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11 LIGHT FITTINGS

11.1 GENERAL

11.1.1 General

- 1 This section includes the supply and installation of lighting fittings as shown on the drawings, and as specified.

11.1.2 Quality Assurance

- 1 Design Criteria:
- (a) lighting fittings shall be of first class quality, made by approved manufacturers and shall be suitable for trouble free operation on the system voltage at the site
 - (b) lighting fittings shall be complete with internal wiring between lamp holder and termination point. Wiring shall be in silicone rubber insulated heat resistant flexible cables
 - (c) the Contractor shall be responsible for co-ordinating the light fitting installation with any other components of the ceiling systems.
 - (d) all lighting fittings shall be complete with accessories and fixing hardware necessary for installation whether so detailed under fixture description or not
 - (e) outdoor lighting fittings shall be installed at mounting heights as specified or instructed on site by the Engineer
 - (f) all outdoor lighting fittings shall be suitably constructed and protected to withstand the corrosive atmosphere and high ambient temperatures of the site, whether indicated under the fittings description or not
 - (g) lighting fittings shall have power factor not less than 0.9.

11.1.3 References

- 1 The following standards are referred to in this Part:

BS 800.....	Limits and methods of measurement of radio interference characteristics of household electrical appliances, portable tools and similar electrical apparatus (IEC 55014-1: Electromagnetic compatibility. Requirements for household appliances, electric tools and similar apparatus - Emission)
BS 3677.....	High pressure mercury vapour lamps (EN 60188, EN 62035)
BS 4533.....	Luminaires
BS 5225.....	Photometric data for luminaires (EN 13032 Light and lighting - Measurement and presentation of photometric data of lamps and luminaires)
BS 60400.....	Lamp holders for tubular fluorescent lamps and starter holders (EN 60400 Lampholders for tubular fluorescent lamps and starterholders)
EN 60081	Double-capped fluorescent lamps. Performance specifications
EN 60238	Edison screw lamp holders (IEC 60238: Edison screw lampholders)

- EN 60529Degrees of protection provided by enclosures (IP Code)
- EN 60662(IEC 662), High-pressure sodium vapour lamps. Performance specifications
- BS EN 60947-1General rules for low voltage switch gear and control gear
- BS EN 61167Metal halide lamps
- KAHRAMAA In accordance with KAHRAMAA all internal & external light & Emergency light fittings should be considered as LED Luminaire to comply with Qatar National Program for Conservation & Energy Efficiency (Tarsheed)

11.1.4 Submittals

1 Products Data:

- (a) Fluorescent fittings and other electrical discharge lamp fittings, submit:
- (i) full technical details of the fittings, including the control gear, indicating the type and size of materials used in construction.
 - (ii) relevant sheets of manufacturer's catalogues and dimensional drawings of the fittings, clearly showing the location of the component
 - (iii) wiring diagram of internal connections indicating colour, size, and type of wiring
 - (iv) confirmation that control gear is suitable for prolonged and continuous service in the ambient conditions described in Part 1
 - (v) the power factor under operating conditions and illumination data sheets.
 - (vi) type and quality of any plastic materials used in the fittings.

2 Other lighting fittings, submit:

- (a) full technical details of the fittings, with relevant manufacturer's catalogues and illumination data sheets
- (b) type and quality of all metal finishes
- (c) size and quality of all glassware.

3 At least one piece of each of the lighting fixtures originally specified and quoted shall be submitted and displayed at the site office, including the alternative items for comparison in the event an alternate make is offered.

11.2 PRODUCTS

11.2.1 Lamps

1 General:

- (a) lamps shall be furnished and installed in all luminaires covered under the Contract
- (b) lamps used for temporary lighting services shall not be utilised in the final use in fixture units

- (c) lamps for permanent installation shall not be placed in the fixtures until so directed by the Engineer, and this shall be accomplished directly before the building areas are ready for occupancy by the Employer
 - (d) lumen output of lamps shall be in accordance with BS 5225
 - (e) generally, high output, low consumption, tri-phosphorus lamps shall be used, unless otherwise indicated.
- 2 Fluorescent Lamps:
- (a) tubular fluorescent lamp, to EN 60081. Lengths/diameters as indicated in the Project Documentation
 - (b) tube colour: cool white, unless otherwise indicated
 - (c) fittings shall comply with BS 800, for suppressing radio frequency interference.
- 3 High Pressure Mercury Vapour Lamps:
- (a) wattage as indicated in the Project Documentation
 - (b) colour: deluxe white
 - (c) lumen output of lamps shall be in accordance with BS 3677
 - (d) burning position: universal.
 - (e) Mercury vapour lamps are not energy efficient and lamp life is inferior to other lamps also we need to consider the environmental hazards of burnt out lamps discarded. We recommend to avoid the usage of Mercury vapour lamps and remove from specifications.
- 4 High Pressure Sodium Lamps
- (a) wattage as indicated in the schedule of luminaires
 - (b) lamps with a high colour rendering index of 80 shall be used as indicated, suitable for indoor applications
 - (c) lumen output of lamps shall be in accordance with EN 60662.
- 5 Metal Halide Lamps
- (a) wattage as indicated in the schedule of luminaires
 - (b) lumen output of lamps shall be in accordance with EN 61167
- 6 Control Gear For Fluorescent Lamps:
- (a) high frequency electronic ballast not less than 25 kHz to IEC 928, unless specified otherwise
 - (b) when specified, conventional type low loss ballast with electronic starters shall be used and shall provide flicker free operation, as indicated in the Project Documentation
 - (c) glow starters shall not be used
 - (d) capacitors shall be supplied with discharge resistors and shall be housed in aluminium canister.
 - (e) Control gear for LED to be added and also specification for CFL to be included.

7 Lamp Holders:

- (a) SBC, BC GES, Bi-pin, etc. as necessitated by the lamp cap
- (b) Edison screw lamp holders, to EN 60238, to be designed so that the lamp cap only makes electrical contact when fully screwed home, and to have means to prevent the unscrewing of the lamp due to vibration or similar cause.
- (c) Lamp holders for fluorescent lamps, shall be the spring loaded rotary type, to BS 6702.

8 LED Lamps:

11.2.2 Luminaires

- 1 Luminaires shall be manufactured to BS 4533 with an appropriate IP classification to EN 60529.
- 2 All lighting fittings shall be supplied complete with appropriate control gear where necessary, lamps, mounting and fixing accessories etc. whether explicitly mentioned in the description of each light fitting or not. All the fittings shall have the same appearance, material, technical details and approximate dimensions.
- 3 Luminaires shall be connected to the main circuit wiring with heat resistant flexible cables of a minimum conductor size of 1.5 mm² insulated with silicon rubber.
- 4 Break joint rings shall be used in conjunction with batten holders, ceiling roses or back plates mounted onto a flush installation.
- 5 Standard fluorescent luminaires shall have two suspension or fixing points. The thickness of the luminaires body shall not be less than 0.6 mm.
- 6 All lamp-holders for flexible pendants shall be of all insulated skirted pattern with code grips and for batten or wall mounting shall be of similar pattern. All lamp holders shall be of the bayonet cap pattern.
- 7 The point box suspensions and other parts of the lighting fittings shall be provided to be erected at festival time to suit the building programme for decoration as per the requirements of the Project Documentation.
- 8 The glassware diffusers, shades and lamps shall not be fitted until all building work is complete.
- 9 All fittings shall be easy to clean inside and outside, when mounted.
- 10 All fluorescent fittings shall be suitable for instant start irrespective of any catalogue or list numbers quoted.
- 11 Diffusers on fluorescent luminaires shall be poly-carbonate unless otherwise specified in the Project Documentation.
- 12 All fittings that are mounted in areas accessible to the public shall be provided with vandal proof high strength diffusers and shall be additionally provided with a galvanised steel mesh security guard.

- 13 All luminaires shall be certified by the manufacturer for use in an ambient temperature of 50°C.
- 14 All luminaires intended for use in hazardous areas shall be certified to be zone 1 or 2 as required at 50°C ambient temperature.
- 15 Wet well luminaires, fixtures and cabling shall conform to ingress protection IP67, shall be PTFE coated and shall be provided with tungsten halogen lamps i.e. no run up or re-strike time for safety reasons.
- 16 All wet well luminaires, fixtures and cabling shall conform to ingress protection IP67.

11.2.3 Termination/Earthing

- 1 Fused terminal blocks shall be fitted and be of sufficient capacity for the wiring involved. Each terminal shall be capable of accommodating two 2.5 mm² conductors.
- 2 Connector strip terminals shall have a current rating not less than the rating of the circuit protective device and shall be encapsulated in self-extinguishing grade polyethylene.
- 3 Where connector strips are provided in boxes behind heat producing appliances, porcelain connectors shall be used where temperatures in excess of 70 °C are likely.
- 4 Conductors shall be clamped between metal surfaces such that no screws make direct contact with the conductor. The metal used in construction of the connector shall be at least 85 °C copper alloy such that good conductivity and electrolytic compatibility are maintained at all times.
- 5 All light fittings shall be provided with an earthing terminal which shall be connected to the earth continuity lead of the final sub-circuit.
- 6 The earthing of all pendant or semi-pendant fittings shall be by a separate core in the connecting flex or cable securely bonding the earth terminal on the fitting to the glanded joint of interconnecting cables. In no case shall pendant chains or conduit support tubes be used as a means of earthing.

11.2.4 Ceiling System

- 1 In false ceilings, luminaires whether surface or recessed mounted shall not be supported by the false ceiling construction. Separate independent supporting systems shall be provided for each luminaire, comprising drop rods, chains or similar.
- 2 Luminaires installed in false ceilings shall be connected to the lighting circuit using mechanically coupled plug-in ceiling roses.
- 3 Luminaires shall be positioned to provide ease of access for maintenance, cleaning etc., while not impairing the distribution of light.
- 4 The Contractor shall ensure that the luminaire manufacturer has the correct details of the ceiling system, including suspension, tiles, etc. He shall ensure that the luminaires are supplied with the correct trim, suspension system and are fully compatible with the ceiling system.

11.2.5 Noise and Interference

- 1 The noise level from control gear, obtained from the average of sound pressure levels each measured at 2000 mm from the control gear in at least five positions (on each side and below), shall not exceed 30 dB Scale "A" (Noise Rating Number).

11.2.6 External Lighting

- 1 General:
 - (a) external lighting system shall consist of supply and installation of lighting columns, foundation and fixing of the columns, underground cabling, high pressure sodium vapour lamps or as specified, and control equipment as required
 - (b) contactor units, where specified incorporating a controlling photo-cell and time switch, shall be provided within the external lighting distribution board for the control of external lighting
 - (c) underground lighting cabling shall be XLPE or PVC/SWA/PVC or as detailed in in the Project Documentation.
 - (d) Where timers are used seasonal correction shall be applied to timer setting to save energy and under all working conditions shall not light up the circuits between 7 am and 4:30pm.
- 2 Lighting Columns
 - (a) columns shall be hot-dip galvanized steel of either tapered or tubular construction complete with luminaire fixing arms or brackets, as per design.
 - (b) all columns shall be externally painted with 2 coats of aluminium paints, internal surface including the studs inside the cable connecting box with red lead anti-corrosive paints, the finishing shall be micaceous iron oxide paint pigmented with aluminium
 - (c) the column shall be equipped with auxiliary control gear and a 15 amp. single pole and neutral cut-out (with a three phase and neutral terminal block), two cable glands and two entry slots in the base of the pole for incoming and outgoing cables
 - (d) a two core and earth 2.5 mm sq. butyl rubber insulated heat resistant flexible cable shall connect the lantern to the cut-out
 - (e) columns shall be provided with base plates having fixing holes and anchor bolts for foundations
 - (f) unless specified otherwise, the column length shall be 5m including buried part or 4m when plinth mounted. The diameter at the bottom shall not be less than 120 mm.
- 3 All external lighting fittings shall be adequately earthed.
- 4 Control gear shall form an integral part of the lighting fittings except where specified, or where this is not possible, it shall be totally enclosed in a housing to suit the installation location.
- 5 All external fittings shall be dust-tight and waterproof to IP 65.
- 6 The particular requirements for road lighting and high mast floodlighting are specified in Section 6, Part 12.

11.3 INSTALLATION

11.3.1 Lighting Installation

1 Terminations:

- (a) general fluorescent fittings mounted direct to conduit outlet boxes shall have the circuit wiring run direct to the fittings terminal position. Flexible conduit pigtail shall be provided for all fixtures to J-boxes
- (b) terminations for recessed, or semi-recessed pattern fittings fitted in false ceilings, shall have the circuit wiring terminal above the ceiling in a ceiling rose. Outlets shall be mounted adjacent to the fitting.

11.3.2 Installation of Lamps

- 1 Generally install new lamps in all luminaires at substantial completion of work.

END OF PART