Name of Work : Providing internal Electrification - Yashada Pune		
Sr. No.	**Specification Code**	**Technical Specification**
1	SW-SWR/MCB	Material :- General Specifications for MCB's • MCB's shall be of current limiting type, ISI marked confirms to IS 8828 – 1996. • The power loss per pole shall be low and shall be in accordance with IS 8828 – 1996. • All cable entries shall be either from bottom or top. • MCB's shall be of C- curve characteristic & shall have quick make & break non-welding self wiping silver alloy contacts for 10 kA short circuit both on the manual & automatic operation. • All the active, live parts of MCB's should be out of human reach, ensuring safety & confirms to IP: 55 degree of protection. • The MCB's must house transparent label holder to ensure circuit identification. • The MCB's must have fully insulated safety shutters. • The MCB's shall have lockable switching lever. • The Minimum electrical endurance shall be 20,000 operations. • The housing of the MCB shall be mounted self-extinguishing DMC (Dough Moulding Compound). • The short circuit Current shall be brought to zero within 4 to 5 milliseconds from the time they are established. • All MCB's shall have a minimum short circuit Capacity of 10kA RMS. Material : Single Pole / Single pole with Neutral / Double Pole / Triple pole / Four pole: MCB, ISI marked as per IS 8828 : 1996 (IEC 60898) with hammer trip and watch mechanism15 arc plates,10 KA capacity with nominal rating of 240/415V. Lugs: Copper lugs of suitable size as per (CB-CL/CU) in chapter 7.10 for Cable Construction :- MCB shall be erected in provided enclosure / distribution board and terminating the provided wires by copper lugs (crimping type) and connecting the same.
2	SW-SWR/MCBDB	Material :- General Specifications for MCBDB's • DB's shall be prewired and shall be fabricated as per IS: 8623. • Suitable for flush mounting & surface mounting, with 100 A copper bus bar (For Horizontal type DB), neutral bar, earth bar & cable ties for cable management. • In case of Vertical DB the bus bar shall be of 200 A rating. • DB's shall be of IP – 43 degree of protection. • All the MCB distribution boards shall be fabricated out of 18 SWG thick sheet steel duly rust inhibited through a process of degreasing, pickling, phosphating & powder coating to an approved colour over primer & shall be of the totally enclosed dust proof type suitable for wall mounting. • All components shall be mounted on DIN rails & covered totally with a sheet steel cover rendering it finger-safe. Access to the internal connections shall be only through removing the cover sheet. • All DB's shall be internally prewired using copper insulated high temperature PVC wires. • Bus bars & neutral bar shall be fully insulated with standard colour code. • Bus bar withstanding capacity shall be 10kA. • DB's must have facility of reversing door without modification, pan assembly for ease of installation & convertible locking. Material : Horizontal/Vertical type MCBDB: ISI marked as per IS 8623, of specified ways (poles), surface/flush mounting, with/without door, suitable for 230 V / 415 V. Lugs – Copper lugs of suitable size as per (CB-CL/CU) in chapter 7.10 for Cable Iron work: Suitable size of angle/flat. Hardware: SM screws, rawl plug, gutties, etc. Construction :- MCBDB shall be erected at designated location and directed by site engineer and terminating the provided wires by copper lugs (crimping type) and connecting the same.

3	CB-LT/AL	Material :- Cables: Cables shall be PVC / XLPE of aluminium conductor as per Table no. 7/3 and of required construction, colour, shall carry ISI mark, IS No, manufacturer's name, size, duly embossed / screen printed at every metre and having the total count of progressive length in meter at each mark. Earth wire: Galvanized Iron (G I) wire of appropriate gauge as per Table No 7/1. Glands: As per specification (CB-GL) Lugs: As per specification (CB-CL/AL) Saddles: Saddles fabricated from GI sheet of required gauge and size depending on dia of cable either galvanized or painted with superior quality enamel black paint with necessary shearing mechanical strength, semi circular shaped with extended piece having suitable holes for fixing. G I Strip: 22 g x 25 mm width G I Strip. Clamps: MS Clamps fabricated of required length and shape, having the size of 3/6 mm thick mild steel having 25/50 mm width (as per size of cable), rounded ends with wooden / resin cast grip for holding the cable. Identification tags: For identifying root, connection position GI strip with identification mark / name embossed / painted with arrangement to tie should be fix on cable or arrangement of ferrulesto be done. Hardware: Sheet Metal (SM) screws of required sizes, plugs / wooden gutties, etc. Construction :- General: a) Irrespective of method of construction the cable ends shall be terminated with appropriate size & type of glands with lugs duly crimped, as directed by Site engineer. b) Wherever the cable has to be bent, the turning radius shall be as mentioned in Table No 7/2. Grouping of cables shall be done with adequate distance between cables as mentioned in IS so as to minimize de-rating. Cables shall be tagged/ferruled with identification name / mark at the point from where distribution starts and at ends. Bare earth wire of appropriate size as per Table no. 7/1 shall run along with the cable. Earth wire running with the cable shall be terminated at the earth terminal nearest to cable termination. Erection of Cable on Surface: Erection shall be done as per the routes and layout finalized, in perfect level and in plumb. Before fixing the cable shall be straightened as far as possible for good aesthetics look, continuous bare GI earth wire of required gauge as per Table No 7/1 shall be run. Cable with G I wire shall be fixed by saddles firmly clipped on cable and shall be fixed to wall with minimum 50 x 8 mm SM screws with plugs/wooden gutties, etc. (Distance between two supports / saddles shall be maximum 450 mm). Wooden gutties shall be used wherever required (Especially for stone wall).The entries made in wall, floor slab, etc for laying the cable shall be made good by filling and finishing with plastering the same. Erection of Cable on Trusses: Cable along with bare GI earth wire, while erecting on trusses, shall be firmly clamped by wrapping GI strip of 22 g, 25 mm width of required length fixed to truss with nuts and bolts. Erection of Cable on Pole: Cable along with bare GI earth wire, while erecting on pole, shall be firmly clipped by suitable wooden / epoxy resin cast grips, clamped with 25 x 3 mm or50x6 mm MS strip of required lengthand fixed to pole with nuts and bolts. Laying of Cable in provided Trench/Pole: While laying Cable along with bare GI earth wire, utmost care shall be taken to prevent damage to the insulation of the cable and to the open end. Cable shall be brought out from trench vertically straight (minimum 1.0 metre above G L). Care shall be taken to inspect the trench so that depth of cable shall not be less than as shown in Table No 7/4. Suitable size of cable loopsshall be provided near termination point at adequate depth. Erecting cable in constructed Trench / duct: Erection of cable/s in constructed trench / duct, shall be as per guide lines of IS 1255. Erection of cable/s on trays: Cable/s shall be tied with PVC tags on GI

		trays. At bending point care shall be taken so that sharp edges of sheet will not damage insulation of cable.
4	CB-LT/CU	Material :- Cables: Cables shall be PVC / XLPE with Copper conductor as per Table no. 7/3 and of required construction, colour, shall carry ISI mark, IS No, manufacturer's name, size, duly embossed / screen printed at every metre and having the total count of progressive length in meter at each mark. Earth wire: Galvanized Iron (G I) wire of appropriate gauge as per Table No 7/1. Glands: As per specification (CB-GL) Lugs: As per specification (CB-CL/CU) Saddles: Saddles fabricated from GI sheet of required gauge and size depending on dia of cable either galvanized or painted with superior quality enamel black paint with necessary shearing mechanical strength, semi circular shaped with extended piece having suitable holes for fixing. G I Strip: 22 g x 25 mm width G I Strip. Clamps: MS Clamps fabricated of required length and shape, having the size of 3/6 mm thick mild steel having 25/50 mm width (as per size of cable), rounded ends with wooden / resin cast grip for holding the cable. Identification tags: For identifying root, connection position GI strip with identification mark / name embossed / painted with arrangement to tie should be fix on cable or arrangement of ferrulesto be done. Hardware: Sheet Metal (SM) screws of required sizes, plugs / wooden gutties, etc. Construction :- General: a) Irrespective of method of construction the cable ends shall be terminated with appropriate size & type of glands with lugs duly crimped, as directed by Site engineer. b) Wherever the cable has to be bent, the turning radius shall be as mentioned in Table No 7/2. Grouping of cables shall be done with adequate distance between cables as mentioned in IS so as to minimize de-rating. Cables shall be tagged/ferruled with identification name / mark at the point from where distribution starts and at ends. Bare earth wire of appropriate size as per Table no. 7/1 shall run along with the cable. Earth wire running with the cable shall be terminated at the earth terminal nearest to cable termination. Erection of Cable on Surface: Erection shall be done as per the routes and layout finalized, in perfect level and in plumb. Before fixing the cable shall be straightened as far as possible for good aesthetics look, continuous bare GI earth wire of required gauge as per Table No 7/1 shall be run. Cable with G I wire shall be fixed by saddles firmly clipped on cable and shall be fixed to wall with minimum 50 x 8 mm SM screws with plugs/wooden gutties, etc. (Distance between two supports / saddles shall be maximum 450 mm). Wooden gutties shall be used wherever required (Especially for stone wall).The entries made in wall, floor slab, etc for laying the cable shall be made good by filling and finishing with plastering the same. Erection of Cable on Trusses: Cable along with bare GI earth wire, while erecting on trusses, shall be firmly clamped by wrapping GI strip of 22 g, 25 mm width of required length fixed to truss with nuts and bolts. Erection of Cable on Pole: Cable along with bare GI earth wire, while erecting on pole, shall be firmly clipped by suitable wooden / epoxy resin cast grips, clamped with 25 x 3 mm or50x6 mm MS strip of required lengthand fixed to pole with nuts and bolts. Laying of Cable in provided Trench/Pole: While laying Cable along with bare GI earth wire, utmost care shall be taken to prevent damage to the insulation of the cable and to the open end. Cable shall be brought out from trench vertically straight (minimum 1.0 metre above G L). Care shall be taken to inspect the trench so that depth of cable shall not be less than as shown in Table No 7/4. Suitable size of cable loopsshall be provided near termination point at adequate depth. Erecting cable in constructed Trench / duct: Erection of cable/s in

		constructed trench / duct, shall be as per guide lines of IS 1255. Erection of cable/s on trays: Cable/s shall be tied with PVC tags on GI trays. At bending point care shall be taken so that sharp edges of sheet will not damage insulation of cable.
5	WG-MA/BOX	Material :- PVC Trunking (Box type): PVC Trunking (Box type) ISI mark, minimum 1.2 mm thick, with push-fit joints/ accessories for PVC trunking such as couplers, elbows, internal / external angles, junction boxes of required ways of the same make. Hardware: Sheet Metal (SM) screws of sizes specified in Method of Construction, washers, rawl / PVC / fill type plugs, wooden gutties, etc. Construction :- Erection of PVC Trunking (Box type): Erection shall be done as per the final approved layout. The Trunking shall be in perfect level and plumb. Screws of minimum 35x8 mm and suitable plugs shall be used for fixing. In case of stonewalls wooden gutties shall be grouted in wall for fixing of screws of Trunking. Distance between 2 screws shall not be more than 600 mm. Size of Trunking shall be correct depending on number of wires to be drawn. Adequate use of accessories shall be made at joints and at required locations.
6	WG-MA/CC	Material :- Rigid Steel conduit: Rigid HG steel screwed conduit, minimum 20mm dia. and higher depending on No. of wires to be drawn as per Table No. 1/1, 16 gauge, ERW grade duly processed for anti-rust treatment and painted with black enamel paint, accessories for rigid steel conduits such as check nuts, long bends, deep junction boxes for slab, regular junction boxes for walls; of required ways, all of the same make. Earth continuity wire: GI wire of 2.5 sq. mm; GI earth clips 22g, 10mm width, for fixing earth wire along the conduits. Junction boxes / Draw-in boxes: Junction box shall be 5 sided with removable top plate and of suitable size to accommodate No. of entries; fabricated from 16g CRCA sheet steel with earth terminal duly treated with antirust treatment and painted with two coats of red oxide paint. There shall be knockout holes in required numbers and dia. for entry of conduit pipes and arrangement to fix cover plate on it. Hardware: U' nails, plumbing and general use nails of required sizes, washers, check-nuts, steel binding wire 20g, fish wire, etc. Other material for Surface finishing: Cement, sand, putty and water. Construction :- Concealing of Rigid steel Conduits: General: Work shall be done in co-ordination with civil work to suite final approved layout. Conduit shall be duly screwed and size of conduit shall be correct depending on number of wires to be drawn. (Table No.1/1, for Steel conduits) Separate pipe shall be used for each phase in 1-ph distribution and for power and light distribution and also for wiring for other utilities like data, telephone, TV cabling, etc. for which distance between pipes shall not be less than 300 mm or anti electrostatic partition is to be provided. Adequate use of conduit accessories shall be made at required locations. Entries in wall shall be at level of corresponding conduit with colour coding as per Table No. 1/4. (For visual identification). Flexible conduits shall be used at expansion joints. Erection shall be done as per the layout finalized, with minimum sharp bends, with junction boxes at angular junctions and for straight runs at every 4.25m, in such manner so as to facilitate drawing of wires. All bending of conduits shall be done approved manner without changing the cross-section. In RCC work: Work shall be commenced after fixing of steel (re-enforcement) on centering material. Conduits shall be firmly fixed with steel in slab by binding wire. Fixing of conduits shall be possibly done with welding tags so that it will

		remain rigid during casting of slab, beam, and column even after use of vibrator. Deep junction boxes and other draw-in boxes shall be such that their open end and centering material will not have gap in between so as to avoid concrete entering inside even after fixing covers to steel re-enforcement; and be filled with dry sand. Open ends of conduits; to be concealed in walls, shall be provided with couplers / sockets at ends and be flush with bottom of beam, and located at the center of the beam. As far as possible bunching / grouping of conduits shall be avoided so that it will not affect strength of RCC work especially in beams. Suitable steel fish wire shall be drawn through the conduits for drawing of wires later on. Concealing of Rigid Steel Conduits in walls/ flooring: Chases shall be made in walls of adequate width, with cutter and chiseling through it. Necessary finishing of the wall surface shall be done. Work in flooring shall not disturb RCC work, Conduits of adequate size shall be erected with use of appropriate accessories, and hardware like 'U' nails, etc. Draw-in / inspection boxes shall be fixed with check-nut, flush with surrounding surface and earthed. Testing :- Earth continuity: Earth continuity shall be ensured at termination point of Earth wire, between the ends of metal conduit.
7	WG-MA/BW	Material :- Wires: in conduits / trunking / panel boards Mains / Sub-mains / Circuit mains (comprising phase and neutral wires): PVC insulated wire of specified size, minimum FR grade insulation, copper conductor of electrolytic tough pitch (ETP) grade, having insulation of 1.1 kV grade, ISI marked, of required colour coding as per Table No 1/5. Wires: open PVC insulated and PVC sheathed wire of specified size, minimum FR grade insulation, copper conductor of electrolytic tough pitch (ETP) grade, having insulation of 1.1 kV grade, ISI marked, of required colour coding as per Table No 1/5. Earth Continuity Wire: PVC insulated wire minimum FR grade insulation copper conductor of electrolytic grade, having insulation of 1.1 kV grade, of green / green yellow colour, ISI marked, of specified size but not less than 2.5 Sqmm as per Table No 1/5. Lugs: Copper lugs of appropriate size & type Other material: Rubber grommet, bush, harnessing material, flexible conduit etc. Construction :- Drawing of wires: General Specified wires shall be drawn with adequate care. Correct colour coding as per Table No. 1/5, shall be used for phase, neutral and earth. Wires shall not have intermediate joint in between terminals of the accessories. Earth-wire and Return wire (neutral) may be looped only within circuit. For lighting load or single-phase distribution wires of two different phases shall not be drawn in single pipe. Wires shall be terminated in the terminals of accessories only, with appropriate type and size of lugs. Drawing of wires: through PVC conduits Bush shall be used at pipe opening to protect wire insulation from getting damaged due to sharp edges. Number of wires shall not exceed with respect to size of pipe as per Table No. 1/2. Drawing of wires: through Rigid Steel conduits Bush shall be used at pipe opening to protect wire insulation from getting damaged due to burrs / sharp edges. Number of wires shall not exceed with respect to size of pipe as per Table No. 1/1. Open Wire bunch: Open wires shall be erected with due care so as to avoid chances of any mechanical injury. Harnessing shall be done with required material in an approved manner in panel boards or where ever necessary. For covering lead wires flexible conduit shall be used with gland as per necessity. Testing :- Insulation resistance test: All wiring shall be tested with 500V Meggar between phases, phase – neutral and to Earth. IR value shall not be less than 1M-ohm. Earth continuity: Earth continuity shall be ensured between termination points of Earth wire. Polarity Test: Test shall be carried out for ensuring the correct polarity in switch and plug.

8	WG PW/CW	Material :- PVC conduit: PVC pipe of minimum 20mm dia and above depending No. of wires to be drawn (refer Table No 1 / 2); ISI mark, HMS grade (2mm thick), accessories for PVC pipes of the same make that of pipe; such as Spacers & Saddles, Couplers, Bends, deep / normal Junction boxes of required ways and resin / adhesive to make all joints rigid. Black pipe shall not be used for surface type wiring. Rigid Steel conduit: Rigid steel screwed conduit minimum 20mm dia. and higher depending on No. of wires to be drawn as per Table No.1/1, 16 gauge, ISI mark, ERW grade duly processed for anti-rust treatment and painted with black enamel paint, accessories for rigid steel conduits such as sockets, bends, deep / normal junction boxes of required ways all of the same make. Sheet metal Junction boxes / Draw-in boxes: Junction box shall be 5 sided with removable top plate, fabricated from 16g CRCA sheet steel with earth terminal duly treated with antirust treatment and painted with two coats of red oxide paint. There shall be knockout holes in required numbers and dia. for entry of conduit pipes and arrangement to fix surface cover plate on it. Cover plate shall be made up of fire resistant PVC material / 3mm thick laminate / Bakelite / Hylam / transparent acrylic sheet painted from inside to match colour of wall with duly tapered edges. Wires: phase and neutral wires PVC insulated wires of specified size, 1.1 kV, & minimum FR grade insulation, electrolytic tough pitch (ETP) copper conductor, ISI marked, of required colour coding as per Table No 1/5 Earth Continuity Wire: PVC insulated minimum FR grade copper wires of electrolytic grade, having insulation of 1.1 kV grade, of green colour, ISI marked, 2.5 Sqmm or bare copper wire of 14g Lugs: Pin type Copper lugs. Accessories: Switch: 1 or 2 way Modular type switch 6/10A. Outlet: Modular type 6A angle / batten lamp holder or 3 plate ceiling-rose or Bakelite / porcelain 3 way connector or if plug point, 6A, 3-pin plug shuttered socket. Boards: Switchboards shall comprise of; concealed type box of required modules made of sheet metal or Polypropylene material, mounting plate and cover plate. The required modules shall be worked out on the basis of points, plug socket/sockets, step type fan regulator, etc are to be fixed. For every blank module, 1 way blank plate shall be fixed. All the above accessories shall be of same make, as that of switch. Hardware: Sheet Metal (SM) screws of sizes specified in Method of Construction, washers, rawl / PVC / fill type plugs / wooden gutties, 'U' nails, plumbing nails, steel binding wire, fish wire 20g, rubber / PVC bushes etc. Other material for Surface finishing: Sand, Cement, water etc. Construction :- Point wiring (Concealed): Concealing of conduits: General: Work shall be done in co-ordination with civil work and to suite final approved layout. Size of conduit shall be correct depending on number of wires to be drawn. (Table No. 1/1 for Steel conduits & Table No 1/2 for PVC conduits) Separate pipe shall be used for each phase in 1-ph distribution and for power and light distribution and also for wiring for other utilities like data, telephone, TV cabling, etc. The distance between pipes shall not be less than 300 mm. Adequate use of conduit accessories shall be made at required locations. Entries in wall shall be at level of corresponding conduit with colour coding as per Table No. 1/4. (For Visual identification) Flexible conduits shall be used at expansion joints. Erection shall be done as per the layout finalized, with minimum sharp bends, with junction boxes at angular junctions and for straight runs at every 4.25m, in such manner so as to facilitate drawing of wires. All the bends shall be done with Bending Spring. Concealing of conduits: In RCC work Work shall be commenced after fixing of steel (re-enforcement) on centering material. Conduits shall be firmly fixed on steel of RCC work by binding wire. Fixing of conduits shall be such that it will remain rigid during casting of slab, beam, and column even

		after use of vibrator. Deep junction boxes and other draw-in boxes shall be such that their open end and centering material will not have gap in between so as to avoid concrete entering inside even after fixing covers to steel re-enforcement; and be filled with dry sand. Open ends of conduits; to be concealed in walls, shall be provided with couplers / sockets at ends and be flush with bottom of beam, and at located at the center of the beam. As far as possible bunching / grouping of conduits shall be avoided so that it will not affect strength of RCC work especially in beams. Suitable steel fish wire shall be drawn through in the conduits for drawing of wires later on. Concealing of Conduits: In walls Chases shall be made in walls of adequate width, with cutter and chiseling through it. Necessary finishing of the surface shall be done. Conduits of adequate size shall be erected with use of appropriate accessories and 'U' nails. Drawing of wires: Use of Steel fish wire shall be made for drawing of wires. Wires shall be drawn with adequate care. Correct colour coding shall be used for phase, neutral and earth. Wires shall not have intermediate Testing :- Insulation resistance test: All wiring shall be tested with 500V Meggar between phases, phase – neutral and to Earth. IR value shall not be less than 1M-ohm. Earth continuity: Earth continuity shall be ensured at all earth terminals of plug outlets and at earth terminals of metal enclosures. Polarity test: Polarity test shall be carried out for ensuing the correct polarity in switch and plug.
10	FG-ODF/FL.	Material :- Fitting: ISI marked Energy efficient T-5 2X14 & 2X24 Street Light fitting complete with electronic ballast, transparent cover made out of 3mm thick acrylic sheet, gear cum reflector tray, canopy and lamp holder duly wired for use on 240 volt AC single phase 50 Hz without T-5 lamp. Canopy shall be made of Aluminum sheet of width 3" minimum per lamp. Gear cum reflector tray (GCRT) shall be made of either CRCA sheet of 0.8 mm thick or Aluminum sheet of 1.25 mm thick.Fitting shall be suitable for mounting up to a height of 15 meters and shall be able to withstand wind load test. It shall conform to class-1 of IS: 10322 (part 5/sec 3)/87 with amdt 1 and IP-65 protection i) Various component of fittings shall conform to IS specification as noted below. a) Electronic ballast (EB) to IS: 13021:Part-1:1991 with Amendment No.1, IS:13021: Part-2:1991 with Amendment Nos.1 and 2 and additional requirement as per the b) Bi-pin lamp holders to IS:3323/80 with amendment No.1/ c) PVC cables to IS:694/90 with amdt.No.1 & 2. ii) Surface of CRCA Steel and Aluminum sheets used shall be properly phosphatised and stove enameled white on the reflector side, tray side and other surface stove enameled grey. iii) The street light fittings shall be required with socket bore of 30mm or 40 mm or 50mm for side entry/top entry type fittings. The socket bore, however, will be specified by the indenters at the time of placement of supply order. iv) All wire leads to be adequately covered with sleeves for protection against accidental contracts. v) All hardware parts used should be zinc coated or nickel/chromium plated so as to be corrosion resistant. vi) Fitting shall be wired with multi-stranded copper wire terminating on suitable connectors. The wiring shall be properly clamped. Construction :- The complete fitting with all the above accessories shall be erected with provided bracket, on wall/street light pole or at any place as directed by Site engineer, duly connected and giving necessary testing.
11	FG-FN/CF	Material :- Ceiling Fan: Electric Ceiling fan capacitor type with double ball bearing complete with capacitor, 300 mm down rod, canopies, shackles, reel insulator, half threaded bolts of 9.53 mm (3/8") dia 62.5 mm (2-1/2") to 88 mm (3-1/2") long and

		7.94 mm (5/16") dia 44.5 mm (1-3/4") to 57 mm (2-1/4") long with nuts, with lock type split pin, spring & plate washers, etc.; three number blade made of Aluminium alloy, suitable for single phase, AC 210 volts, 50 Hz supply and conforming to class I of IS : 374/1979 with amendment no 1 to 6 except for performance parameters to the extent modified as details in general requirements. The down rod shall be capable to withstand a tensile load of 1000 kg without breakdown and a torsion load of 500 kg.cm without breakage as per Clause 10.14.1 of IS: 374/1979 with amendment no.1 to 6. Electrical motor should be single phase permanent capacitor type with no. of poles 12/14/16/18 (As per sweep), Class-I with basic insulation. Class of insulation shall be B class. The winding wire used for fan should be synthetic enamelled of 30 to 38 SWG. Connection wire: Flat / round Two core flexible stranded copper wire cord 24/0.2mm ISI marked. Paint: Superior quality enamel paint of specified colour for marking Sr. No and date of erection. Construction :- Blades of ceiling fan shall be properly fixed. Down rod, clamp shall be carefully fixed with nut bolt and split pin. Canopies shall be tightened on down rod keeping sufficient clearance. Wiring connections shall be made with required wire leads. Regulator of fan shall be erected on provided switchboard with required wire leads. Testing :- After erection fan shall be tested by connecting to supply at all positions of regulator. Also steadiness of fan shall be checked at full speed, so that there is no wobbling.
13	AP-UPS	Material :- Equipment manufactured as per standard manufacturer's specification and as tabulated in Table No. 3.7/2. The unit housed in powder coated CRCA sheet enclosure with following fault protection on mains / UPS mode: ? Under voltage on mains mode ? Over voltage on mains mode ? Charger protection on mains mode ? Overload on UPS mode ? Short circuit on UPS mode ? Low battery on UPS mode ? Battery reverse on UPS mode ? Under voltage on UPS mode ? Over voltage on UPS mode ? LED & LCD display for above fault protection ? Alarm for above fault protection ? Batteries shall be of Sealed Maintenance Free type (Tubular). The selection of number of batteries required shall be as per Table No 3.7/1 The UPS shall comply with specifications as indicated in the following table 3.7/2 given in Specification book. Construction :- To be erected at designated place duly connected, tested, as per the directions of Site Engineer
14	EA-EP	Material :- Earth Plate: Galvanised cast iron / Copper earth plate or G.I. pipe as per specifications given in Table No 9.1/1 of Specification book. CI Cover: As per specifications given in Table No 9.1/1 of Specification book. Earthing Conductor: Copper/G.I strip/Annealed bare copper wire/G.l. earth wire of size as per specifications given in Table No 9.1/1 of Specification book. GI Pipe: As per specification (CW-PLB/GP) mentioned chapter no. 17.5 for watering, and as enclosure for Earth wire, refer specifications given in Table No 9.1/1 of Specification book. Hardware: Screw / nut bolts with required washer of dimensions, Rawl plug / clip/ 'U' nails and material as per specifications given in Table No 9.1/1 of Specification book. Filling material: Coal /Charcoal/ salt as per specifications given in Table No 9.1/1 of Specification book. as per specifications given in Table No 9.1/1 of Specification book. Lugs: As per specification (CB-LG/AL, CB-LG/CU) mentioned chapter 7.9 & 7.10 Copper/ Aluminium lugs as per specifications given in Table No 9.1/1 of Specification book.

		Construction :- Pit is to be dug of required dimension and depth for the earthing at site, and laying of Galvanised cast iron / Copper earth plate or G.I. pipe shall be as per Table No 9.1/1 in Specification book. The earth connection to equipment/ switch gear and earthing electrode shall be connected as shown in the diagram and as per IS 3043 amended up to-date. The connections shall be made either by strip or double run of earth wire with drilling, welding, riveting, brazing and nut bolting to plate or pipe, where ever required in an approved manner. As far as possible continuous strip shall be used, but where ever jointing of strip is unavoidable, the overlap portion must not be less than 21/2 times the width of the strip either welded/ brazed/soldered by all sides or 6 inches overlap with two nut bolts/ riveting of adequate size with required washer and covered by anti-corrosive paint as per approved jointing practice in the industry and as per directives from site engineer in charge. Pit shall then be filled with screened soil with alternate layer of coal and salt, and if, necessary brick masonry work (Where ever applicable) shall be done as specified in IS: 3043, with laying wires in PVC/ G.I. pipe and watering arrangement as per diagram and covered with C.I. Cover (Where ever applicable). Where ever requires or as specified by Site Engineer, a Test link shall be provided for facilitating the testing of resistance of earth electrode. Testing :- The value of each earth electrode shall be measured by earth tester in presence of site Engineer and record to be submitted.

Providing Street Lighting - Yashada Pune		
1	FG-ODF/FL S2	Material :- Fitting: ISI marked Energy efficient T-5 2X14 & 2X24 Street Light fitting complete with electronic ballast, transparent cover made out of 3mm thick acrylic sheet, gear cum reflector tray, canopy and lamp holder duly wired for use on 240 volt AC single phase 50 Hz without T-5 lamp. Canopy shall be made of Aluminum sheet of width 3" minimum per lamp. Gear cum reflector tray (GCRT) shall be made of either CRCA sheet of 0.8 mm thick or Aluminum sheet of 1.25 mm thick.Fitting shall be suitable for mounting up to a height of 15 meters and shall be able to withstand wind load test. It shall conform to class-1 of IS: 10322 (part 5/sec 3)/87 with amdt 1 and IP-65 protection i) Various component of fittings shall conform to IS specification as noted below. a) Electronic ballast (EB) to IS: 13021:Part-1:1991 with Amendment No.1, IS:13021: Part-2:1991 with Amendment Nos.1 and 2 and additional requirement as per the b) Bi-pin lamp holders to IS:3323/80 with amendment No.1/ c) PVC cables to IS:694/90 with amdt.No.1 & 2. ii) Surface of CRCA Steel and Aluminum sheets used shall be properly phosphatised and stove enameled white on the reflector side, tray side and other surface stove enameled grey. iii) The street light fittings shall be required with socket bore of 30mm or 40 mm or 50mm for side entry/top entry type fittings. The socket bore, however, will be specified by the indenters at the time of placement of supply order. iv) All wire leads to be adequately covered with sleeves for protection against accidental contracts. v) All hardware parts used should be zinc coated or nickel/chromium plated so as to be corrosion resistant. vi) Fitting shall be wired with multi-stranded copper wire terminating on suitable connectors. The wiring shall be properly clamped. Construction :- The complete fitting with all the above accessories shall be erected with provided bracket, on wall/street light pole or at any

		place as directed by Site engineer, duly connected and giving necessary testing.
2	CB-LT/CU	Material :- Cables: Cables shall be PVC / XLPE with Copper conductor as per Table no. 7/3 and of required construction, colour, shall carry ISI mark, IS No, manufacturer's name, size, duly embossed / screen printed at every metre and having the total count of progressive length in meter at each mark. Earth wire: Galvanized Iron (G I) wire of appropriate gauge as per Table No 7/1. Glands: As per specification (CB-GL) Lugs: As per specification (CB-CL/CU) Saddles: Saddles fabricated from GI sheet of required gauge and size depending on dia of cable either galvanized or painted with superior quality enamel black paint with necessary shearing mechanical strength, semi circular shaped with extended piece having suitable holes for fixing. G I Strip: 22 g x 25 mm width G I Strip. Clamps: MS Clamps fabricated of required length and shape, having the size of 3/6 mm thick mild steel having 25/50 mm width (as per size of cable), rounded ends with wooden / resin cast grip for holding the cable. Identification tags: For identifying root, connection position GI strip with identification mark / name embossed / painted with arrangement to tie should be fix on cable or arrangement of ferrulesto be done. Hardware: Sheet Metal (SM) screws of required sizes, plugs / wooden gutties, etc. Construction :- General: a) Irrespective of method of construction the cable ends shall be terminated with appropriate size & type of glands with lugs duly crimped, as directed by Site engineer. b) Wherever the cable has to be bent, the turning radius shall be as mentioned in Table No 7/2. Grouping of cables shall be done with adequate distance between cables as mentioned in IS so as to minimize de-rating. Cables shall be tagged/ferruled with identification name / mark at the point from where distribution starts and at ends. Bare earth wire of appropriate size as per Table no. 7/1 shall run along with the cable. Earth wire running with the cable shall be terminated at the earth terminal nearest to cable termination. Erection of Cable on Surface: Erection shall be done as per the routes and layout finalized, in perfect level and in plumb. Before fixing the cable shall be straightened as far as possible for good aesthetics look, continuous bare GI earth wire of required gauge as per Table No 7/1 shall be run. Cable with G I wire shall be fixed by saddles firmly clipped on cable and shall be fixed to wall with minimum 50 x 8 mm SM screws with plugs/wooden gutties, etc. (Distance between two supports / saddles shall be maximum 450 mm). Wooden gutties shall be used wherever required (Especially for stone wall).The entries made in wall, floor slab, etc for laying the cable shall be made good by filling and finishing with plastering the same. Erection of Cable on Trusses: Cable along with bare GI earth wire, while erecting on trusses, shall be firmly clamped by wrapping GI strip of 22 g, 25 mm width of required length fixed to truss with nuts and bolts. Erection of Cable on Pole: Cable along with bare GI earth wire, while erecting on pole, shall be firmly clipped by suitable wooden / epoxy resin cast grips, clamped with 25 x 3 mm or50x6 mm MS strip of required lengthand fixed to pole with nuts and bolts. Laying of Cable in provided Trench/Pole: While laying Cable along with bare GI earth wire, utmost care shall be taken to prevent damage to the insulation of the cable and to the open end. Cable shall be brought out from trench vertically straight (minimum 1.0 metre above G L). Care shall be taken to inspect the trench so that depth of cable shall not be less than as shown in Table No 7/4. Suitable size of cable loopsshall be provided near termination point at adequate depth. Erecting cable in constructed Trench / duct: Erection of cable/s in constructed trench / duct, shall be as per guide lines of IS 1255. Erection of cable/s on trays: Cable/s shall be tied with PVC tags on GI

		trays. At bending point care shall be taken so that sharp edges of sheet will not damage insulation of cable.
3	OH-PL/BKT	Material :- Pole Bracket: MS pole bracket fabricated as per specifications in Table 8.4/1. Thickness and size of channel is to be checked from the steel table. D' type Clamps: MS Flat of 50x6mm, 15 mm MS nut bolts Paint: Silver paint, Red oxide paint Construction :- The cross arm shall be made up of size of channel mentioned in table given in Specification book. The length shall be as stated in table given in Specification book. The cross arm shall be complete with pole clamp of size 50X6 mm MS flat and holes required for pin / shackle insulator. For MS pole bracket with guarding extension, an extension piece of same size of length 300 mm shall be welded to bracket as per drawing attached herewith. The cross arm and pole clamp shall be painted with one coat of red oxide and two coat silver enamel paint any other colour paint (as per the instructions of engineer in-charge). Cross arm shall be fabricated as per drawing.
4	EA-EP	Material :- Earth Plate: Galvanised cast iron / Copper earth plate or G.I. pipe as per specifications given in Table No 9.1/1 of Specification book. CI Cover: As per specifications given in Table No 9.1/1 of Specification book. Earthing Conductor: Copper/G.I strip/Annealed bare copper wire/G.l. earth wire of size as per specifications given in Table No 9.1/1 of Specification book. GI Pipe: As per specification (CW-PLB/GP) mentioned chapter no. 17.5 for watering, and as enclosure for Earth wire, refer specifications given in Table No 9.1/1 of Specification book. Hardware: Screw / nut bolts with required washer of dimensions, Rawl plug / clip/ 'U' nails and material as per specifications given in Table No 9.1/1 of Specification book. Filling material: Coal /Charcoal/ salt as per specifications given in Table No 9.1/1 of Specification book. as per specifications given in Table No 9.1/1 of Specification book. Lugs: As per specification (CB-LG/AL, CB-LG/CU) mentioned chapter 7.9 & 7.10 Copper/ Aluminium lugs as per specifications given in Table No 9.1/1 of Specification book. Construction :- Pit is to be dug of required dimension and depth for the earthing at site, and laying of Galvanised cast iron / Copper earth plate or G.I. pipe shall be as per Table No 9.1/1 in Specification book. The earth connection to equipment/ switch gear and earthing electrode shall be connected as shown in the diagram and as per IS 3043 amended up to-date. The connections shall be made either by strip or double run of earth wire with drilling, welding, riveting, brazing and nut bolting to plate or pipe, where ever required in an approved manner. As far as possible continuous strip shall be used, but where ever jointing of strip is unavoidable, the overlap portion must not be less than 21/2 times the width of the strip either welded/ brazed/soldered by all sides or 6 inches overlap with two nut bolts/ riveting of adequate size with required washer and covered by anti-corrosive paint as per approved jointing practice in the industry and as per directives from site engineer in charge. Pit shall then be filled with screened soil with alternate layer of coal and salt, and if, necessary brick masonry work (Where ever applicable) shall be done as specified in IS: 3043, with laying wires in PVC/ G.I. pipe and watering arrangement as per diagram and covered with C.I. Cover (Where ever applicable). Where ever requires or as specified by Site Engineer, a Test link shall be provided for facilitating the testing of resistance of earth electrode. Testing :- The value of each earth electrode shall be measured by earth tester in presence of site Engineer and record to be submitted.

Providing LV System (Networking, Telephone, FAS, PA & CCTV) work		
1	WG-MA/CC	Material :- Rigid Steel conduit: Rigid HG steel screwed conduit, minimum 20mm dia. and higher depending on No. of wires to be drawn as per Table No. 1/1, 16 gauge, ERW grade duly processed for anti-rust treatment and painted with black enamel paint, accessories for rigid steel conduits such as check nuts, long bends, deep junction boxes for slab, regular junction boxes for walls; of required ways, all of the same make. Earth continuity wire: GI wire of 2.5 sq. mm; GI earth clips 22g, 10mm width, for fixing earth wire along the conduits. Junction boxes / Draw-in boxes: Junction box shall be 5 sided with removable top plate and of suitable size to accommodate No. of entries; fabricated from 16g CRCA sheet steel with earth terminal duly treated with antirust treatment and painted with two coats of red oxide paint. There shall be knockout holes in required numbers and dia. for entry of conduit pipes and arrangement to fix cover plate on it. Hardware: U' nails, plumbing and general use nails of required sizes, washers, check-nuts, steel binding wire 20g, fish wire, etc. Other material for Surface finishing: Cement, sand, putty and water. Construction :- Concealing of Rigid steel Conduits: General: Work shall be done in co-ordination with civil work to suite final approved layout. Conduit shall be duly screwed and size of conduit shall be correct depending on number of wires to be drawn. (Table No.1/1, for Steel conduits) Separate pipe shall be used for each phase in 1-ph distribution and for power and light distribution and also for wiring for other utilities like data, telephone, TV cabling, etc. for which distance between pipes shall not be less than 300 mm or anti electrostatic partition is to be provided. Adequate use of conduit accessories shall be made at required locations. Entries in wall shall be at level of corresponding conduit with colour coding as per Table No. 1/4. (For visual identification). Flexible conduits shall be used at expansion joints. Erection shall be done as per the layout finalized, with minimum sharp bends, with junction boxes at angular junctions and for straight runs at every 4.25m, in such manner so as to facilitate drawing of wires. All bending of conduits shall be done approved manner without changing the cross-section. In RCC work: Work shall be commenced after fixing of steel (re-enforcement) on centering material. Conduits shall be firmly fixed with steel in slab by binding wire. Fixing of conduits shall be possibly done with welding tags so that it will remain rigid during casting of slab, beam, and column even after use of vibrator. Deep junction boxes and other draw-in boxes

		shall be such that their open end and centering material will not have gap in between so as to avoid concrete entering inside even after fixing covers to steel re-enforcement; and be filled with dry sand. Open ends of conduits; to be concealed in walls, shall be provided with couplers / sockets at ends and be flush with bottom of beam, and located at the center of the beam. As far as possible bunching / grouping of conduits shall be avoided so that it will not affect strength of RCC work especially in beams. Suitable steel fish wire shall be drawn through the conduits for drawing of wires later on. Concealing of Rigid Steel Conduits in walls/ flooring: Chases shall be made in walls ofadequate width, with cutter and chiseling through it. Necessary finishing of the wall surface shall be done. Work in flooring shall not disturb RCC work, Conduits of adequate size shall be erected with use of appropriate accessories, and hardware like 'U' nails, etc. Draw-in / inspection boxes shall be fixed with check-nut, flush with surrounding surface and earthed. Testing :- Earth continuity: Earth continuity shall be ensured at termination point of Earthwire, between the ends of metal conduit.
2	WG-MA/BOX,	Material :- PVC Trunking (Box type): PVC Trunking (Box type) ISI mark, minimum 1.2 mm thick, with push-fit joints/ accessories for PVC trunking such as couplers, elbows, internal / external angles, junction boxes of required ways of the same make. Hardware: Sheet Metal (SM) screws of sizes specified in Method of Construction, washers, rawl / PVC / fill typeplugs, wooden gutties, etc. Construction :- Erection of PVC Trunking (Box type): Erection shall be done as per the final approved layout. The Trunking shall be in perfect level and plumb. Screws of minimum 35x8 mm and suitable plugs shall be used for fixing. In case of stonewalls wooden gutties shall be grouted in wall for fixing of screws of Trunking. Distance between 2 screws shall not be morethan 600 mm. Size of Trunking shall be correct depending on number of wires to be drawn. Adequate use of accessories shall be made at joints and at required locations.
3	WG-TW/TC	Material :- PVC Telephone cable: PVC insulated Tinned copper solid conductor with minimum 0.5 mm dia. (Single & Multi pair) properly paired and colour coded, shall be terminated on KRONE module with suitable tool. Construction :- Use of Steel fish wire shall be made for drawing of wires. Wires shall be drawn with adequate care. Wires shall not have intermediate joint in between terminals of the accessories. Wires shall be terminated in the terminals of accessories only. Adequate extra length shall be left at termination points.
4	WG-COC/N C	Material :- UTP Cable : 4 pairs,100 ohms, unshielded twisted pair (UTP), each pair separatedby a PE former (Star shaped) solid 23 AWG tinned copper conductor rated for temperature of 750 C, PVC insulated grey colour with types as in the table 1.12/1 and as per detailed specifications mentioned in Specification book. Construction :- The cable shall be laid in provided separate casing n capping/ PVC conduit/ trunking 400mm away from electrical cables wherever required without sharp bends. Thecable shall be spliced at both the ends for punching/ crimping at keystone jacks/ UTP connectors.
5	WG-COC/O FC	Material :- Optical Fibre Cable : Dielectric & metallic sheath armoured multimode optical fibre cable for underground/ aerial

		applications, fibres separated into binder groups inside a Industry standard 3mm gel filled buffer tubes standard around a central strength member; water blocked with dry water blocking material, making access & handling individual tubes easier & craft-friendly cable core; operating temperature of 40 - 700 C, crush resistance of 44N/m, as per table 1.12/3 and as per detailed specifications mentioned in Specification book. Hardware: Sheet Metal (SM) screws of required sizes, plugs, wooden gitties, clips etc. Construction :- As per the method of construction of PVC armoured cable. But these cables shall be tagged as "OFC" every metre length & can be laid in trench side by side. For underground cable laying cable indicator mentioning "Optical Fibre Cable" is a must.
6	WG-COC/FP C	Material :- Fibre Patch Cord : FRLS duplex fibre patch cord/ pigtails 1mtr in length with LC/ SC/ ST termination consisting of 1.6mm/ 3.0mm dia. 62.5um fibre with minimum bandwidth of 200MHz- km at 850nm & 500MHz at 1300nm with following specifications, as per table 1.12/4 and as per detailed specifications mentioned in Specification book. Construction :- Supplying & plugging FRLS duplex fibre patch cord/ pigtails into the LC/ SC/ ST termination of LIU & fibre module/ fibre switch port complete.
7	WG-NAS/IO	Material :- Information Outlet Flush/ Surface type: Spring shuttered front access, high impact plastic body FR grade with high performance unshielded RJ-45 keystone jack (conforming to EIA/TIA 568-B.2-1 Cat 6), 15 milliohms contact resistance, gold over nickel spring contact, 1.5A current carrying capacity, with T568A/T568B wiring option, insulation displacement connector for cable crimping to accept 22-26AWG solid wire for connections up to Gigabit Ethernet. Hardware: Sheet Metal (SM) screws of required sizes, plugs, wooden gitties, etc. Construction :- The Information outlet shall be fixed on the wall with sheet metal (SM) screws, rawl plugs/wooden gitties and making due connections as per EIA/TIA 568 B.2-1 by splicing the UTP cable, untwisted up to 12mm & punching the 4 pairs in the keystone jack with the help of punching tool. Not a single wire shall be left without connections.

8	WG-NAS/LI U	Material :- Lightguide Interconnect Unit: Wall mount type Lightguide Interconnect Unit with dimensions shown in the table, an interfacing unit for fibre cables coming in from field & those originating from the equipments. consisting of fibre spools to provide minimum bending radius & splice trays as splice cover for pigtail splicing, two compartment design with adaptor panel in the centre, compartmentalizing the box, complete aluminium housing, fully powder coated, two doors enclosure with lock & key, rubber grommets at the cable entry points for tight sealing; Splice trays of 140 x125 x 10mm complete aluminium body fully powder coated with provision for fibre splices fully cushioned splice holder containing grooves for fixing splice protective sleeves; FR grade high impact resistance plastic two halves design stackable sufficient room for excess cable. Hardware: Sheet Metal (SM) screws of required sizes, plugs, wooden gitties, etc. Construction :- Supplying & erecting Lightguide Interconnect Unit (LIU) on wall with cable termination complete with sheet metal screws of required size, plugs/ wooden gitties.

Providing HVAC System		
1	AP-AC/WA C	Material :- Compressor: The room air conditioners shall be fitted with hermetically sealed type suction cooled (Reciprocating) or discharge cooled (Rotary) compressor with suitable rated capacitor start electric motor. It should start unloaded and shall be equipped with overload protection. The compressor shall be mounted on resilient mountings for quiet operation. The compressor shall conform to IS.10617 (part-1): 1983 with amendment 1 & 2. Cooling capacity for Compressors shall be as under: For 1.5 Ton - Minimum 4750 kcal/hourFor 2.0 Ton - Minimum 6250 kcal/hour Energy efficiency ratio for Compressor shall be minimum 2.625 kcal/hour/watt. Cabinet: The cabinet of the air conditioner be made from either galvanized MS sheet of 1mm thickness or aluminium alloy sheet of 1.2mm thickness. The sheets shall be suitably stiffened by embossing the fabrication work and shall be of suitable workmanship. The sheets shall be suitably phosphate and protected by powder coated paint. The galvanized steel sheets shall conform to IS: 277:2003 and have a

		coating grade of 120 gm/m2. Air Filter: The air filters provided shall be of cleanable type and made of synthetic material. Thermostat: The air-conditioner shall be fitted with thermostat suitable for a working range from 16 degree Centigrade to 35 degree Centigrade with a differential of +/-1 degree Centigrade, with operational voltage as 240V and current rating not exceeding 25 amps. The thermostat shall conform to IS: 11338:1985. Condenser: As per (FG-FG/AS7) specified in chapter 2.4 Paint: Superior quality enamel paint of specified colour. Construction :- The AC unit shall be fixed in the recess/window with necessary materials. The outer frame shall be fitted to recess or cutout made in window making the recess/window air tight, duly connecting the unit to power supply by means of metal clad switch & plug and giving satisfactory trials
2	WG-MA/BW	Material :- Wires: in conduits / trunking / panel boards Mains / Sub-mains / Circuit mains (comprising phase and neutral wires): PVC insulated wire of specified size, minimum FR grade insulation, copper conductor of electrolytic tough pitch (ETP) grade, having insulationof 1.1 kV grade, ISI marked, of required colour coding as per Table No 1/5. Wires: open PVC insulated and PVC sheathed wire of specified size, minimum FR grade insulation, copperconductor of electrolytic tough pitch (ETP) grade, having insulation of 1.1 kV grade, ISImarked, of required colour coding as per Table No 1/5. Earth Continuity Wire: PVC insulated wire minimum FR grade insulation copper conductor of electrolytic grade, having insulation of 1.1 kV grade, of green / green yellow colour, ISI marked, of specified size but not less than 2.5 Sqmm as per Table No 1/5. Lugs: Copper lugs of appropriate size & type Other material: Rubber grommet, bush, harnessing material, flexible conduit etc. Construction :- Drawing of wires: General Specified wires shall be drawn with adequate care. Correct colour coding as per Table No. 1/5, shall be used for phase, neutral and earth. Wires shall not have intermediate joint in between terminals of the accessories. Earth-wire and Return wire (neutral) may be looped only within circuit. For lighting load or single-phase distribution wires of two different phases shall not be drawn in single pipe. Wires shall be terminated in the terminals of accessories only, with appropriate type and size of lugs. Drawing of wires: through PVC conduits Bush shall be used at pipe opening to protect wire insulation from getting damaged due to sharp edges. Number of wires shall not exceed with respect to size of pipe as per Table No. 1/2. Drawing of wires: through Rigid Steel conduits Bush shall be used at pipe opening to protect wire insulation from getting damaged due to burrs / sharp edges. Number of wires shall not exceed with respect to size of pipe as per Table No. 1/1. Open Wire bunch: Open wires shall be erected with due care so as to avoid chances of any mechanical injury. Harnessing shall be done with required material in an approved manner in panel boards or where ever necessary. For covering lead wires flexible conduit shall be used with gland as per necessity. Testing :- Insulation resistance test: All wiring shall be tested with 500V Meggar between phases, phase – neutral and to Earth. IR value shall not be less than 1M-ohm. Earth continuity: Earth continuity shall be ensured between termination points of Earth wire. Polarity Test: Test shall be carried out for ensuring the correct polarity in switch and plug

LIST OF PREFERRED MATERIALS FOR THIS WORKS

Sr.No	ITEMS	MAKE/BRANDS -- SUBSTANTIALLY EQUIVELANT
1	PVC CABLES (COPPER)/ ALLUM	FINOLEX, RR KABLES, HAVELLS ,KEI
2	PVC INULATED ALUMINUM / COPPER WIRE WITH STRANDED CONDUCTORS. (FRLS/FR / HFFR)	FINOLEX, RR KABLES, HAVELLS ,KEI
3	PVC RIGID CONDUITS / CASING-N- CAPPING	FINOLEX , PRECISION, DIAMOND, MODI
4	ELECTRICAL FITTINGS (FLUORESCENT, CFL, MV, METAL HALIDE ETC.)	PHILIPS, BAJAJ, CROMPTON, WIPRO, HAVELLS
5	CEILING FANS, EXHAUST FANS	CROMPTON, ORIENT, HAVELLS, USHA, ALMONARD
6	HRC SWITCH FUSE UNIT	L&T, SIEMENS , HAVELLS, C & S
7	CABLE GLAND & LUGS	SIEMENS, DOWELS, BRACO
8	INDUSTRIAL SOCKETS	CROMPTON, SIEMENS, HAVELLS ,STANDARD , LEGRAND, INDOASIAN
9	FLUORESCENT TUBES & BULBS	PHILIPS, CROMPTON, BAJAJ, WIPRO, HAVELLS
10	ELECTRONIC FAN REGULATOR (STEP TYPE)	ROMA, GREATWHITE, LEGRAND, HAVELLS
11	MCCB'S & RCCB, RCBO (ALL POLS)	L&T, SIEMENS, SCHNEIDER ELECTRIC (MG), ABB, LEGRAND
12	MS & GI CONDUITS	AKG OR ISI MARKED APPROVED BY C.E. (ELECT.)PWD MUMBAI
13	ISOLATORS, DISTRIBUTION BOXES	L&T, SIEMENS, CROMPTON, SCHNEIDER ELECTRIC (MG), ABB, LEGRAND, HAVELLS, STANDARD, C & S
14	WIRING ACCESSORIES: 1) PIANO TYPE SWITCHED, SOCKETS, ACCESSORIES. 2) MODULAR TYPE SWITCHES SOCKETS, ACCESSORIES. MODULAR TV / TELEPHONE SOCKET	LEGRAND, , ROMA, GEM, SCHNEIDER
15	FLUORESCENT TUBES, MF/GF LAMPS	CROMPTON, BAJAJ, PHILIPS , WIPRO
16	L.E.D. FITTING INDOOR & OUTDOOR	CROMPTON, PHILIPS, BAJAJ, HAVELLS, WIPRO , STURLITE
17	WATER PUMP	CROMPTON GREAVES, KSB, , KIRLOSKAR, CRI, GRAND FOSS
18	HT CABLE	RR CABLES, FINOLEX , HAVELLS, KEI
19	HT SWITCHGEARS	SIMENS, SCHNEIDER, ABB, L&T , LEGRAND
20	AIR CONDITIONING UNITS	VOLTAS, CARRIER, DAIKIN , MITUBHISHI, BLUESTAR
21	FIRE PUMPS :	KIRLOSKAR BROS. LTD / MATHER & PLATT / GRUNDFOS
22	G.I./ M.S. PIPES :	JINDAL(HISSAR) / TATA / ZENITH / APPOLO
23	PIPE FITTINGS :	BHARAT FORGE / TUBE PRODUCTS / M.S. FITTINGS / VS
		BRAND / GOYAL / SANJAY FORGE / B & M
24	BUTTERFLY VALES :	AUDCO / KEY STONE / BDK / FOURESS / INTERVALVE I/NEW AGE / KARTAR / NVR /ZOLOTO
25	NON – RETURN VALVES :	H. SARKER / CRESENT / HAWA / KARTAR / NVR
26	GATE VALVES (SCREWED END) :	LEADER / ZOLOTO / ITAP / KARTAR / NVR
27	BALL VALES (SCREWED END) :	LEADER / ZOLOTO / ITAP/ KARTAR / NVR
28	DG SET WITH AMF PANEL	KIROSKAR / GREAVES / MAHINDRA / CUMMINS
29	STRAINERS :	GUJRAT OTO FILT / GRAND FRIX / TEL FLOW / KARTAR
30	C.I. GATE VALVES :	H. SARKER / CRESENT / UPADHAYA / HAWA/ KARTAR
31	FLOW METRE :	FORBES MARSHALL / EUREKA
32	PRESSURE SWITCH :	INDFOS / SWITZER / DELTA CONTROL
33	PRESSURE GAUGE :	H. GURU / FIEBIG / PRICOL / BELLS CONTROL/DONE FOSS/FIBE/UDAY.
34	ANTICORROSIVE MATERIAL :	I W L / RUSTECH
35	HYDRANT VALVES :	NEWAGE / WINCO / SHAHBHOGILAL / MINIMAX / ARIHANT / PARSHAW / ESSEL
36	BRANCH PIPE WITH NOZZLE :	NEWAGE / WINCO/ SHAHBHOGILAL /MINIMAX / ARIHANT/ PARSHAW / ESSEL
37	FIRE HOSES	NEWAGE / CRC /RAHINO / ESSEL
38	HOSE COUPLINGS	NEWAGE / WINCO/ SHAHBHOGILAL / MINIMAX / ARIHANT/

		PARSHAW / ESSEL
39	HOSE REEL	EVERSAFE / TYCO / NEWAGE MINIMAX / MITRAS / SHREE
40	HOSE BOX / FIRE DUCT SHUTTER	EVERSAFE / TYCO / NEWAGE / MINIMAX
41	FIRE EXTINGUISHERS	SAFEX / ACE FIRE / MINIMAX / VIJAY / EVERSAFE
42	SPRINKLERS	TYCO / VIKING / KIDDE/ NEWAGE / H.D.
43	SPRINKLER ALARM VALVE	HD / TYCO / VIKING / KIDDE
44	FLOW SWITCH	SYSTEM SENSOR / POTTER / SWITZER/ LEVCON
45	PAINT	ASIAN / BERGER
46	AIR RELEASE VALVES	LEADER / BAJAJ / HAWA /ZOLOTO
47	WELDING ELECTRODES	ESAB 28/ ADVANI
48	FLEXIBLE DROPS	EASYFLEX / DONGA FLEX / ANY UL LISTED/FM APPROVED MATERIAL
49	ELECTRIC MOTORS	KIRLOSKAR ELECTRIC / CROMPTON GREAVES / SIEMENS / ABB
50	BATTERY	EXIDE / STANDARD / AMRON
51	MOTOR CONTROL CENTER	PRAGATHI CONTROLS / LOAD CONTROLS / DYNAMO /
		BRIGHT ENGINEERING/ELLINS / LOTUS
52	CONTROL / POWER CABLES	CCI/ FINOLEX /HAVELL / RRKABEL
53	CONTROL MCB	ABB/LEGRAND / SIEMENS / HAVELL / MDS /CROMPTON
		GREAVES / LEGRAND
54	VOLT METER SELECT SWITCH	SALZER / L & T / KAYCEE
55	VOLTMETER (AC / DC)	MECO / AE
56	AMMETER (AC / DC)	MECO / AE
57	POWER CONTACTORS	ABB/LEGRAND / SIEMENS / HAVELL / MDS / LEGRAND / L & T
58	INDICATING LAPS (LED TYPE)	VINAY / TEKNIC / L& T
59	PUSH BUTTONS	TEKNIC / SIEMENS / L&T
60	AUTO / MANUAL SELECTOR	SALZER / KAYCEE / L&T
61	TIMERS	EAPL / AE / L & T
62	TERMINAL BLOCKS	ELMEX / WAGO
63	CURRENT TRANSFORMERS	KALPA / VOLTAMPS / KAPPA
64	OVER LOAD RELAY	L & T / SIEMENS
65	SINGLE PHASE PREVENTORS	MINILEC / AE /SIEMENS
66	ENGINE CONTROL SELECTOR	SALZER / KAYCEE / L&T
67	MAIN SUPPLY SELECTOR – DPMCB	SIEMENS / LEGRAND /ABB/ L&T
68	BATTERY CHARGING SELECTOR	SALZER / L & T/ KAYCEE
69	BATTERY CHARGER	KAYBEE POWEREC / HBL-NIFE/ AFCO/CHABBI
70	SIREN / HOOTER	KHERAJ/EQUI
71	TOGGLE SWITCH	JAY / EQUI
72	END TERMINATIONS	DOWEWLS / MULTI
74	SMOKE DETECTORS	NOTIFIER / EST (EDWARDS) / SIMPLEX / APPOLO
		/HONEYWELL / SIEMENS / MIRTONE / SECUTRON / AGNI
75	HEAT DETECTORS	NOTIFIER / EST / SIMPLEX / APPOLO / HONEYWELL /
		SIEMENS / MIRTONE / SECUTRON / AGNI
76	MAIN CONTROL PANEL	NOTIFIER / EST / SIMPLEX / APPOLO / HONEYWELL /
		SIEMENS / MIRTONE / SECUTRON / AGNI
77	MANUAL PULL STATIONS	NOTIFIER / EST / SIMPLEX / APPOLO / HONEYWELL /

		SIEMENS / MIRTONE / SECUTRON / AGNI
78	HOOTERS / STROBES	NOTIFIER / EST / SIMPLEX / APPOLO / HONEYWELL /
		SIEMENS / MIRTONE / SECUTRON / AGNI
79	MODULES	NOTIFIER / EST / SIMPLEX / APPOLO / HONEYWELL /
		SIEMENS / MIRTONE / SECUTRON/ AGNI
80	BATTERY	HITACHI / DRYSIL / JOHNSON / EXIDE / STANDRD
81	COPPER CONDUCTOR CONTROL CABLE / WIRES	HAVELLS /KEI /FINOLEX
82	COMMUNICATION WIRES	HAVELLS /KEI /FINOLEX
83	P.A. SPEAKERS	PHILIPS / AHUJA / AKG / BOSCH
84	P.A.CONSOLE	TYCO / KIDDE / FIRE PRO / CHERY TECH / BOSCH
86	DATA CABLE(CAT 6, CAT6+)	AMP, D LINK, MOLEX, SYSTIMAX
87	PROJECTOR	SONY / BENQ
88	SOLAR INVERTER	FRONIOUS , POLYCAB , GROWAATT , ZEROVER , ABB
89	SOLAR “ON GRID” SYSTEM / SOLAR “OFF GRID” SYSTEM	VIKRAM,,GREENBRILLIENCE, TATA POWER SOLAR SYSTEMS LTD. GOLD SOLAR PVT LTD , WAAREE SOLAR
90	SOLAR PANEL	VIKRAM,,GREENBRILLIENCE, TATA POWER SOLAR SYSTEMS LTD. GOLDIGREEN , WAAREE SOLAR
91	LINE ARRAY SPEAKER , LINE ARRAY SUB WOOFER ,TWP WAY STAGE MONITOR	BOSE /BOSCH /SONY
92	POWER AMPLIFIER (FOR LINE ARRAY) , POWER	BOSE /BOSCH /SONY
93	EQUALISER (31+31)	BOSCH / YAMAHA /SOUNDCRAFT/ BOSE
94	LIVE MIXER	BOSCH / YAMAHA /BOSE
95	ACTIVE CROSS OVER STEREO	BOSCH / YAMAHA
96	DIGITAL SIGNAL PROCESSOR DRIVE RACK	DBX/AHUJA
97	HANGING MICROPHONE	SHURE/AKG/SENNHEISER /BOSCH
98	PODIUM GOOSENECK MICROPHONE	SHURE/AKG/SENNHEISER /BOSCH
99	BOUNDARY MICROPHONE	SHURE/AKG/SENNHEISER /BOSCH
101	WIRELESS HANDHELD MICROPHONE , WIRELESS	SHURE/AKG/SENNHEISER /BOSCH
102	NVR & NVR SOFTWARE	SONY, SAMSUNG, HONEYWELL
103	SEMI OPEN HEADPHONE	AKG/SENNHEISER/YAMAHA
104	SURVEILLANCE HARD DIST	SEAGATE, WD
105	ROOM MONITOR SPEAKER	BOSCH / BOSE/SONY
107	SUB WOOFER FOR FLY MOUNTS SPEAKER MOUNTING BRACKETS	BOSCH / BOSE/SONY
108	GIGABYTE POE & ETHERNET SWITCHES	CISCO, ALCATEL, JUNIPER, D-LINK
109	DVD PLAYER	SONY/PHILIPS/SAMSANG
110	UTP CABLE, FIBER OPTIC CABLE, I/O, PATCH	CISCO, SYSTIMAX, AMP, D-LINK
111	MICROPHONE CABLE	FALCON/DELTA/SUNPLAST
112	RACKS	APW, WQ, VALLRACK, AMS NET TECH, NET RACK
113	SPEAKER CABLE	FALCON/DELTA/SUNPLAST
114	UPS	EMERSON, MICROTECK
115	MICROPHONE PATCH PANEL , SPEAKER PATCH PANEL	MX/NEUTRIK/LEO
116	OCTAGONAL POLES / HIGH MAST POLES	BAJAJ, WALLMOUNT, CROMPTON, MAGNETIC, TRANSRAIL
117	TRANSFORMER	VOLTAMP, STATIC, DELTRON , MAHATI, CROMPTON PACTIL
118	TELEPHONE CABLE	FINOLEX, HAVELLS, D-LINK
119	TELEPHONE INSTRUMENTS	PANASONIC, BEETEL, SIEMENS
120	MDF BOX	LEGRAND
121	KRONE MODULE	KRONE OR ISI MARKED APPROVED BY C.E. (ELECT.)PWD MUMBAI.

122	CO-AXIAL RG11 CABLE	FINOLEX, RPG
123	SOLAR HOT WATER SYSTEM	RACOLD SOLAR WATER HEATING SYSTEM , KOTAK URJA PVT. LTD, PHOTON ENERGY SYSTEMS LTD , VIKRAM SOLAR PVT. LTD , WAAREE ENERGIES LTD , V.GUARD , SKYLARK SOLAR , LAXMI SOLAR
124	LED TV SET	BARCO / SAMSUNG / CHRISTI
125	EXTENDER SWITCHES, CONTROLLER , CABLE , CABLE TERMINALS	LIGHTWEL / KRAMER / EXTRON
126	MIC , AMPLIFIRE , DIGITAL SINGLE PROCESSOR (DSP)	SCNNHEISER / XILICA / KRAMER
127	CAMERA / PTZ CAMERA	SONY , SAMSUNG , HONEYWELL
128	FAÇADE LIGHTING	PHILIPS , HAVELLS , ORIENT, BAJAJ
129	HEAT PUMP	AO SMITH , KORLOSKAR, STIEBEL, ELTRON, BLUEBOX, EMERSON,
		V-GARD
130	LINE ARRAY SPEAKER , LINE ARRAY SUB WOOFER , TWO WAY STAGE MONITOR	JBL , MARTIN, BSS
131	AMPLIFIER	CROWN. DBX, JBL
132	MICROPHONE	AKG , SHURE , AUDIOTECHNICA , SENNHEISER
133	MIXER	SOUND CRAFT , YAMAHA ,
134	DIGITAL SIGNAL PROCESSOR DRIVE RACK	DBX, BSS, CROWN
135	MIC STAND	MX, AHUJA , AKG
136	MICROPHONE CABLE	FALCON, DELTA,KRYSTAL
137	SPEAKER CABLE	FALCON, KRYSTAL FINOLEX
138	RACKS	VAL RACK, AMS NET TECH, NET RACK,D-LINK
139	MICROPHONE PATCH PANEL , SPEAKER PATCH PANEL	MX/NEUTRIK/CUSTOM
	STAGE LIGHTING AND STAGE CRAFT	
140	LIGHTS	LEKSA LIGHTING,MARKRICH,AULTRA LIGHTING
141	DMX CABLE	FALCON, GURUASTRONICS, BELDEN
142	POWER AND DMX CONNECTOR	LEKSA LIGHTING,MX,
143	POWER PANELS	LEGRAND, SIEMENS, CUSTOM, LEKSA LIGHTING
144	CONSOLE / SPLITTER	LEKSA LIGHTING,MARKRICH,AULTRA LIGHTING
145	GEAR BOX	KISCO GEAR , LEKSA LIGHTING
146	MOTOR	NAVJOT , CROMPTON , LAKSA LIGHTING
Note: Makes other than the above if not available in market, prior approval from Engineer -in-change is essential and the make shall be either from the approved list by Chief Engineer (Electrical), PWD, Mumbai or shall have ISI mark		