of the lighting system.

Ensure luminaires fully comply with the following:

- manufactured to meet the requirements of BS EN 60598
- manufactured to provide Class 1 protection against electric shock
- protected to an ingress class, as referred to in BS EN 60598, of IP 20 minimum
- suitable for operation at 230V, 50Hz, SP&N
- incorporates integral high-power factor correction (HPC) to 0.95
- manufactured to meet the requirements of the appropriate electromagnetic compatibility (EMC) Directive of the European Council and appropriately CE marked

Provide all luminaires with high frequency (HF) control gear unless stated otherwise on the drawings or in this specification.

7.0 Installation

General – underwater lighting

Ensure that the installation complies with BS 7671.

Use non-corrosive fixings that are compatible with the environment where they are installed.

Installing luminaires

Install luminaires in accordance with the manufacturer's instructions.

Adjust the orientation of adjustable luminaires to give the optimum performance.

General

When interconnecting sensors, controllers and luminaires, only use the manufacturers' recommended cable types.

Installing daylight sensors

Locate daylight sensors in a position which is representative of the daylight level in the area under control.

Installing occupancy sensors

Locate occupancy sensors in a position to suit the occupancy pattern of the area under control. Shield the sensors from erroneous influences.

Cleaning and cable inspection

Upon completion of the installation, clean all detector lenses using anti-static cleaning fluid.

Check that all cable connections are secure.

Labelling

Provide identification labels for all equipment and sensors. Label the central controller and its output circuits, describing each item's purpose.

Fixing to Building Fabric

When fixing accessories to the structural steelwork use proprietary brackets or clamps. Do not drill or weld to the structural steelwork.

8.0 Testing and Commissioning

Inspect and test the complete installation fully in accordance with BS 7671.

Test the installed lighting system progressively during construction and upon final completion of the whole installation. Test the complete lighting system, including luminaires, control devices and all associated equipment in accordance with the manufacturer's recommendations.

Carry out the inspection and tests in the same sequence as set out in BS 7671, and in such time to allow any remedial work to be completed within the contract period. Ensure tests also include any part of an existing installation related to the new work.

Carry out the following BS 7671 tests before making the system live:

- the cable containment is supported adequately
- all luminaires are complete with lamps and accessories
- LEDs are of the correct colour, rating and manufacturer selection
- control devices have been correctly installed
- all switch plates align straight and true
- all required labelling has been provided
- luminaires are in clean condition

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- continuity of protective conductors including main and supplementary equipotential bonding
 - continuity of ring final circuit conductors
 - insulation resistance
 - site applied insulation resistance
 - verification of protection by separation of circuits
 - verification of protection against direct contact by barrier or an enclosure provided during erection
 - polarity
 - earth electrode resistance

Carry out the following BS 7671 tests after making the system live:

- earth fault loop impedance
- prospective fault current
- functional testing

END OF SECTION