Specifications to Football Court
(Sports Lighting System and sports Lighting Masts)

The system shall follow the below mentioned specifications and the attached drawings.
The Architect and the Engineer shall grant prior Approval for the all items before implement the work.

The technical catalogues and data sheets (in English version) indicating reference numbers and literature of the items offered with the following particulars shall be furnished for approval.

- Constructional features, materials used.
- Test Reports for the compliance of the material
- Complete dimensional drawings
- Wiring Diagram & complete technical details

1. General

The lighting design of the football pitch shall be complied with **Class I (Training and Recreation).**

The design shall conform to the BS EN 12193 (Latest version) and FIFA Standards (Lighting Design Specifications and Technology) on lighting for football stadiums.

The work covered by this section of specifications covers the sports lighting for football pitch and all related works including light luminaire, light pole, panel boards, cabling, lightning protection access systems, standby power supply etc. and this shall be read in conjunctively with drawings provided.

2. Lighting design

1. Performance Requirements: Lighting calculations shall be developed and field measurements taken on the grid spacing with the minimum number of grid points specified in the FIFA document. Measured average illumination level shall be predicted mean in accordance with IESNA RP-6-01, and measured at the first 100 hours of operation.

2. Lumen maintenance: Light system shall use adjustments to achieve a lumen maintenance. Lumen maintenance control strategy calls for reducing the initial illumination of a new system to the designed minimum level.

3. Independent Test Report: Manufacturers bidding light system must provide an independent test report verifying the field performance of the system for the duration of the life of the lamp, signed by a licensed professional engineer with outdoor lighting experience.

4. Project References: Manufacturers bidding any form of a light system must provide a minimum of five (5) sports project references that have been completed within the last calendar year utilizing this exact technology that have a minimum of 500 hours of operation and field testing to verify light levels. Manufacturer will include project name, project city with country, contact name, and contact phone number for each reference.

Strictly follow the specifications attached for electrical installation

According to the FIFA Standards on lighting for football stadiums and BS EN 12193 following conditions must be satisfied for Class I – Training and Recreation.

Following shall be available at the pitch when the installation is finished

	All illuminance values indicated below are maintained values.			
			Foot Ball	
1	Horizontal illuminance[1]	Eh ave (lux)	≥200	
2	Uniformity	U2(min./average illumination)	≥0.6	
		U1 (min./max illumination)	≥0.5	
3	Lamp colour temperature	T (k)	> 4,000	
4	Lamp colour rendering		≥ 70	
5	Recommended maintenance factor	0.7		
6	Initial values will therefore be approximately 1.4 times those indicated above.			
7	Illuminance uniformity shall not exceed than 30% every 10 metres.			
8	Primary player view angles must be free of direct glare. This glare rating is satisfied when the player view angles are satisfied.			

Accordingly, the horizontal average lux level 200 Lux in foot ball shall be available after the installation and the **lighting design (both hard copies and soft file using Dialux or similar software) shall be submitted using proposed fitting and the poles**.

Horizontal illuminance is a measure of light reaching a horizontal plane, one metre above the playing surface. A 10m x 10m grid across the playing field is used as a basis for collecting these measurements and calculating maximum/minimum/average illumination on the playing field.

Contractor shall adjust the luminaries using an aiming device as per the Dialux design and prove the above light levels are satisfied by using Lux meter. The necessary testing instruments shall be supplied and testing shall be done by the bidder at the presence of the Engineer. Testing format shall comply with the FIFA standard.

Approved brands shall be as following		
1.	**Sports Luminaires**	**Philips, AAA-LUX, Nikkon or equivalent approved**
2.	**Masts**	**Valmont, NCM, Lysuaght or equivalent approved.**

3. Luminaire

Energy efficient LED floodlight system used for sports applications shall be used. The proposed system shall be innovative LED lighting solution that supports the latest sports requirements standards and features a control platform.

Proposed system shall be with outstanding lighting quality, effective thermal management and long lifetime. It shall ensure effective thermal management system to optimize the lifetime cost and deliver high performance

3.1. General

LED luminaire should have following;

		Foot ball	
1	Ingress protection	IP65	
2	Housing Material	Extruded aluminium and die cast aluminium	
	Adjustable bracket	Stainless steel galvanized	
	comply with requirements of IEC 60598-2-3 in conjunction with IEC 60598-1, such that adequate resistance to dust and moisture, impact/vibrations and corrosion is achieved		
3	Power Consumption (Maximum)	1000W	
4	Lamp colour rendering	≥ 70	
5	Efficacy	**≥108 lm/W.**	
6	Power factor	≥ 0.9	
7	Surge protection of luminaire	15kV/kA.	
8	IK protection	IK08	
9	colour temperature	> 4,000K	
10	lifetime	50000 hours at Ta 35 outdoor	
11	Shall be high resistance to temperature and UV (heat sink fins with proper thermal management system). Aluminium		
12	LM - 79 and LM - 80 test reports shall be attached		
13	Lumen depreciation - more than 70% available at the end of 50000hrs		
14	Shall be compatible for mounting in high masts more than 18m height with wind force protection, Anti-dust, UV resistance		
15	Provision for future upgrading with Remote operating facility and dimming shall be included		
16	Safety chain		

1. Support Housing shall be shielded with protective coating(s) and shall comply with requirements of IEC 60598-2-3 in conjunction with IEC 60598-1, such that adequate resistance to dust and moisture, impact/vibrations and corrosion is achieved.

2. Lens (clear front cover): Flat optic cover made from injected molded high impact acrylic plastic or tempered glass and shall be impact resistant, dust proof

3. Color of the body: Gray/Black

4. Shall match with the light pole

5. The pole, cross arms shall be designed to cater to the proposed luminaire

3.2. Lamp Control Gear

Power Factor shall not be less than 0.9

Total Harmonic Distortion shall be complied with IEC 61000-3-6(Harmonics)

The lantern control gear shall fully comply with IEC 60598-2-3 in conjunction with IEC 60598-1 and IEC 6137-2-1 and all its inclusive parts referring specific control gear (as applicable)

Control gear shall also comply with performance requirements specified in IEC 60923 and/or IEC 62384 as applicable. It's also comply with IEC 60342-2.

The driver or lighting module(s) should be able to independently replace without damaging the luminaire.

The proposed control gear shall be complied with EN 55015 for radio disturbances, and all other requirements.

3.3. Plug and Connector Socket

A readily accessible IP 65 plug and socket or IP 65 connector box for the connection approved by the manufacturer (for quick disconnect plugs for easy maintenance) shall be available. with the 'Live' and 'neutral' connections clearly and indelibly marked shall be provided. Both male and female connector shall be supplied with copper insulated wire as per the BS standards with minimum 1.5mm^2 cross section.

3.4. Information to be supplied with the Offer

1. Details which are necessary to ensure proper installation, use and maintenance and detailed product catalogues in English specifying the reference numbers for products quoted shall be furnished with the offer
2. All details in English necessary to ensure proper installation use and maintenance of luminaires and control gear.
3. Instructions related to safety in English
4. Complete dimensional drawings
5. Technical details including following but not limited to the following:
    - Photometric Measurements (Rated lumens, intensity distribution(polar curves), intensity table for horizontal and vertical angles, zonal lumens)
    - Colorimetric Measurements(CCT, CRI)
    - Electrical Measurements (test voltage, test current, efficacy, lamp wattage, power

factor

6. Life test reports
7. Lumen depreciation curves
8. Evidence of performance with regards to manufacture, supply and utilization of the particular luminaire technology in large scale projects
9. ISO 9001:2008 quality assurance certification
10. Bidder shall furnish the list of simulations and conventional Factory Acceptance Test (FAT) for inspection

3.5. Sample

One sample shall be submitted as per the requirement. Failure to supply a sample shall be a cause of rejection of the offer.

3.6. Inspection and Testing

All light fittings shall be subjected to inspections after delivery and randomly selected sample(s) from the lot will be tested to any of above requirements, as requested in an accredited independent testing laboratory which is acceptable.
Cost pertaining to the testing shall be borne by the supplier.

Bidder's proposal for the LED Luminaire shall be complied with the above parameters/requirements and any deviated proposal will not be accepted.

4. Lighting masts

The lighting mast (in this bid the word 'lighting mast' stands for all parts of the mast including anchor bolts, anchor bolt templates, anchor bolt cage assembly, base plate/flanges (rolled and forged), pole and arm shaft, arm mounting brackets, other brackets, platforms, ladders etc.) shall follow the attached drawings and comply with the specifications.

4.1. Design

The recommendation shall be obtained from the manufacturer that the mast is suitable for following loading conditions. (This would be the minimum and must satisfy the proposed lighting system loading conditions by the bidder)
Foot ball;

1. Minimum 04 Nrs of (minimum weight 38kg) luminaires at top or higher
2. Wind loading
3. Brackets, cross arms, lighting circuits, arrestors, warning lights etc
4. Additional 20% of the total load above

Safety and strength of the pole shall be guaranteed in all loading conditions

The specified luminaires shall able to be mounted and the required lux levels shall be available at the site by using proper cross arm, bracket etc. to the mast.
The mounting methods of the luminaires, lighting arrestors, warning lights, lift etc which comes to the mast and the electrical wiring shall be pre considered.
The pole foundation shall be approved by the engineer.

Head frame and light structure of the pole shall be within 25^0-45^0 from horizon, starting from the middle of the pitch

Submit the following along with the bid;

Calculations and shall also satisfy that the mast conforms structurally, to the specified load and wind loadings calculated for 35m/s wind speed or high as subjected to the site conditions governed. The depth of foundation shall vary accordingly.

- The contractor shall submit a report conforming the stability of the shaft and the anchor bolts to the specified loads.
- Also the contractor shall submit a certificate conforming its experience at least for the last 15 years.

4.2. Material

All metal components shall be of first quality and free of gouges, pits or other surface defects. Welds shall be ground smooth or otherwise dressed and not readily available on visual inspection.

Columns shall present a smooth appearance overall, with particular attention to the junction of the outreach and vertical sections. All burrs and blemishes shall be removed from the edges of the materials used.

All sharp corners which could damage electrical cables either during installation or while in service shall be removed from exposed edges, holes and openings provided for cables and for access to electrical equipment.

		Foot ball	
Mast Height		18m (Fixed Head frame type)	
Headframe shall designed for no of luminaires per pole		Min 05nos	
Wind speed		The mast should be suitable for mounting of the proposed number of luminaires at the wind speed of 35m/s or higher as the standards	
Galvanising		Poles shall be hot dip galvanised finishing as per ASTM A-123/A153.	
Mast materials	Pole shaft	A572-65 or Equivalent	
	Base plate, Flange plate	A572-50 or Equivalent	
	Anchor bolts	6.8 Grade	
	Structural shapes(channel, angle, pipe)	IS:808 / IS:1161 / IS:2329 (YS: 240 Mpa or equivalent)	
	All other parts of mast shall be from A572-65 or equivalent material		
		All metal components shall be of first quality and free of gouges, pits or other surface defects. Welds shall be ground smooth or otherwise dressed and not readily available on casual inspection. Circumferential welding is not allowed.	

	Mast should have proper lighting arrestor and earthing arrangement. Aircraft warning lights also should be provided.	
Access to the luminaires	A platform should be supplied at the bottom of the headframe and necessary ladder system should be provided to easily access all the luminaires	N/A

4.3. Galvanizing

Galvanise to level 6 or coastal environment
The finished mast and its components including holding down bolts, shall be hot dipped galvanized to BS EN ISO 1461:1999, BS EN ISO 14713:1999 for both the exterior and interior and shall be quenched in a Sodium Dichromate or Preton W20 solution immediately after galvanizing to prevent white rust.

All iron and steel used in the works shall be galvanized after all sawing, shearing, drilling, punching, filling, bending, machining and welding operation is completed.
The preparation for galvanizing and the galvanizing itself shall not distort or adversely affect the mechanical properties of the material.

The zinc coating shall be uniform, clean, smooth and free from spangle as far as possible.
All galvanized items shall satisfy the tests specified in BS EN ISO 1461:1999, BS EN ISO 14713:1999.

Special care should be taken to protect the zinc coating of all galvanized parts from injury due to abrasion during periods of transport and shipping.

4.4. Service door

An opening shall be provided in the base portion of each column for access to top.
The lower end of the aperture shall be **at least 600mm above ground level**. Subject to approval an alternative height to door opening may be used. Adequate stiffening shall be provided around.

Suitable lockable hinged type access doors shall be provided. Hinges should be galvanized or made of stainless steel.
The same pattern of door lock is to be used throughout on all columns installed. Keys for door locks shall be provided to the Engineer.

4.5. Threaded Holes

Where threaded holes are required, those holes shall have threaded filler plugs placed in them prior to coating to avoid filling threads with coating materials. Filler plugs shall have hex heads or other similar type heads for ease of removal. Filler plugs shall not be removed by the coater prior to transport to the City.
The manufacturer shall provide a means of ventilating the structure poles at the top to allow a flow of air through the poles to keep the interior of the poles dry. Ventilation shall be placed in a location

wherein it will not be visible from normal viewing angles.

4.6. Internal Wiring

Internal wiring in between the terminal block in the lamp and the components in the base of the mast shall be PVC insulated and sheathed cable of 300/500V grade, manufactured to BS 7671:2001. All cabling inside the lighting mast shall be of double insulated Cu/PVC/PVC conductor cable of minimum cross section of 3x2.5mm^2 for the connection between the light fitting and its individual protection 2P Miniature Circuit Breaker at the pole bottom outdoor control panel.
The vertical cable runs shall be laid inside the mast with means of cable ladders or suitable method.

4.7. Connector Boxes

Connector Boxes made should be rust free, water tight, dust proof enclosures suitable for coastal areas, with provisions for cable connecting by means of 60A Bakelite connectors. Class of protection should be IP65.
Steel Armour inside each cable shall be connected to the earth inside each connection box and then earthed well.

Number of cu rods required to obtain the necessary resistance shall be determined by the contractor. Testing of earth resistance after installation shall be done by the contractor in the presence of the project Engineer. All costs for testing shall be borne by the contractor.

4.8. Protective Devices - Miniature Circuit Breakers

Miniature Circuit Breakers shall be in accordance with BS EN 60898 and BS 4752 for use on 230V single phase supply of 400V three phase supply as appropriate. Minimum short circuit current rating shall be 10kA and they shall be type C or equivalent. Thermal or magnetic excess current tripping devices shall be provided with a mechanism to ensure that the contact cannot be held closed against a fault.
Current Rating for MCBs should be 16A or according to the luminaire wiring.

4.9. Additional Requirements

All masts and brackets shall carry an identification mark which indicates the,

- Manufacturer's Identification
- Type of Lantern
- Operating Voltage
- Wattage
- Year of Manufacture

This information shall be clearly visible after erection of the masts.

4.10. Erection of poles

Pole shall be assembled and a foundation pit of dimensions as specified or as otherwise directed by the Engineer shall be excavated.

Foundations with reinforcements shall be laid according to given drawings and details and then leave for curing as per the instructions by the Engineer. Then poles shall be erected, vertically aligned and the arm shall be correctly oriented.
After erection of poles, light fittings, connector boxes shall be fixed and internal wiring shall be done.

5. Aircraft warning lamp

The aircraft warning light system of the proposed masts shall comply with the relevant aviation guidelines.

AC powered and battery backed up with solar energy capture module LED air craft warning lamp shall be supplied

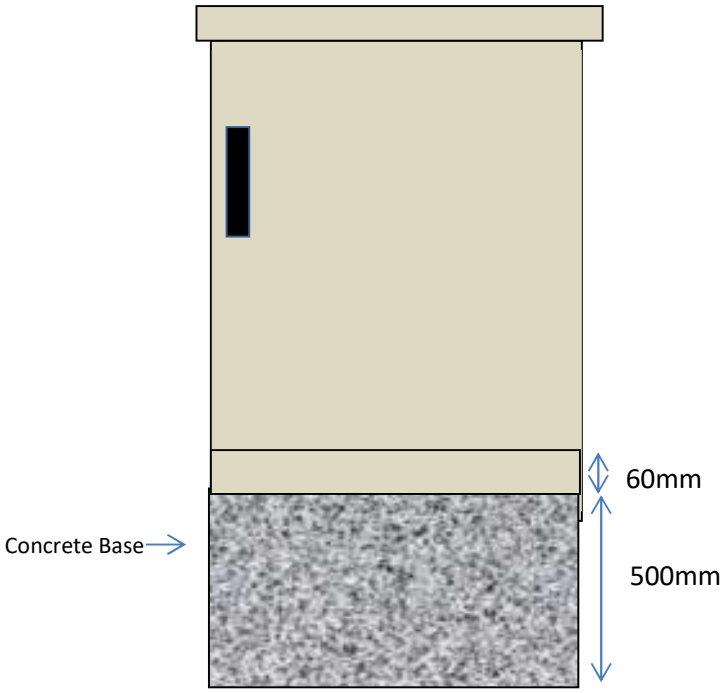
Lamp should be operate on manually as well as using a photo sensor

The light system shall have following features further;

Viewing range	>6 km	
colour	red	
flash patterns	Automatically go on and off with preset levels of lighting levels	12%, 25% 50% , 1005 duty pattern and 20 , 30, 50,75 PPS
IP rating	IP66	
Power source	230V/AC	
battery	Li-ion battery pack maintenance free 2 days autonomy	
charging	4-5 hrs	
Peak intensity	20cd	
weight	1-2kg	
Housing and dome	Polycarbonate UV	

All accessories including mounting brackets, warning light pole,nuts shall be Stainless Steel

6. Outdoor feeder pillar



This panel shall complete with all its internal switch gear and control devices with wiring as per the given drawing. Load wires shall be arranged to connect the system with main DB. **Dimensions of the panel shall be decided by the panel builder & 20% additional space shall be provided.**

7. Cabling

7.1. General

Work shall consist of excavation of trenches, supplying and laying of underground armoured cables, backfilling trenches in accordance with the Specifications and with the details shown in the Drawings or as directed by the Engineer. Special care shall be taken to have no cable joints underground in-between light points or panels. If unavoidable, prior approval shall be taken from the Engineer.

All cable end terminations shall be perfectly done as per relevant standards. All cable ends shall be sealed using cable termination kits suitable for outdoor applications, before connecting to breakers/joint boxes.

Underground cables

All cables shall be cu/PVC/XLPE insulated, steel wire armoured underground 2 or 4 core cables. All cables shall be terminated in suitable terminal blocks enclosed in terminal boxes or panels. Cable entry to panels shall be made through cable glands, which shall be covered and protected so that no live parts are exposed.

All wires and cables shall conform to sizes and current ratings of BS 7671:2008

All non- current carrying parts shall form an electrically continuous system, which shall be grounded or separately grounded as specified in 17th edition of IEE regulations.

All cable tees and joints shall be made in compound filled joint boxes and accessories specially manufactured for the cables. The compound shall be two-part resin-hardener, which will be form a void-free quick setting compound. Alternatively an equivalent insulating compound to be applied and then wrapped with approved electrical insulating tape can be used.

Conductor connections within the joint shall be made using compression crimps or other means of positive mechanical clamping to ensure electrical conductivity.

All exposed ends of underground cables shall be capped and sealed until properly terminated, to prevent the ingress of moisture.

Power cables : ACL, Kelani, Sierra

Cable manufacturer shall be an ISO 9001:2000 and ISO 14001 certified company.

All cables shall be according to following standards.

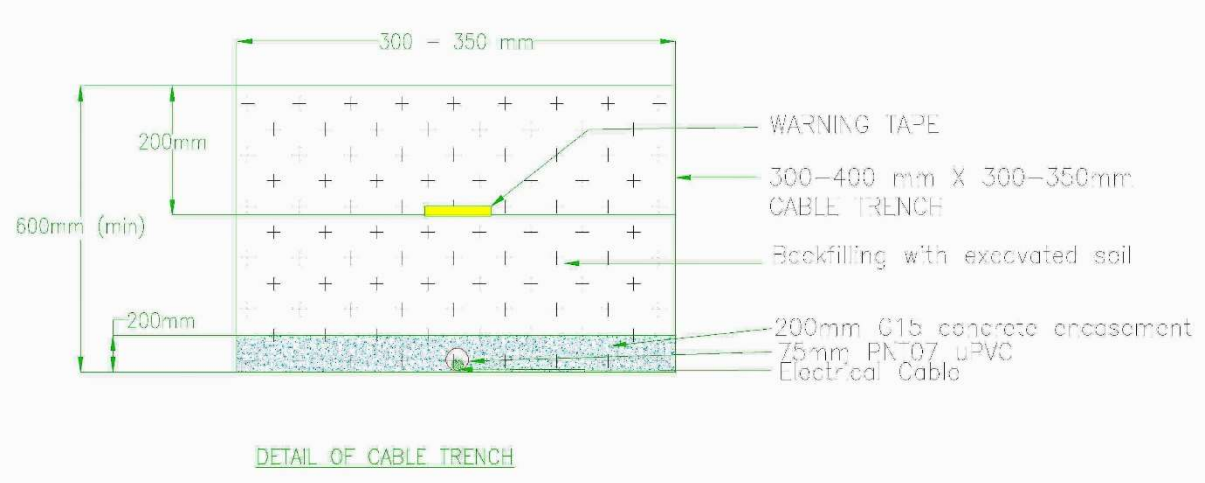
- Cu/PVC/PVC SLS 733 (Falls in line with BS 6004: 1995 300/500V)
- Underground PVC insulated cables to SLS 987(FALLS IN LINE BS 6346 600/1000V)
- Underground XLPE insulated cables to BS 5467 600/1000V

7.2. Excavation and backfilling (Cable trench).

This is relevant to the playground lighting circuits only

Prior to the commencement of excavation, the contractor shall mark the locations of all existing services along the proposed route. Any existing service damaged during the course of the work, shall be repaired and reinstated to the original condition to the Engineers satisfaction.

Backfilling material shall be free of stones, debris, etc. and shall be compacted thoroughly in 200mm layers until the surface matches the original adjacent. Trenches shall not be backfilled until the Engineer review the installation. Minimum depth of a trench shall be 600mm and 75mm PNT07 uPVC shall laid with G15 concrete encasement.



DETAIL OF CABLE TRENCH

It is necessary to Provide additional length (about 100mm) of every cable near each and every junction box for future use. All the cables lay across pathways and roads shall be laid in 110mm dia. PNT07 grade uPVC ducts with concrete encasement.

Warning tapes with wording “Electrical cable buried below” shall be laid over the cable path as per given in relevant drawings.

7.3. Certificates

All columns and brackets supplied must be manufactured by a company accredited under the Quality Assurance scheme ISO 9002 and the developer must supply a copy of the appropriate accreditation documentation as part of the record information to be provided
Past evidence should be provided to prove that the type of lamp masts to be supplied by the tendered had been used at least 15 years without corroding.

8. Warranty

Entire system 5 year comprehensive warranty from the handover date Bidder shall furnish a warranty ensuring replacement of any or all parts of the proposed, beyond the above mentioned manufacturer’s warranty 5 year period within one month.	Luminaire and circuitry	
	Air craft warning lamps and circuitry	
	Lightning arrestors	
	Panel boards and outdoor pillars including all inside equipment	panel board finish also includes
	Masts including brackets , ladders, cross arms, base plates etc and all features	Warranty for Finish for 15 years from the date of acceptance, against rusting of steel or rust creep age (unless coating has been damaged by physical means or vandalism) blistering or delaminating.
	Underground cabling	
	Main panel board	

The design shall have comprehensive warranty for the total system installation with all equipment related to Electrical Installation for 5 years including the light levels from the hand over date.

For next 5 years after free comprehensive warranty period the lighting system shall be maintained by the bidder. A delaying or cancellation of an event due to the failure of the total system is not accepted.

Provide the yearly maintenance fee for the system after first five years

Year	Maintenance fee
1st five years	Free
6th year	-mention-
7th year	-mention-
8th year	-mention-
9th year	-mention-
10th year	-mention-

9. Bidder qualifications

The bidder shall have the following qualifications

Lighting system installation local bidder/contractor/sub contractor	At least should have EM-1 Grade (Electrical Installation for Low Voltage) and experience of supplying and installation and commissioning of National / International level sports flood lighting systems for Cricket/Athletic/Football/Rugby stadiums during last 10 years in Sri Lanka. Also should have done maintenance work of sports flood lighting systems
Light fitting manufacturer	Must have supplied lighting for international sport flood lighting systems (Specially LED) for last 15 years with proven evidence for experience and technical compatibility
Mast manufacturer	Must have supplied masts for international sport flood lighting systems for last 15 years and shall have obtained ISO 9001:2008 quality system certificate for the design and fabrication of lighting masts from international reputed testing authority.

10. Testing and commissioning

All installations shall be tested in accordance with these Specifications and shall meet the prescribed criteria. The work shall conform to these Specifications and shall meet the prescribed standard of acceptance.

10.1. Illumination levels:

Shall be measured according to the guidelines and formats in FIFA Standards and BS standards on lighting for football stadiums. Testing shall be done in presence of the engineer.

10.2. Electrical Installation

(Including lightning protection, standby power supply, and uninterruptable power supply):

- Chartered Engineer Certificate
- Testing and commissioning charge shall be borne by the contractor

Contractor shall also carry out the following tests to the entire satisfaction of the Engineer.

1. Each circuit shall be tested for ground continuity and ground resistance, as per relevant British standards.
2. Each circuit shall be tested for continuity and polarity.
3. Voltage drop in each circuit shall be determined

On the completion of testing, the contractor shall submit three copies of “as built” drawings of wiring and circuit diagrams

11. Electrical Installation

Specifications for electrical works provided with the Specifications and preamble initially issued with tender documents.

Unless Otherwise Specified in that document content in this section is applicable:

11.1. Approved Brands

I. All Switches, Switch Covers, Socket Outlet Covers & Weatherproof Socket Outlets

Abb, Clipsal, Legrand, Orange Or Cabtree Or Equivalent Purchased From Local Agent.

II. Cable Glands:

Comet, Hensel, Comex Or Equivalent Purchased From Local Agent.

III. uPVC Conduits

National, Anton, Duro, S-Lon, Polychrome

IV. G.I. Conduits

Melware , Maruichi, Pusan Or Any U.K. Approved U.S. Brands.

V. Surge Protection Device

OBO bettermann, Schneider Or Any U.K / U.S.A Approved Brands.

11.2. Grounding

All Exposed Non-Current Carrying metallic parts of electrical equipment shall be grounded. Grounding electrodes shall be driven ground rods of the cone-pointed, copper-encased steel.

Every panel shall be properly earthed using 50mm earth pipes and suitable earth cables. The equipment, completely wired and mounted on a separate mounting board shall be included in the panel. Internal wiring shall be PVC insulated and sheathed cable of 300/500V grade, manufactured to BS7671:2001.

11.3. Additional Requirements

All panels shall carry an identification mark which indicates the,

- Danger sign
- Manufacturer's identification

This information shall be clearly visible after erection of the panels.

11.4. Equipment

- **Contactors**

Should be suitable for making/ breaking electric circuits at a long distance. Relevant standards are IEC60947-4-1 & GB14048.4.