GENERAL SPECS & CONDITIONS FOR ELECTRICAL WORKS

1. The work under the contract shall be carried out in accordance with the schedule of item-wise works, these general specifications, drawings forming part of this tender document, general conditions and other terms of the tender.
2. The Contract works shall be carried out as per following the latest CPWD rules & regulations – Centralized one (Typical for All states in India) for Electrical & Civil Works unless otherwise specified in the nomenclature of the individual item or in the general specifications of concerned items of works.
3. For items not covered under latest CPWD specification, for (Electrical & Civil Works) and in particular specification or nomenclature of the individual item as above, the work shall be done as per latest relevant BIS codes of practice.
4. In case of non-availability of any specification in the above lines or any overlapping provisions, non- clarity on any issue, applicability of particular provision out of above, shall be decided by Engineer- in-Charge whose decision shall be final & binding on the contractor.
5. The contractor shall be responsible for executing and completing the work in accordance with the specified standards and specification which are as per requirements of IGBC-medal ratings. Execution of Electrical quality control is intended to provide a comprehensive common and consistent framework of quality control which is comprised of two main elements.
6. The contractor shall be responsible for the types of test to be carried out, frequency of testing and stage of testing as directed by Engineer-in-charge or as stipulated in Indian Standards CPWD Specifications for electrical and civil works. The cost of all these tests shall deem to be included in the rates being quoted by the contractor.
7. In case of non-availability for any electrical items from the approved makes, In such cases electrical contractor shall proceed with equivalent brand of that particular items as per getting prior approval in advance from respective Client/Architect/Consultant by producing relevant certificates/documents/samples from the chosen equivalent brand. All test samples should be preserved, with proper identification, test log reference, test date and other applicable information. These samples must be stored at site by the contractor. In addition to tests performed on site, the contractor is responsible for specialized tests which are performed by manufacturers or third parties during the manufacturing of various materials and equipment components, to be incorporated in the works.
8. The Electrical (Interior & External) Works, Substation works & DG Set Works shall be carried out in accordance with Indian Standard Code of Practice for Electrical Wiring Installation IS: 732-1989 and IS: 2274-1963. Electrical Installation work shall also be done in conformity with National Electrical Code with respect to latest amendments. All Electrical work shall be carried out in accordance with the

provision of Indian Electricity Act 1910 & Indian Electricity practice for the type of work involved. It shall also be in conformity with regulations

Part I	-	Internal Work	-	2013
Part IV	-	Substation Work	-	2013
Part VII	-	DG Set	-	2013

9. Wherever this Tender Specifications call for a higher standard of material and for workmanship than those required act by any of the above mentioned regulations and specifications with respect to given general specifications & conditions herewith which shall take precedence over the said regulations and standards.

Contractor shall do necessary co-ordination works with Govt. officials for organizing the EB point of supply inside the site premises, Getting load sanction from TANGEDCO as per site overall power demand requirement, Arranging the site inspection for all Govt legal agencies(Like CEIG,TANGEDCO,etc.,) after completing all electrical works installation at site subject to obtain their approval and shall avail the safety clearance certificate from them against installed electrical system leading to energize the electrical system for site operation.

1.0 **Internal Electrical Wiring**:

1.1 ***Scope****:*

This section covers the general technical requirements and measurement of the various components in Internal Electrical Installation Works. The definition of terms shall be accordance with IS 732: 1989 (Indian Standard Code of Practice for Electrical Wiring), except for the definitions of point, circuit and sub main wiring

1.2 **Electrical Point Wiring**:

A point (other than socket outlet point) shall include all works necessary in complete wiring to the following outlets from the controlling switch or MCB. The scope of wiring for a point shall, however, includes the wiring work necessary in tapping from another point in the same distribution circuit: -

- Ceiling rose or connector (in the case of points for ceiling/ exhaust fan points, pre-wired light fittings and call bells)
- Ceiling rose (in case of pendants except stiff pendants)
- Back plate (in the case of stiff pendants)
- Lamp holder (in the case of gooseneck type wall brackets, batten holders and fittings which are not pre-wired.

In the case of call bell points, the words “from the controlling switch or MCB” shall be read as “from the ceiling rose meant for connection to bell push”.

1.2.1 **Scope**:

i) Following works shall be deemed to be included in point wiring:

- Conduit, accessories for the conduit and wiring cables between the switch box and light point outlet, loop protective earthing of each fan/ light fixture.
- All fixing accessories such as clips, nails, screws, Phil plug, raw plug etc. as required.
- Metal switch boxes for control switches, regulators, sockets etc. recessed or surface type and phenolic laminated sheet covers in case of piano type switches and outer & inner cover plates in case of modular type switches.
- Outlet boxes, junction boxes, pull-through boxes etc. but excluding metal boxes if any, provided with switchboards for loose wires/ conduit terminations.
- Control switch or MCB as specified.
- Ceiling rose or connector as required.
- Connections to ceiling rose, connector, lamp holder, switch etc.
- Interconnection wiring between points on the same circuit, in the same switch box or from another.
- Protective (loop earthing) conductor from one metallic switch box to another in the distribution circuits, and for socket outlets. (The length of protective conductor run along with the circuits/ sub mains is excluded from the scope of points)
- Based conduit or porcelain tubing where wiring cables pass through wall etc.

ii) Following items shall be deemed to be included in group control point wiring:

- Conduit, accessories for the conduit and wiring cables between the Switchboard/ MCBDB to the first point or wiring cable between points forming a group including loop protective earthing of each fan / light fixtures.(Installing MCB/Switch is not included in this scope and will be measured separately].
- All fixing accessories such as clips, nails, screws, Phil plug, raw plug etc. as required. Junction boxes pull-through boxes etc. but excluding metal boxes if any provided with Switchboard/ MCBDB for loose wires/ conduit terminations.
- Ceiling rose or connector as required.
- Connections to ceiling rose, connector & Switch/ MCB etc.
- Bushed conduit or porcelain tubing where wiring cables pass through wall etc.

1.3 Measurement:

1.3.1 **Point Wiring (light & Fan Points)**:

Unless and otherwise specified, there shall be no linear measurement for point wiring as light points, fan points, exhaust fan points and call bell points. These shall be measured on unit basis by counting.

No separate measurement will be made for interconnections between points in the same distribution circuit and for the circuit protective (loop earthing) conductors between metallic switch boxes.

1.3.2 **Point Wiring (Socket Outlet Point)**:

The light plug (6 Amp) point and power 16 Amp plug point wiring shall be measured on linear basis, from the respective tapping point of live cable, namely, switchbox, another socket outlet point, or the Sub distribution board as the case may be, up to the socket outlet.

The metal box with covers, switch/ MCB, socket outlet and other accessories shall be measured and paid as separate item. The power point may be 16/6 Amp 6 pin socket outlet, where so specified in the Tender documents. (2 pin or 5 pin socket outlet shall not be permitted)

1.3.3 **Group Point Wiring (Switch Control)**:

In the case of points with more than one point controlled by one switch, such points shall be measured in part i.e. from switch to the first point outlet as one point and (from switch to first point of group controlled point). Subsequent looping points i.e one point to another point in the same group will be measured under group controlled point (from one point to another point).No recovery shall be made for non-provision of more than one switch in such cases.

1.3.4 **Group Point Wiring (MCB Control)**:

In the case of points with more than one point controlled by one MCB, such points shall be measured in part i.e. from MCB to the first point outlet as one point and will be measured under group controlled point (from MCB to first point of group controlled point). Subsequent looping points i.e. one point to another point in the same group will be measured under group controlled point (from one point to another point).

Providing MCB is not covered in this scope and will be measured separately

1.3.5 **Main Circuit**:

Circuit wiring shall mean the wiring from the distribution board up to the tapping point for the nearest first point of that distribution circuit, viz. up to the nearest first switch box.

1.3.6 **Sub main circuit**:

Sub main wiring shall mean the wiring from one Main/Distribution switchboard to another.

1.3.6.1 **Measurement of circuit and sub main wiring**:

Circuit and sub main shall be measured on linear basis along the run of the wiring. The measurement shall include all lengths from end to end of conduit exclusive of interconnections inside the switchboard etc. The increase on account of diversion or slackness shall not be included in the measurement. The length of circuit wiring with two wires shall be measured from the distribution board to the first nearest switch box

in the circuit irrespective of whether the neutral conductor is taken into switch box or not.

When wires of different circuit are grouped in as single conduit the same shall be measured on linear basis depending on the actual numbers and sizes of wires run. When circuit wires and wires of point wiring are run in the same conduit, circuit wiring shall be measured on linear basis depending on the actual number and sizes of wires run in the existing conduit. As far as, practicable circuit wiring and point wiring shall be drawn in different conduit.

Circuit wiring and sub main shall not be run in the same conduit. Protective (loop earthing) conductors, which are run along the circuit wiring and the sub main wiring, shall be measured on linear basis and paid for separately.

1.3.7 **General Wring Works**:

Except as specified above for point wiring, circuit wiring and sub main wiring, other types of wiring shall be measured separately on linear basis along with the run of wiring depending on the actual number and sizes of wires run.

1.3.8 **Distribution-Wring**:

The main distribution board and branch distribution board shall be controlled or provided with linked switch fuse unit or miniature circuit breaker (MCB) of specified rating on the phase or live conductor or combined phase and neutral control gear for incoming and outgoing as indicated in the BOQ.

1.4 **Distribution of sub main and circuits**:

1.4.1 **Wiring System**:

1. Unless and otherwise specified in the tender documents, wiring shall be done only by the “Looping System”. Phase of live conductors shall be looped at the switch boxes and neutral conductors at the point outlets.

2. Lights, fans and call bell shall be wired in the ‘lighting’ circuits. 15/ 16 Amp socket outlets and other power outlets shall be wired in the ‘Power’ circuits. 5/6 Amp socket outlets shall be wired in the ‘lighting circuits’.

3. The wiring throughout the installation shall be such that there is no break in the neutral wire except in the form of linked switchgear

1.4.2 **Run of Wiring**:

1. The type of wiring shall be as specified in tender document, i.e. conduit.

2. Surface wiring shall run, as far as possible, along the walls and ceiling so as to be easily accessible for inspection.

3. In no case, the open wiring shall be run above the false ceiling without the

approval of Engineer-In-Charge.

4. In all types of wiring, due consideration shall be given for neatness, good appearance and safety.

1.4.3 **Passing through walls or floors**:

When wiring cables are to pass through a wall, these shall be taken through a protection (Steel/PVC) pipe or porcelain tube of suitable size such that they pass through in a straight line without twist or cross in them on either end of such holes.

The ends of metallic pipe shall be neatly bushed with porcelain, PVC or other approved material. Where a wall pipe passes outside a building so as to be exposed to weather, the outer end shall be bell mouthed and turned downwards and properly bushed on the open end. All floor openings for carrying any wiring shall be suitably sealed after installation.

1.4.4 **Joints in Wiring**:

1. No bare conductor in phase and/or neutral or twisted joints in phase, neutral, and/or protective conductors in wiring shall be permitted.

2. There shall be no joints in the through runs of cables. If the length of final circuit or sub main is more than the length of a standard coil, thus necessitating a through joint, such joints shall be made by means of approved mechanical connectors in suitable junction boxes.

3. Termination of multi-stranded conductors shall be done using suitable crimping type thimbles.

2.0 **Wires & Cables**:

2.1 **General:**

Conductors of wiring cables (other than flexible cables) shall be of aluminum or copper, as specified.

Stranded aluminum conductor shall not be used in wiring cables up to 6Sq.mm. size. Unless or otherwise specified, copper conductor of size 1.5 Sq.mm. and above used for wiring Shall be stranded.

2.2 **Flexible Cables**:

Conductor of flexible cables shall be of copper. The minimum cross sectional area of conductor for flexible cables shall be 0.0006 Sq. inch (14/.0076” or 14/0.193 mm).

Only 3 core flexible cables shall be used for connecting single-phase appliances.

Unless armour, or tough rubber or PVC sheath mechanically protects the flexible cables, these shall not be used in workshops and other places where they are liable to mechanical damage.

Flexible cable connection to bell push from ceiling rose shall be taken through steel conduit/ metallic casing and capping.

2.2.1 **Wiring Accessories**:

Control Switch for Points Combined switch cum socket shall not be permitted. Control switch shall be placed only in the live conductor of the circuit. No single pole switch or fuse shall be inserted in the protective (earth) conductor or earthed neutral conductor of the circuit.

2.2.2 **Socket Outlets**:

6Amp and 16Amp 6 Pin socket outlets shall be installed at the following Positions unless OR otherwise specified.

- Kitchen/ Pantry 23 cm above working platform and away from the likely Positions of stove and sink.
- Toilets in non-residential building – 1.25 mt. above floor level. At all other places – 23 cm above floor level.

2.2.3 **Switch box covers**:

Phenolic laminated sheet of 3 mm thick of approved shade shall be used for switch box covers in case of piano type switches. For modular type switches/ sockets suitable outer and inner cover plates as specified shall be provided over the standard box as recommended by the manufacturers of modular type switch/ sockets and no separate sheet cover is required.

2.2.4 **Ceiling Rose**:

A ceiling rose shall not be used at circuit voltage of which normally exceeds 250 Volts.

Only one flexible cord shall be connected to ceiling rose. Specially designed ceiling roses shall be used for multiple pendants. A ceiling rose shall not embody fuse terminal as an integral part of it.

2.2.5 **Lamp Holders**:

The standard constructional feature of manufacturers (ISI approved) of lamp holders is acceptable. Where the lamp holders are part of light fixtures the holders shall be suitable for the type of lamps used.

2.3 **Fittings**:

The type of fittings shall be as specified in BOQ of tender documents.

2.3.**1 Indoor Type Fittings**:

The contractors shall supply the specified model and make of the fittings. The standard constructional features of specified make and model as given in the tender document are acceptable.

Where conductors are required to be drawn through tube or channel leading to the fitting, the tube or channel must be free from sharp angles or projection edge, and of such size as will enable them to be wired with the conductors used. Pendants in verandahs and similar situations exposed to wind shall be of fixed rod type.

Fittings using discharge lamps shall be complete with power factor correction capacitors, either integrally or externally. An earth terminal with suitable marking shall be provided for each fitting for discharge lamps. Fittings shall be installed such that the lamp is at a height specified in approved drawings or as directed by the Engineer-In-Charge.

Copper chokes of Fluorescent Tube light fittings shall be of Electronics type or as specified in BOQ.

2.4 **Fittings & Accessories**:

2.4.1 **Conduiting/Wiring System**:

All accessories like switches, socket outlets, call bell pushed and regulators shall be fixed in flush pattern inside the switch/ regulator boxes. Accessories like ceiling roses, brackets, batten holders, stiff pendants etc. Shall be fixed on metal outlet boxes. Brass screws shall be used to fix the accessories to their bases.

The switch box/ regulator box shall normally be mounted with their bottom as 1.25 m from floor level, unless otherwise directed by the Engineer-In-Charge.

Fixing of Conduits at Walls and Ceiling:

- PVC sleeves/ dash fasteners should normally be used for fixing at walls or ceiling.

Plugging of walls or ceiling can be done in a better way where neatness is the first consideration. In all such cases, an approved type of asbestos or fiber fixing plug (rawl or Phil plug) with correct size of tools shall be used and done in a workmanlike manner.

2.5 **Fans, Regulators & Fans**:

2.5.1 **Ceiling Fans**:

Ceiling fans including their suspension shall conform to relevant Indian Standards.

Any additional hardware items required for installation of ceiling fans including fan hooks/ clamps as specified below shall be provided as specified in BOQ as a separate item.

All ceiling fans shall be wired to ceiling roses or to special connector boxes, and suspended from hooks or shackles, with insulators between hooks and suspension rods. There shall be no joint in the suspension rods.

For wooden or steel joists / beams, the suspension shall consist of MS flat of size not less than 40mm x 6mm, secured on the sides of the joists or beams by means of two coach screws of size not less than 5 cm for each flat. Where there is space above the beam, a through bolt of size not less than 1.5cm dia. shall be used.

2.5.2 **Conduit Wiring (Metallic):**

All rigid conduit pipes shall be of steel and be ISI marked. The wall thickness shall be 1.6mm (16 swg) for conduit upto 32mm and 2mm (14swg for conduit),The maximum number of PVC insulated cables conforming to IS: 694-1990 that can be drawn in one conduit is given size wise in Table I., and the number of cables per conduit shall not be exceeded. Conduit sizes shall be selected accordingly in each run.

No steel conduits less than 20mm in diameter shall be used.

2.5.3 Conduits Accessories:

- The conduit wiring system shall be complete in all respects, including their accessories.
- All conduit accessories shall be of threaded type, and under no circumstances pin grip type or clamp grip accessories shall be used.
- Bends, couplers etc. shall be solid type in recessed type of works and may be solid or inspection type as required, in surface type of works.
- Saddles for surface conduit work on wall shall not be less than 0.55mm (24 gauge) for conduits up to 25mm dia and not less than 0.9mm (20 gauge) for larger diameter. The corresponding widths shall be 19mm and 25mm.
- The minimum width and the thickness of girder clips used for fixing conduits to steel joints and clamps shall be as per Table shown below;

(Maximum Permissible Number be 1100 Volt Grade Multi core Cables)

Wire Size in Sq.mm	Size of Conduits (mm) (Max No Wires)				
	20	25	32	40	50
1.5	4	8	12	-	-
2.5	3	6	10	-	-
4.0	2	4	8	12	-
6.0		3	6	7	-

2.6 **Outlets**:

The switch box regulator box shall be made of metal on all sides, except on the front. In case of welded mild steel sheet boxes the wall thickness shall not be less than 1.2mm (18 gauge) for boxes up to a size of 20 cm x 30 cm and above this size 1.6mm (16 gauge) thick MS boxes shall be used. The metallic boxes shall be duly painted with anticorrosive paint as before erection with respect to painting specification.

Outlet boxes for light/ power sockets shall be of standard size of manufacturer to accommodate required number of modular switches, socket outlet. Where a large number of control switches and/ or fan regulators are required to be installed at one place, these shall be installed in more than one outlet box adjacent to each other for ease of maintenance.

An earth terminal with stud and metal washers shall be provided in each DB/MS box for termination of protective conductor and for connection to socket outlet/ metallic body of fan regulator etc. A metal strip shall be welded/ screwed, to the metal box as support if fan regulators are to be fixed herein.

Clear depth of the box shall not be less than 50mm, and this shall be increased suitably to accommodate mounting of fan regulators in flush pattern. The fan regulators can also be mounted on the switch box covers, if so directed by the Engineer-In-Charge.

The size of the switchbox in case of piano type switches shall be as per guidance through Engineer-In-Charge

2.7 **Without any fan regulator/ Dimmer on the Switch box**:

The size of the switch box shall be minimum 75mm x 75mm x 60mm deep to accommodate the number of switches and fan regulators which shall meet spacing requirements mentioned below.

2.7.1 **Spacing Requirements**:

- The spacing between any edge of live terminal of Switch/ socket and the body shall not be less than 26mm at any point.
- The size of the switch box in case of modular type switches shall be as per

  Manufacturer's standard.

2.8 **Conduit Joints**:

The conduit work in each circuit or section shall be completed as before the cables are being drawn in. Conduit pipes shall be joined by means of screwed couplers and screwed accessories only. Threads on conduit pipes in all cases shall be between13mm to 19mm long being suit to accommodate pipes to full threaded portion of couplers or accessories.

Cut ends of conduit pipes shall have no sharp edges, nor any burrs left to avoid damage to the insulation of the conductors while pulling them through such pipes.

The Engineer-In-Charge, with a view to ensuring that the above provision has been carried out, may require that the separate lengths of conduit etc. after they have been prepared shall be submitted for inspection before being fixed. No bare threaded portion of conduit pipe shall be allowed, unless such bare threaded portion is treated with anticorrosive preservative or covered with approved plastic compound.

2.9 **Bends in Conduit**:

All necessary bends in the system, including diversion, shall be done either by neatly bending the pipes without cracking with bending radius of not less than 7.5 cm., or alternatively, by inserting suitable solid or inspection type normal bends, elbows or similar fittings, or by fixing cast iron inspection boxes, whichever is most suitable.

No length of conduit shall have more than the equivalent of four quarter bends from outlet to outlet. Conduit fittings shall be avoided as far as possible on conduit system exposed to weather. Where necessary, solid type fittings shall be used.

2.10 **Outlets**:

All outlets such as switches, wall sockets etc. may be either flush mounting type, or of surface mounting type, as specified in the additional specifications if any or as directed by the Engineer-In-Charge.

3.0 **Lighting Fixture**:

The light fixture and fans shall be Approved makes and as per specification assembled and installed in position complete and ready for service in accordance with the detailed drawing, manufacturer's instructions and to the satisfaction of the Architect / Consultant. Fixture shall be suspended true to alignment plumb level and capable of resisting all lateral and vertical forces and shall be fixed as required.

3.1 **General requirements for the fixtures**:

All the fixtures shall be suitable for 240 volts, single phase, 50 cycles/sec AC supply available from a phase and earthed neutral of the 415 V, 3 phase, 4 wires system(Unless OR otherwise specified).

The fixture shall be provided with the earthing arrangements and shall meet with safety

requirements of the various standard specification, safely codes and be approved by the Fire Insurance Association.

All fixtures supplied against this specification shall be guaranteed for a period of one year from the date of their installation and commissioning for free repairs and free replacement.

In case of tube fixture internal wiring shall be done with minimum 1.0 Sq. mm flexible copper conductor wires so as to avoid stroboscopic effect.

3.1.1 For each type of fixtures and lamp unit the following data shall be required.

- Illumination distribution curves with percentage ceiling.
- Total mean output of the lamp.
- Overall dimensions and mounting arrangement in false ceiling.
- Other technical details such as co-efficient of utilization, reflecting properties etc. and complete details of louvers.
- Descriptive technical literature and test certificate.
- Weight of lighting fixtures.

3.1.2 **Light output of the fitting**:

The light output indicated in technical data sheet is guaranteed one & shall be measured and polar curves shall be submitted.

3.2 **Guarantees**:

The LED lighting fixtures & LED driver unit shall be guaranteed for satisfactory operation for 66 months from the date of supply or 60 months from the date of commissioning.

The fitting shall be of complete with all accessories like, side holders, Electronic LED Driver duly wired.

Note: Samples taken at random from the supply made shall be subjected to inspection / testing. If the same does not meet the requirements of the specification, the entire lot will have to be replaced with Acceptable Brands from approved makes only.

LIST OF PREFERRED MAKES		
Sl. No.	**Items Description**	**Makes or its equivalent**
1	RMG panel	System Control/Schneider/Siemens or Equivalent
2	HT Panels(Client Side Control)	System Control/Schneider/Siemens/L&T or Equivalent
3	Transformer	Voltamp/3si /Indotech or Equivalent
4	11KV XLPE Power Cables	Havells/KEI/Polycab or Equivalent
5	11KV cable termination kits	Raychem/3m/Denson or Equivalent
6	1.1kv XLPE/ PVC Cables	Havells/KEI/Polycab or Equivalent
7	Cable glands	Comet/Prabath or Equivalent
8	Cable lugs	Comet/Dowell's or Equivalent
9	ACB	Schneider-MVS/ABB-E-Max/Siemens-3WL/L& T- U Power or Equivalent
10	MCCB	Schneider-CVS / ABB-T-Max /Siemens-3VA/L&T D Sin or Equivalent
11	MCB/ELCB / RCCB	Anchor/Honywell/ ABB/Hager or Equivalent
12	Switch Fuse Unit (HRC Type)	Schneider/ABB/Siemens or Equivalent
13	Changeover Switches	HPL / Socomec / L&T or Equivalent
14	Contactors/ThermalRelay/Timers/Push Button/Indication lamps	Schneider / ABB / Siemens / L&T or Equivalent
15	MCB Distribution Boards	Legrand / Honywell / ABB / Hager or Equivalent
16	Current Transformers	Kappa / Kalpa / JP Electronics or Equivalent
17	Digital Meters	Elmeasure / Conzerve / HPL Socomec or Equivalent
18	Analog meters	AE / Rishab / IMP or Equivalent
19	Selector switches	Salzer / Kaycee or Equivalent
20	APFC Controller	Beluk / Epcos or Equivalent

21	Capacitors/ Reatcors	Schneider / Epcos / L&T or Equivalent
22	TVSS	OBO/Cape/Liebert or Equivalent
23	Annunciator	Minilec/Bharani or Equivalent
24	Panel Fabrication shops	Tesla Controls/Mahaveer Fabs /sivasakthi Electricals or Equivalent
25	Moulded Plug & Sockets and enclosures	Legrand/L&T/Scame/ Mennekes or Equivalent
26	Outdoor W/P Boxes	Hensel/Sintex or Equivalent
27	FRLS Wires	Anchor/Polycab / Havells/Finolex or Equivalent
28	FRLS Flexible cables above 6sq.mm	Anchor / Polycab / Havells / Finolex or Equivalent
29	Cat6 / Cat 5E Cables	Legrand / Commscope / D-Link / Finolex or Equivalent
30	Coaxial cables	Commscope / Havells / Finolex or Equivalent
31	PVC Pipes & Accessories	Anchor / Avon Plast / Precision-(Medium Duty) or Equivalent
32	MS Conduits	BEC / Bharat / Gupta or Equivalent
33	Modular Switches / Sockets	Schenider / MK / Anchor-Roma/ Havells or Equivalent
34	Light Fittings	Panasonic/Philips/Wipro/Crompton Greaves or Equivalent (LED fittings)
35	Lamps	Osram / Philips or Equivalent
36	Street Light Poles	Metal Coats / Maruthum Poles / K-lite or Equivalent
37	Solar Street Light Poles	Havells / DK Solar/ K-LITE or Equivalent
38	Ceiling/Wall/Exhaust fans	Almonard / Havells / Crompton / Bajaj / Usha /Orient or Equivalent
39	Lightning Protection system	Approved by Client/Consultant or Equivalent
40	Cable trays	OBO Betterman / Profab / Pinnacle or Equivalent
41	Terminal Blocks	Connectowell / Elmex or Equivalent
42	First aid box	Thadani or Equivalent