

SPECIFICATIONS FOR ELECTRIFICATIONS

Rules & Regulations:

The installation shall be generally carried out in conformity with the requirements of Indian Electricity Act 2003 (as amended up to date) and the latest Indian Electricity Rules 1956 and supplementary Regulations of the State Electricity Departments and Electricity Undertakings and where the installation is subject to inspection and approval of Fire Insurance and Explosives Authorities, such installation shall be planned and executed to conform to their special Rules.

1.0 Point Wiring:

1.1 Supply:

The following material shall be included in a point wiring and accessories.

- a) Conduit - 20 / 25 mm dia. 2.0 mm thick PVC rigid ISI & FIA approved conduit with accessories.
- b) Wires - PVC insulated copper conductor multi-stranded flexible type wires ISI mark of 1.0, 1.5, 2.5, 4.0, 6.0, 10, 16 sq.mm
- c) Switches and accessories (Modular Plate Type) - 5 Amp single pole one way, two way switch, 5 amp socket, 15 Amp switch and 5/15 A socket, fan Regulators step control type (Hummfree)
- d) Cover plates for outlet boxes - 3 mm thick formica / Hylam sheet specially for electrical purposes.
- e) Hardwares - screws and washers non rusting type brass type.
- f) Switch Boards and outlet Boxes - factory made boxes for flush mounting for switches and accessories and 16 SWG m.s. sheet hot dip GI boxes as outlet boxes with knock-outs for conduit entries and tapped holes for screws.
- g) Holders - Pendant holders / angle holders / ceiling rose etc. of Anchor make white in colour.
- h) Industrial Sockets - Polycarbonate (Polyamide) Industrial type with its top.

1.2 Installation :

All conduit shall be concealed in walls, beam, column, slabs or above false ceiling duly clamped with GI spacers saddles. Chases shall be made in walls to embed / conceal the conduits fully and then refilling of the chases with cement mortar and also, wherever the conduits are embedded in wall then the re-filling and finishing

/ covering of the chases shall be done with chicken mesh. All switch boards and outlet boxes (placed for bracket wall points) shall be embedded in walls and should be kept in line and level with help of spirit level. Fan boxes shall be provided with nut welded on top with threaded hook and check nut. Wire drawing should be done with the help of draw wire. The conduits shall be cleaned of all foreign materials before inserting the wires. Drawing of wires should be done such that the insulation of wires is not damaged. All conduits shall be tighten with check-nuts in all outlet / junction boxes and switch boxes. All ends of conduits shall be sealed properly to avoid entering cement slurry or other foreign materials inside to conduits during casting of slab / plastering of wall or during flooring.

All chases / jery in wall / RCC / Flooring shall be made by machine only. Manual cutting shall not be allowed

All works shall be done as per instruction of the Engineer-in-charge and to the satisfaction of the E.I.C.

For surface conduiting wiring, the conduit, fittings, switch boards, outlet boxes, ceiling fan regulator boxes etc. shall be installed on surface exposed. Flexible conduits shall not be used for earth continuity of conductors, separate earth wire shall be provided either inside or outside the flexible conduits, which shall be connected by means of earth clips to the earth system at one end and to the equipment at the other end as per IS 3043-1987.

Size of wire shall be chosen to limit Voltage drop within 3 %. Area of conductor shall be 1.0, 1.5, 2.5, 4.0 and 10.0 sq.mm copper. Generally not more than 8 to 10 points shall be wired in one circuit.

All cost of material and labour shall be included while quoting and no extra payment shall be entitled.

1.3 Testing :

After completion of wiring, installation of switches etc., testing shall be done for insulation resistance as specified in the tender

Notes : No joints shall be allowed in any wires in the conduits, all wires shall only be joined or connected at termination points. All circuits shall have individual neutrals and one neutral shall not complete the while wiring system.

Circuits mains shall start from Distribution board to switch board or from Meter board to Distribution. The circuits mains includes supply and installation of two nos. of wires with earth wire for single phase mains and Four nos. of wires with earth wire for three phase mains.

2.1 Supply :

a) Conduit - 20 / 25 mm dia 2.0 mm thick PVC rigid ISI & FIA approved conduit with accessories.

b) Wires - PVC insulated copper conductor multi-stranded flexible type wires ISI mark of 1.0, 1.5, 2.5, 4.0, 6.0, 10, 16 sq.mm

c) All cost of material and labour should be included when quoting and no extra payment shall be entitled.

2.2 Installation :

a) All conduit shall be concealed in walls, beam, column, slabs or above false ceiling duly clamped with GI spacers saddles. Chases shall be made in walls to conceal the conduits and then refilling of the chases with cement mortar and also, wherever more than two conduits are embedded in wall then the refilling and finishing of the chases shall be done with chicken mesh. All switch boards and outlet boxes (placed for bracket wall points) shall be embedded / concealed in walls and should be kept in line and level with help of spirit level. Fan boxes shall be provided with nut welded on top with threaded hook and check nut. Wire drawing should be done with the help of draw wire. The conduits shall be cleaned of all foreign materials before inserting the wires. Drawing of wires should be done such that the insulation of wires is not damaged. All conduits shall be tighten with check-nuts in all outlet / junction boxes and switch boxes. All ends of conduits shall be sealed properly to avoid entering cement slurry or other foreign materials inside to conduits during casting of slab / plastering of wall or during flooring.

b) For surface conduiting wiring, the conduit, fittings, switch boards, outlet boxes, ceiling fan regulator boxes etc. shall be installed surface exposed. Flexible conduits shall not be used for earth continuity conductors. Separate earth wire shall be provided either inside or outside the flexible conduits, which shall be connected by means of earth clips to the earth system at one end and to the equipment at the other end as per IS 3043-1987.

c) Wires shall be drawn in conduit after cleaning of conduits and drawn with the help of draw wires. No damage to the insulation of wires should be done while drawing.

All chases / jery in wall / RCC / Flooring shall be made by machine only. Manual cutting shall not be allowed

2.3 Testing :

After completion of wiring, installation of switches etc, testing shall be done for insulation resistance as specified in the tender

3.0 Distribution Boards :

3.1 Supply:

Distribution boards (DB) shall be of sheet metal with rated bus bars, factory made. They shall be for three-phase or single phase distribution system as per the requirements or schedule of quantities.

3.2 Installation :

The distribution board shall be embedded / concealed in wall, flush mounted or surface mounted and should be in line and level. These shall be factory tested. Final MCBs on sub circuits shall be marked by permanent markers on the DB door.

3.3 Test :

After installation of MCBs, it shall be tested.

4.0 M.C.B & ELMCB / RCCB.

4.1 Supply :

MCB : These shall be SP,SPN,TP or TPN as specified in B.O.Q. Rating of 2A, 6A, 16A, 25A, 30A, 63A, 10KA fault level, as per IS-8828-1978; BS 3871-part.I

ELMCB / RCCB : These shall be of SPN, TPN and specified in B.O.Q. of rated value. ELMCB / RCCB - BS-4293 neutral advance feature at closing neutral will be first to contact at the time of opening neutral breaks last after allowing the phases to open first. Since the ELMCB is to be used as main switch, it shall have safe interrupting clearance as per IEC 408 / IS 4064. The ELMCB shall have terminals to terminate aluminum conductor up to 25 mm². The ELMCB / RCCB shall have sensitivity of 30 - 300 mA. as per requirements

4.2 Installation :

All ELMCB / RCCB and MCBs shall be installed in the DB on din rail provided in the DB, spares shall be blocked by blank plates.

4.3 Testing :

All ELMCB / RCCB should be tested for overloading, short circuit, earth leakage tripping and MCBs should be tested for overloading and short circuit tripping.

5.0 Material :

All materials, fittings and appliances used in the electrical installation shall be of the best quality and brand new of approved manufacturer and shall conform to the latest Indian Standard Specifications, wherever these exist.

6.0 Workmanship :

Good workmanship and neat appearance are the prerequisites for compliance with the various sections of these specifications. The work shall be carried out under direct supervision of a person holding Certificate of Competency issued by

the State Government and in accordance with the statutory rules and regulations in force. The relevant ISI code of practice shall be followed wherever applicable.

7.0 Drawing :

Four sets of all relevant electrical drawings and specifications shall be furnished by Client to the Contractor for his own use until the completion of the contract which shall be accessible at all reasonable times to the Engineer-in-Charge or their representatives. The tender drawings shall indicate only the general scheme of requirements. Exact position of all points, controls, switch boxes and inspection boxes, main and sub-distribution boards etc. shall be got approved by the Engineer-in-Charge before the commencement of the work. Wherever required, detailed drawings shall be prepared and got approved.

On completion of the work, completion drawings shall be prepared and two copies of the same should be submitted to the Employer. The completion drawings shall indicate clearly the main switch board, the runs of various mains and sub-mains, position of points and their controls. All circuits shall be clearly indicated and numbered in the wiring diagrams and all points shall be given the same number as the circuit to which they are electrically connected. For bought out items such as Transformers, PCC Sub Panels etc then he must submit drawings and specifications and technical information at least in four sets.

8.0 Marking & Apparatus :

When a board is connected to voltage higher than 250 volts, all the terminals or leads of the apparatus mounted on it shall be marked in the following colours to indicate the different poles or phases to which the apparatus or its different terminals may have been connected.

Three Phases	--	Red, Blue & Yellow
Neutral	--	Black
Off wire	--	White or Grey
Earth wire	--	Green

Where four wire three phase wiring is to be done, the neutral shall be in black colour and the other three wires in with Red, Blue & Yellow colour. Where it has more than one switch, each such switch shall be marked to indicate which section of the installation it controls. The main switch shall be marked and also where there are more than one main switch in the building, each such switch shall be marked to indicate which section of the installation it controls.

All marking required under this clause shall be clear and permanent.

9.0 Materials :

All materials used in the construction of fittings shall be of such quality, design and construction that will provide adequate protection in normal use against

mechanical and electrical failures and exposures to the risk of injury or electric shock and shall withstand the effects of exposure to atmosphere.

10.0 Ceiling Rose :

Ceiling rose and similar attachments - A ceiling rose or any other similar attachments shall not be used on a circuit for the voltage which normally exceeds 250 Volts. Normally only one flexible cord shall be attached to a ceiling rose. Specially designed ceiling roses shall be used for multiple pendants.

11.0 Socket Outlets & Plugs :

A socket outlet shall not embody fuse terminals as an integral part of it. But the fuse may be embodied in plug in which case the plug shall be non-reversible and shall be so arranged and connected that the fuse is connected to an outer or phase conductor or the non-earthed conductor of the circuit. Every socket outlet shall be controlled by a switch which will be on the live side of the line. In an earthed system of supply, the outlet and plug shall be three pin type and the third terminal connected to earth.

a) Every lighting fitting shall be controlled by a switch and where two controls for a point is necessary then it shall be controlled by two way switches. Lights, fans and socket outlets shall be so located as to provide maximum comfort to the occupant and to enable him to utilise the electricity in the most economical manner.

b) Where conductors are required to be drawn through tube or channel leading to the fittings, the tube or channel must be free from sharp angles or protecting edges and of such size as will enable them to be wired with the conductors used for the final sub-circuit without removing the braiding or taping. As far as possible all tubes or channels should be of sufficient size to permit looping back.

c) Where a light fitting is supported by one or more flexible cords, the maximum weight to which the twin flexible cords can be subjected shall be as follows :

SIZE OF TWIN FLEXIBLE CORDS

Nominal cross sectional Maximum permissible wires		No. & diameter area of weight		in
Sq.Inch Kg.	Sq.mm Lbs.	Sq.Inch	Sq. mm	
0.0006	0.5	14/0.0076	14/0.193	1.4
	3			
0.0010	-	23/0.0076	23/0.193	2.3
5				

0.0017	1.5	40/0.0076	40/0.193	4.3
10				

Where the weight of the fixture is greater than 4.5 Kgs.(10 Lbs) then it has to be supported, two or three twin flexible cords and shall be used so that the maximum weight to which any cord is subjected does not exceed the above values, or Alternatively other support viz. suitable metal pipe or suitable support shall be provided. Preferably metal pipe shall be used only.

d) No inflammable shade shall form a part of a light fitting unless such shade is well protected against all risks of fire. Celluloid shade or light fitting shall not be used under any circumstances.

e) Enclosed type fittings shall be provided with a removable glass receptacle, arranged to enclose the lamp completely and of such size or construction as to prevent undue heating of the lamp or if the position of fitting be such that the glass receptacle is liable to mechanical damage the glass shall be protected by a suitable wire guard.

12.0 Fittings Wire :

The use of fitting wire shall be restricted to the internal wiring of the lighting fittings. Where fittings wire is used for wiring fittings, the sub-circuit leads shall terminate in a ceiling rose or connector from which they shall be carried into the fittings.

13.0 Lamp Holders :

Lamp holders for use on brackets and the like shall have not less than 1.3 cm(1/2") nipple and all those for use with flexible pendant shall be provided with cord grips. All lamp holders shall be provided with shade carriers. Where center contact Edison screw lamp holders are used, the outer or screw contact shall be connected to the ' middle wire ' or the neutral or to the earthed conductor of the circuit.

14.0 Water Tight Fittings :

External and road lamps shall have weatherproof fittings of approved design so as to effectively prevent the admission of moisture. An insulating distance piece of moisture proof material shall be inserted between the lamp holder nipple and the fitting flexible core conductors and cord grip lamp holders must not be used where exposed to weather.

15.0 Lamps :

All incandescent lamps, unless otherwise required, shall be hung at height of 2.5m (8 ft.), above the floor level. They shall be provided with caps of the following patterns : -----

Upto and including 200 watts.	-	Standard
Bayonet (B)		
Above 200 watts and not exceeding 300 watts.	-	Edison Screw (E.S.)
Above 300 watts	-	Golliath
Screw (GS)		

16.0 Fans, Regulators and Clamps :

i) Ceiling Fans : Ceiling fans including their suspension shall conform to IS :374-1951 and to the following requirements :

a) 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 rod but if joints are unavoidable then such joints shall be of 2" minimum length and both ends of the pipes shall touch together within couplers and shall in addition to it be secured by means of split pins; alternatively the two pipes may be welded.

b) Canopies on top of suspension rod shall effectively hide the suspension.

c) The leadings-in-wire shall be of nominal cross section area not less than 0.002 sq.inch (3.00.029") and shall be protected from abrasion.

ii) Exhaust fans shall be erected at the places indicated by the Consultants / EIC. For fixing an exhaust fan, a circular hole shall be provided in the wall to suite the size of the frame, which shall be fixed by means of rag bolt embedded in the wall. The exhaust fan shall be wired as near to the hole as possible by means of a flexible cord, care being taken that the blades rotates in the proper direction.

TESTING OF INSTALLATION

17.0 Insulation Resistance :

a) The insulation resistance shall be measured by applying between earth and the whole system of conductors or any section thereof with all fuses in place and all switches closed and except in earthed concentric wiring all lamps in position or both poles of the installation otherwise electrically connected together. A direct current pressure of not less than twice the working pressure provided that it need not exceed 500 volts for medium voltage circuits. Where the supply is derived from the three wire (AC or DC) or a poly phase system, the neutral pole of which is connected to earth either direct or through added resistance, the

working pressure shall be deemed to be that which is maintained between the outer or phase conductor and the neutral.

b) The insulation resistance measured as above shall not be less than 50, divided by the number of points on the circuits provided that the whole installation shall be required to have an insulation resistance greater than one mega ohm.

c) Control rheostats, heating and power appliances and electrical signs may, if required, be disconnected from the circuit during the test, but in that event the insulation resistance between the case of frame work and all live parts or each rheostat appliance and sign shall not be less than that specified in the relevant IS specifications shall not be less than half a megohm.

d) The insulation resistance shall also be measured between all conductors connected to one or phase conductor of the supply and all the conductors connected to the middle wire or the neutral or to the other pole or phase conductors of the supply and its value shall not be less than that specified in sub clause(b).

e) On completion of an electric installation (or an extension to an installation) a certificate shall be furnished by the contractor countersigned by the qualified supervisor where the installation was carried out.

Testing of earth continuity path : The earth continuity conductor including metal conduits and metallic envelopes of cables in all cases shall be tested for electric continuity and the electrical resistance of the same along with the earthing lead but excluding any added resistance or earth leakage circuit-breaker measured from the connection with the earth electrode to any point in the earth continuity conductor in the completed installation shall not exceed one ohm.

Testing of polarity of non-linked single pole switches :

a) In a two wire installation a test shall be made to verify that all non-linked single pole switches have been fitted in the same conductor throughout and such conductor shall be labeled or marked for connection to an outer of phase conductor or to the non-earthed conductor of the supply.

b) In a three wire or a four wire installation, a test shall be made to verify that every non-linked single pole switch is fitted in a conductor which is labeled or marked for connection to one of the outer or phase conductor of the supply.

19.0 CONDUIT CAPACITY

Maximum number of PVC insulated cables conforming to IS: 694-1977 than can be drawn in one conduit shall be as follows ;

	20mm		25mm		32mm		38mm		51mm			
64mm	S	B	S	B	S	B	S	B	S	B	S	B
1.5	5	4	10	8	10	12	-	-	-	-	-	-
2.5	5	3	8	6	12	10						
4	3	2	6	3	10	8						
6	2	-	5	4	8	7						
10	2	-	4	3	6	5	8	6				
16	-	-	2	2	3	3	6	5	10	7	12	8
25	-	-	-	-	3	2	5	3	8	7	9	7
35	-	-	-	-	-	-	3	2	6	5	8	6
50	-	-	-	-	-	-	-	-	5	3	6	5
70	-	-	-	-	-	-	-	-	4	3	5	4

NOTE:

1. The above table shows the max. capacity of conduits for a simultaneous drawing of cables.

2 The columns headed 'S' applies to runs of conduit which have distance not exceeding 4.25m between draw in boxes and which do not deflect from the straight by an angle of more than 15. The columns headed 'B' apply to runs of conduit which deflect from the straight by an angle of more than 15.

20.0 CABLES

20.30Cabling :

Cabling shall be done with help of jack and rollers. Cable shall be passed through RCC Hume Pipe wherever road crossing or pathway crossing is there. All cables shall rise from cable trenches in G I Pipes. Cable shall be tagged as per cable schedule at every 30 mts. by Aluminium tags of minimum 2mm thick securely fastened. They shall also be identified near the terminations.

Above the cable trenches cable route markers shall be installed as per rules and regulations at every 30 mts. and at every turnings of the cables or branching of cables.

All cables shall be laid in trenches at a depth of 1000 mm clear from last layer of bricks and as shown in drawings. Before laying of cables sand shall be spread then the cable shall be laid which shall again be covered with sand minimum 150mm from the top of the largest dia of the cable. Then second class bricks shall be laid across the trench completely covering the trench, lastly excavated soil shall be backfilled and compacted by watering intermittently.

All cables after laid shall be checked for insulation level and meggered before back filling. Cable entries in GI pipes or Hume pipes shall be sealed by cable compound or putty for smaller dia of pipes.

If required for the cable to run on cable trays then the cable shall be clamped by 16 SWG GI saddles and clamps. All works should be done to the satisfaction of the Engg.- in Charge.

20.4 Terminations

Cable shall be terminated by means of double compression heavy duty glands with PVC hood and terminated by solder less crimped type long barrel copper lugs. All should be done to the satisfaction of the Engg.-in -Charge. If the cores do not have any colour identification, then they should be identified by insulation tape of various phases. Cable shall enter any termination point by means of double compression glands, using reducers if required or drill of holes in gland plates. IF panel installed on a cable trench which does not have any bottom excess then holes shall be drilled in one line for the cables then the gland plates is cut into two halves from the center of the hole. Cables inserted and sealed and the armoured in the bottom should open and earthed to the earth bus. Crimping of lugs shall be done by hand crimping tool or hydraulic crimping tool with conducting jelly applied to conductors. Insulation shall be cut immediately after the lugs and care should be taken that the conductor is not left open. All jointing and crimping shall be carried out by licensed and experienced jointers approved E.I.C. and termination and straight joint shall be of 'Taped' or heat shrinkable type as specified.

20.5 Testing :

Before energizing , the megger test shall be carried out for insulation resistance between phase to phase and phase to earth.

For cable up to 1.1KV grade 1000 KV megger shall be used.

D.C. High Voltage test shall be conducted after installation on the following and test results are recorded as per format furnished by the Engineer-in-charge.

- a) All 1000 Volts grade cables in which straight through joints have been made.
- b) All cables above 1100 V grade.

For record purposes test data shall include the measure values of leakage current verses time.

The DC High voltage test shall be performed as detailed below in the presence of the EIC or his authorised representative only.

Cables shall be installed in final position with all the straight through joints complete. Termination shall be kept on unfinished so that the motors, switchgears, t transformers, etc.. are not subjected to test Voltages.

The Test Voltage shall be as under:

- | | | |
|-----------------------------|------|-------|
| i) for cable 1.1 KV Grade | 2.0 | KV DC |
| ii) for cable 3.3 KV Grade | 5.4 | KV DC |
| iii) for cable 6.6 KV Grade | 10.8 | KV DC |
| iv) for cable 11 KV Grade | 18 | KV DC |

Cable schedule and layout drawings must be marked for AS BUILT conditions during the installations work and shall be approved by the Site Engg.

EARTHED TERMINAL

Identification of earthed and earthed neutral conductors and position of switches and cutouts therein :

Where the conductors include an earthed conductor of two-wire system or an earthed neutral conductor of a multi-wire system or a conductor, which is to be connected thereto, the following conditions shall be complied with

1. An indication of a permanent nature shall be provided by the owner of the earthed or earthed neutral conductor, or the conductor, which is to be connected thereto, to enable such conductor to be distinguished from any live conductor. Such indication shall be provided.

a) Where the earthed or earthed neutral conductor is the property of the supplier, at or near the point of commencement of the supply.

b) Where a conductor forming part of a consumer's system is to be connected to the supplier's earthed or earthed neutral conductor, at the point where such connection is to be made.

c) In all other cases, at a point corresponding to the point of commencement of supply or at such other point as may be approved by an inspector.

2. No cut-out, link or switch other than a linked-switch arranged to operate simultaneously on the earthed or earthed neutral conductor and live conductor shall be inserted or remain inserted in any earthed or earthed neutral conductor of a two-wire system or in any earthed or earthed neutral conductor of a multi-wire system or in any conductor connected thereto with the following exceptions

a) A link for testing purposes - OR -

b) A switch for use in controlling a generator or transformer.

LIST OF MAKE OF EQUIPMENT AND ACCESSORIES

1. PVC rigid conduits & Accessories	:	1.5 mm thick Precision
Plastic Co. ISI		
		and FIA approved

2. a) L.T. Cables : RPG / Avocab / Polycab
- b) Wires (FRLS) : R. R. Kable / Finolex
3. Main Distribution Boards : L& T/MDS (Legrand)/ABB
4. Miniature Circuit Breaker : L& T/MDS (Legrand)/ABB
5. ELMCB / RCCB : L& T/MDS (Legrand)/ABB
6. Domestic fittings (Colour of cover plates shall be selected
by Architects / Consultants / Client)
 - a) 5A one / two way switch : M. K. India Make (Mylinec)
/ Anchor Roma / L&T Entice
 - b) 15A switch socket : M. K. India Make (Mylinec) /
Anchor Roma / L&T Entice
 - c) 5A 5 pin socket : M. K. India Make (Mylinec) /
Anchor Roma / L&T Entice
 - e) 15A switch : M. K. India Make (Mylinec)
/ Anchor Roma / L&T Entice
 - f) 5A switch / socket : M. K. India Make (Mylinec)
/ Anchor Roma / L&T Entice
 - g) Adhesive Tape : Bhor (Steel Grip) or approved
equivalent.
 - h) Holders / ceiling roses : Anchor Make
 - i) Telephone (RJ 11) / T.V. sockets (Co-axial): M. K. India Make (Mylinec)
/ Anchor Roma / L&T Entice
7. 16 - 63 A Polycarbonate Socket & Top: MDS / R R Kable / Hansel / BCH
8. Telephone Wires / Cable : Finolex / RR Kable
9. T.V. Co-Axial Cable : Finolex / RR Kable

- | | | |
|---|---|---|
| 10. Telephone tag block | : | Krone tags with standard box with Locking arrangement |
| 11. Cable Lugs | : | Dowell / Lotus / Jainson |
| 12. Cable gland Single / Double Compression | : | HMI / Comet / Ismile |
| 13. Cable gland FLP Double Compression | : | HMI / Comet / Ismile |
| 14. Lighting Fixtures | : | Philips / Wipro |
| 15. Lighting Fixtures (Flame Proof) | : | Baliga / FCG |
| 16. Wall Fans / Air- Circulator fan | : | Crompton / Almonard |
| 17. Ceiling fans make. | : | Crompton / Bajaj / Khaitan |
| 18. Exhaust fan (Light duty) | : | Crompton / Khaitan make. |
| 19. Exhaust fan (Heavy duty) make. | : | Crompton / GEC / Alstom |
| 20. Exhaust fan (Heavy duty)Flame proof Flexpro make. | : | Crompton / FCG / Baliga / |
| 21. Switch gears | : | L & T / Siemens / ABB |
| 22. HRC fuses | : | L & T / Siemens / ABB |
| 23. MCCB | : | L & T / Siemens / ABB /MDS |
| 24. Change Over Switch | : | HPL Socomac |
| 25. Ammeter / Voltmeter (Digital Type) Enercon make. | : | AE / HPL /MECO/ |
| 26. Selector switches | : | L & T salzer. |
| 27. Indicator lamps Binay. | : | LED type Teknic / Precifine/ |
| 28. HRC fuse back-up and holder | : | L&T |
| 29. Connector strips | : | Elmex make. |
| 30. Load Manager | | |

Energy Management System : L&T / Conserve / HPL
31. KWH Meter : L&T / Conserve / HPL
32. Push Button Station : Hansu / Baliga
33. Misc. Hardwares : As approved by EIC /
Client / Consultants

Date: :

Signature of Electrical Contractor

ELECTRICAL CODE OF PRACTICE

The following ISI code of practice for providing and installation of the electrical items shall be deemed. Any deviation from the code should be approved from the Electrical Inspector.

- a) ISI 694-1977 : PVC insulated cables for working voltages upto and including 1100 Volts.
- b) ISI 1554-1976 : PCV insulated (heavy duty) (part-I) electric cables for working voltages upto and including 1100 V.
- c) ISI 1554-1981 : PVC insulated (Heavy duty) electric (PART-I) cables for working voltages from 3.3 KV upto and including 11 Kv.
- d) ISI 2551-1963 : Danger notice plates.
- e) ISI 3043-1966 : Earthing
- f) ISI 5578-1970 : Guide for marking of insulated conductors.
- g) ISI 5216-1969 : Guide for safety procedures and practices in electrical works.
- h) ISI 3072-1975 : Installation and maintenance of switch gears.
- i) ISI 1886-1967 : Installation & maintenance of transformers.
- j) ISI 1944-1970 : Lighting of Public thoroughfares.
- k) ISI 2309-1969 : Protection of building and allied structures against lightning.
- l) ISI 3106-1966 : Selection, installation and maintenance of fuses (Voltages no exceeding 650 volts).
- m) ISI 8923-1978 : Warning symbol for dangerous voltages.
- n) ISI 2208-1962 : HRC cartridge fuse links upto 650 V.
- o) ISI 8724-1978 : Re-wire able fuses upto 650 V.
- p) ISI 10118-1982: Switchgear and control gear, selection, (PART-III) installation and maintenance code of practice.
 - Part III : Installation.
 - Part IV : Maintenance.
- q) Transformers, selection, installation and maintenance of code of practice.
 - Part II
 - Installation : 10028 (Part II) 1981.
 - Part III
 - Maintenance : 10028 (Part II) 1981

Date: :

Signature of Electrical Contractor