

BOOK No: -

CENTRAL RAILWAY



NAGPUR-DIVISION

ELECTRICAL-DEPARTMENT

GENERAL-SERVICES

TENDER NO :-

DUE DATE ON :-

Name of Work- Electrical work in connection with Sch. A) Butibori: Augmentation of SSE(T)/ Butibori store depot due to commissioning of 3rd and 4th line under the jurisdiction of ADEN South. Sch. B) Sewagram: Augmentation of SSE(T)/ Sewagram store depot due to commissioning of 3rd and 4th line under the jurisdiction of ADEN South.

Tender Cost: - Rs. /-

Tender issued by: - Sr. Divisional Electrical Engineer (Genl)
Central Railway, Nagpur-440001

Issued to: - M/s. _____

PREAMBLE AND SCOPE OF WORK

1.0. NAME OF WORK: Electrical work in connection with Sch. A) Butibori: Augmentation of SSE(T)/ Butibori store depot due to commissioning of 3rd and 4th line under the jurisdiction of ADEN South. Sch. B) Sewagram: Augmentation of SSE(T)/ Sewagram store depot due to commissioning of 3rd and 4th line under the jurisdiction of ADEN South.

2.0 SCOPE OF WORK:-

The scope of work covers Electrical work in connection with Sch. A) Butibori: Augmentation of SSE(T)/ Butibori store depot due to commissioning of 3rd and 4th line under the jurisdiction of ADEN South. Sch. B) Sewagram: Augmentation of SSE(T)/ Sewagram store depot due to commissioning of 3rd and 4th line under the jurisdiction of ADEN South.

3.0 GENERAL

1. All the works shall be carried out by the Tenderer with tools and equipment arranged by the Tenderer.
2. Water / electricity / transport shall be arranged by the Tenderer at his own cost. The Purchaser shall not provide the same under any circumstances. The site for depot / workshop can be provided to the Tenderer on his request.
3. The Tenderer shall arrange at his own cost, all tools & plants, facilities required for erection, testing and commissioning of all the equipment in compliance with the respective specifications.
4. The schedule of rates and quantities enclosed should be read in conjunction with the explanatory notes given in the tender papers.
5. Conditional offer will not be considered.
6. Valid Electrical Contractor License.

4.0 ELIGIBILITY CRITERIA: - MINIMUM ELIGIBILITY CRITERIA OF TENDERER

Similar nature of works- Not applicable.

- 5.0 Special condition-**The contractor shall get the work executed through electrical license holder agency and shall get the work inspected and certified from Railway nominated Electrical Engineer as per direction of Engineer in-charge.

EXPLANATORY NOTES OF TENDER SCHEDULE

Name of work: Electrical work in connection with Sch. A) Butibori: Augmentation of SSE(T)/ Butibori store depot due to commissioning of 3rd and 4th line under the jurisdiction of ADEN South. Sch. B) Sewagram: Augmentation of SSE(T)/ Sewagram store depot due to commissioning of 3rd and 4th line under the jurisdiction of ADEN South.

The scope of work covers the Electrical work in connection with Sch. A) Butibori: Augmentation of SSE(T)/ Butibori store depot due to commissioning of 3rd and 4th line under the jurisdiction of ADEN South. Sch. B) Sewagram: Augmentation of SSE(T)/ Sewagram store depot due to commissioning of 3rd and 4th line under the jurisdiction of ADEN South with associated accessories/equipment's as per schedule and specifications given in an approved manner and as per IS standard. It is to be noted that the quantity may be varied as per requirement at the time of execution of work.

In case of any discrepancy / difference between description mentioned in the schedule of price and explanatory note of each item, the description specified in explanatory note and decision taken by Sr. DEE(G)NGP shall be applicable.

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Schedule item no.: A-1 & B-1

Concealed wiring for light, fan & 6 Amps plug points with PVC Pipe and PVC insulated copper conductor 1.5 sq.mm. size with modular board with supply of all materials.

Supplying, installation, testing and commissioning of concealed wiring for light points, fan points and 6 Amp socket outlets shall be carried out using PVC insulated, FRLS (Flame Retardant Low Smoke) multi-stranded copper conductor wires of 1.5 sq.mm size, conforming to IS 694 (latest amendment), suitable for 1100V grade, including 1.5 sq.mm green insulated copper conductor for earthing. The wiring shall be drawn through heavy duty rigid PVC conduit pipes of suitable size (minimum 20 mm dia or as required), conforming to IS 9537 (Part 3), concealed in wall, ceiling or floor with all necessary accessories such as bends, tees, couplers and junction boxes. Modular type switches and socket outlets shall be provided, conforming to IS 3854 and IS 1293 respectively, complete with flush type modular boxes, cover plates and all required accessories, and electronic fan regulators conforming to IS 11037 shall be provided wherever required. Flush boxes shall be of MS powder coated or PVC type conforming to IS 14772, with proper earthing arrangement for metal parts. The entire installation shall include wall chasing, conduit laying, fixing with saddles/clamps, pulling of wires, termination using proper lugs/ferrules, and ensuring proper color coding for phase, neutral and earth conductors. Complete earthing shall be provided as per IS 3043. The work shall include making good of walls and surfaces after installation, and all joints and terminations shall be executed to ensure safe and reliable operation. After completion, the system shall be tested for insulation resistance, continuity and polarity as per relevant IS standards. The entire work shall conform to IS 732 and other applicable standards and shall be executed as per the instructions of the Engineer-in-Charge, including supply of all materials, labour, tools and tackles, complete in all respects.

Schedule item no. : A-2 & B-2

Concealed Wiring for 6/16 Amps plug points with PVC Pipe and PVC insulated copper conductor 2.5 sq. mm. size with modular board supply of all materials.

Supplying, installation, testing and commissioning of concealed wiring for 6/16 Amp socket outlets shall be carried out using PVC insulated, FRLS (Flame Retardant Low Smoke) multi-stranded copper conductor wires of 2.5 sq.mm size, conforming to IS 694 (latest amendment), suitable for 1100V grade, including 1.5 sq.mm green insulated copper conductor for earthing. The wiring shall be drawn through heavy duty rigid PVC conduit pipes of 25 mm diameter, conforming to IS 9537 (Part 3), concealed in wall, ceiling or floor with all necessary accessories such as bends, tees, couplers and junction boxes. Modular type switches and 6/16 Amp socket outlets shall be provided, conforming to IS 3854 and IS 1293 respectively, complete with flush type modular boxes and cover plates of approved make. Flush boxes shall be of MS powder coated conforming to IS 14772, with proper earthing arrangement for metal parts. The installation shall include wall chasing, conduit laying, fixing with saddles/clamps, pulling of wires, and termination using proper lugs/ferrules, ensuring proper color coding for phase, neutral and earth conductors. Complete earthing shall be provided as per IS 3043. The work shall also include making good of walls and surfaces after installation. After completion, the system shall be tested for insulation resistance, continuity and polarity as per relevant IS standards. The entire work shall conform to IS 732 and

other applicable standards and shall be executed as per the instructions of the Engineer-in-Charge, including supply of all materials, labour, tools and tackles, complete in all respects.

Schedule item no. : A-3 & B-3

Wiring for submain along with earth wire with the size 2X2.5 sq.mm+1X2.5 sq.mm earth wire of PVC insulated copper conductor, single core cable in concealed/ surface/recessed PVC heavy gauge conduit as required. The work shall be done as per CPWD Pt. I, manual (1972) for general specification of electrical work. All materials should be IS marked.

Supplying, Erection, Testing & Commissioning of Sub-main Wiring with Earthing Conductor, using 2 Nos. x 2.5 Sq.mm + 1 No. x 2.5 Sq.mm (earth) PVC insulated stranded copper conductor single core FRLS wires, conforming to IS 694 (latest amendment), drawn through heavy duty rigid PVC conduit pipe of suitable size in concealed / surface / recessed manner as required, complete with junction boxes, bends, saddles, inspection boxes, accessories and all materials, including chasing, fixing, wiring, termination, testing and commissioning complete in all respects as per CPWD General Specifications for Electrical Works (latest applicable edition), relevant IS standards and instructions of Engineer-in-Charge.

Schedule item no. : A-4 & B-4

Wiring for submain along with earth wire with the size 2X4 sq.mm+1X4 sq.mm earth wire of PVC insulated copper conductor, single core cable in concealed/ surface/recessed PVC heavy gauge conduit as required. The work shall be done as per CPWD Pt. I, manual (1972) for general specification of electrical work. All materials should be IS marked.

Supplying, Erection, Testing & Commissioning of Sub-main Wiring with Earthing Conductor, using 2 Nos. x 4 Sq.mm + 1 No. x 4 Sq.mm (earth) PVC insulated stranded copper conductor single core FRLS wires, drawn through heavy duty rigid PVC conduit pipe of suitable size in concealed / surface / recessed manner as required, complete with junction boxes, bends, saddles, inspection boxes, accessories and all materials, including chasing, fixing, wiring, termination, testing and commissioning complete in all respects as per CPWD General Specifications for Electrical Works (latest applicable edition), relevant IS standards and instructions of Engineer-in-Charge.

Schedule item no. : A-5 & B-5

Wiring for submain along with earth wire with the size 2X6 sq.mm+1X6 sq.mm earth wire of PVC insulated copper conductor, single core cable in concealed/surface/recessed PVC heavy gauge conduit as required. The work shall be done as per CPWD Pt. I, manual (1972) for general specification of electrical work. All materials should be IS marked.

Supplying, Erection, Testing & Commissioning of Sub-main Wiring with Earthing Conductor, using 2 Nos. x 6 Sq.mm + 1 No. x 6 Sq.mm (earth) PVC insulated stranded copper conductor single core FRLS wires, drawn through heavy duty rigid PVC conduit pipe of suitable size in concealed / surface / recessed manner as required, complete with junction boxes, bends, saddles, inspection boxes, accessories and all materials, including chasing, fixing, wiring, termination, testing and commissioning complete in all respects as per CPWD General Specifications for Electrical Works (latest applicable edition), relevant IS standards and instructions of Engineer-in-Charge

Schedule item no. -: A-6 & B-6

SETC of outdoor 2x20 wats LED surface/ suspended water proof industrial luminaries with polycarbonate housing and diffuser with 20 watts LED tube 2-no. for each fitting. The scope shall be inclusive of design to achieve the required level of illumination by utilising above luminaries.

Supplying, erection, testing and commissioning of 2x20 wats LED surface/ suspended water proof industrial luminaries with polycarbonate housing and diffuser with 20 watts LED tube 2-no. for each fitting, shall be carried out for operation on 230V, single phase, 50 Hz AC supply. The luminaire s hall be high efficiency LED source and opal/PC diffuser for uniform glare-free illumination. The fitting shall conform to IS 10322 (Part 5/Section 1) and relevant applicable standards for LED luminaires. The scope shall be inclusive of design to achieve the required level of illumination by utilising above luminaries.

The fitting shall be complete with inbuilt constant current electronic LED driver, having power factor not less than 0.9, low THD, and protection against short circuit, over-voltage and surge. The luminaire shall have minimum IP-20 protection suitable for indoor application. The fitting shall be

suitable for fixing on wall/ceiling with all necessary accessories such as mounting brackets, screws, rawl plugs and fasteners required for proper installation. Connection wiring shall be carried out using 1.5 sq.mm, 2 core PVC insulated FRLS copper conductor cable, conforming to IS 694, complete with proper termination and earthing arrangement as per IS 3043.

Schedule item no. -: A-7 & B-7

SETC of Energy Efficient, BLDC AC Ceiling Fan, 1200 mm Sweep, Voltage 170-250v, Single Phase, Frequency 48-52Hz, Input Power Not More Than 32W, Air Delivery 230 cmm, Speed 380 RPM, Speed Control, Remote Handset, BEE 5 Star Rating With 5 Yrs. Warranty, Authorized OEM Certificate & CPRI Test Certificate to be Submitted Along With Supply complete.

Supplying, erection, testing and commissioning of energy efficient BLDC ceiling fan of 1200 mm sweep shall be carried out, suitable for 230V, single phase, 50 Hz AC supply, operating within voltage range of 170–250 Volts and frequency range of 48–52 Hz. The fan shall be of aerodynamic design with dynamically balanced blades to ensure smooth and noiseless operation.

The fan shall be equipped with BLDC (Brushless Direct Current) motor with input power consumption not exceeding 32 Watts, delivering minimum air delivery of 230 CMM and minimum speed of 380 RPM. The fan shall be complete with electronic speed control and remote handset, including all necessary accessories such as receiver unit, canopy, down rod, shackle assembly and mounting hardware.

The fan shall conform to relevant Indian Standards such as IS 374 (Ceiling Fans) and shall be BEE 5 Star rated, certified under the Bureau of Energy Efficiency (BEE) labeling program. The fan shall also have valid CPRI test certificate confirming performance parameters.

The fan body shall be of high-quality material with corrosion resistant finish, and blades shall be of aluminium/ABS with suitable coating. Proper earthing provision shall be ensured as per IS 3043. The fan shall be supplied with a minimum 5 years comprehensive warranty. An authorized OEM certificate shall be submitted along with supply to ensure authenticity and support.

The installation shall include complete mounting on ceiling with proper alignment, connection with supply wiring using 1.5 sq.mm PVC insulated FRLS copper conductor cable conforming to IS 694, and testing for proper operation including speed control and remote functionality.

Schedule item no. : A-8 & B-8

SETC of 12" metal body type exhaust fan complete with motor guard, cover etc.

Supplying, erection, testing and commissioning of metal body exhaust fan of 12 inch shall be carried out, suitable for 230V, single phase, 50 Hz AC supply. The fan shall conform to IS 2312 (Exhaust Fans) or latest applicable standards.

The fan shall be of robust metal body construction with corrosion resistant finish, complete with aerodynamically designed metal blades, heavy duty motor, and minimum air delivery as per relevant IS standards. The fan shall be suitable for continuous operation with low noise and vibration.

The fan shall be complete with protective motor guard (grill) on both sides, and louvers/shutter on outer side to prevent entry of dust, rain and insects. The fan shall be suitable for wall/window mounting, complete with all necessary fixing accessories such as frame, screws, rawl plugs, etc. The motor shall be of high efficiency type with proper insulation and thermal protection. Proper earthing shall be ensured as per IS 3043. Connection wiring shall be carried out using 1.5 sq.mm, 2 core PVC insulated FRLS copper conductor cable, conforming to IS 694, drawn through suitable PVC conduit, complete with all accessories.

Schedule item no. : A-9 & B-9

SETC of energy efficient 80 W LED medium bay fitting with housing made of pressure die cast aluminum with protective toughened glass with dedicated LED with wide beam distribution suitable for surface / suspended mount.

Supplying, erection, testing and commissioning of energy efficient LED medium bay light fitting of 80 Watt rating shall be carried out, suitable for operation on 230V, single phase, 50 Hz AC supply. The luminaire housing shall be made of pressure die-cast aluminium with powder coated finish and provided with protective toughened glass cover, suitable for indoor industrial/commercial applications. The fitting shall conform to IS 10322 (Part 5/Section 1) and relevant applicable standards for LED luminaires. The fitting shall be provided with high efficiency dedicated LED source having wide beam light distribution for uniform illumination. The luminaire shall be complete with inbuilt constant current electronic LED driver, having power factor not less than 0.9, low THD, and protection against short circuit, over-voltage and surge. The luminaire shall have minimum IP-65 protection, suitable for dusty indoor environments and industrial applications. The fitting shall be suitable for surface mounting or suspended mounting, complete with all necessary

mounting accessories such as suspension hooks, brackets, clamps, nuts, bolts and fasteners. Connection wiring shall be carried out using 1.5 sq.mm, 2 core PVC insulated FRLS copper conductor cable, conforming to IS 694, complete with proper termination and earthing arrangement as per IS 3043.

Schedule item no. : A-10 & B-10

S.E.T.C. of Single phase DB capacity 40 Amp. RCBO for incomer and various type SPMCB 6-32 Amp (4x6A, 2x10A & 2x16A) for outgoing 8 Nos complete

Supplying, erection, testing and commissioning of single phase distribution board shall be carried out suitable for 230V, single phase, 50 Hz AC supply, having 40 Amps, 2 Pole RCBO as incomer, and 8 Nos. outgoing Single Pole MCBs comprising 4 Nos. 6A, 2 Nos. 10A and 2 Nos. 16A, all conforming to IS/IEC 61009 (for RCBO) and IS/IEC 60898-1 (for MCBs), with minimum 10 kA breaking capacity or as per system requirement.

The distribution board shall be of double door, metal clad, dust and vermin proof construction, fabricated from CRCA steel sheet of minimum 1.2 mm thickness, duly powder coated after proper surface treatment, and conforming to relevant provisions of IS/IEC 61439 (Part 3). The DB shall be suitable for flush mounting, complete with hinged door, locking arrangement, and provision for cable entry from top/bottom through removable gland plates. The DB shall be provided with aluminium busbars for phase and neutral, and a separate earth bar of adequate size, mounted on suitable insulated supports. The internal wiring shall be carried out using PVC insulated copper conductors conforming to IS 694, properly ferruled, dressed and terminated with suitable lugs. A proper neutral link and earth bar with sufficient terminals for all outgoing circuits shall be provided. The DB shall have minimum IP-42 protection. The RCBO shall provide protection against overload, short circuit and earth leakage, and shall be of appropriate sensitivity (generally 30 mA unless otherwise specified). All outgoing MCBs shall be clearly labeled for circuit identification. The DB shall be complete with all necessary accessories such as DIN rail, blanking plates, danger notice plate, and earthing studs.

Proper earthing of the DB shall be ensured with connection to earth as per IS 3043. The complete unit shall be factory assembled, inspected and routine tested as per IS/IEC standards, and after installation, testing shall include insulation resistance, polarity and functional checks.

The work shall include supply of all materials, labour, tools and tackles, complete erection, connection, testing and commissioning, in all respects, as per approved drawings and instructions of the Engineer-in-Charge.

Schedule item no. : A-11 & B-11

S.E.T.C of Three phase Distribution Board having 63 Amps 300 mA 4 pole RCBO-1 no and SP MCB 6-32 Amps-8 Nos (4x6A, 2x10A & 2x16A) on each phase as per requirement complete.

Supplying, erection, testing and commissioning of three phase distribution board shall be carried out suitable for 415V, 3 phase, 50 Hz AC supply, having 63 Amps, 4 Pole RCBO (300 mA sensitivity) – 1 No. as incomer, and 8 Nos. outgoing MCBs comprising 4 Nos. 6A, 2 Nos. 10A and 2 Nos. 16A. The RCBO and MCBs shall conform to IS/IEC 61009 and IS/IEC 60898-1 respectively.

The distribution board shall be of double door, metal clad, dust and vermin proof construction, fabricated from CRCA steel sheet of minimum 1.2 mm thickness, duly powder coated after proper surface treatment, and conforming to IS/IEC 61439 (Part 3). The DB shall be suitable for flush mounting, complete with hinged doors, locking arrangement and provision for cable entry from top/bottom through removable gland plates.

The DB shall be provided with aluminium busbars for all three phases and neutral, along with a separate earth bar of adequate size, mounted on insulated supports. The busbar arrangement shall ensure proper phase balancing of outgoing circuits. The internal wiring shall be carried out using PVC insulated copper conductors conforming to IS 694, properly ferruled, dressed and terminated with suitable lugs. A proper neutral link and earth bar with sufficient terminals for all outgoing circuits shall be provided. The DB shall have minimum IP-42 protection.

The RCBO shall provide protection against overload, short circuit and earth leakage, and all outgoing MCBs shall be clearly labeled for circuit identification. The DB shall include all necessary accessories such as DIN rails, blanking plates, danger notice plate and earthing studs.

Proper earthing of the DB shall be ensured with connection to earth as per IS 3043. The complete unit shall be factory assembled, inspected and routine tested as per relevant IS/IEC standards, and after installation, testing shall include insulation resistance, polarity and functional checks.

The work shall include supply of all materials, labour, tools and tackles, complete erection, connection, testing and commissioning, in all respects, as per approved drawings and instructions of the Engineer-in-Charge.

Schedule item no. : A-12 & B-12**SETC of Octagonal galvanized steel pole of 7 mtr height on cement concrete foundation complete with foundation bolts, single arm etc.**

Supplying, erection, testing and commissioning of 7 meter long octagonal pole shall be carried out, made from high strength steel, with 130 mm bottom A/F and 70 mm top A/F, suitable for outdoor lighting applications. The pole shall be manufactured from steel sheets conforming to IS 2062 (Grade E250 or latest) and shall be continuously tapered with single longitudinal seam welding. The pole shall be hot dip galvanized as per IS 4759, with minimum average coating thickness of 70 microns, to provide long term corrosion protection. The pole shall be provided with base plate of suitable thickness (minimum 10 mm), welded at the bottom, complete with foundation bolt holes, and M.S. foundation bolts (minimum 4 Nos., 16 mm dia, 500 mm length) with nuts and washers. The pole shall be provided with a hot dip galvanized double arm bracket, fabricated from suitable diameter MS pipe, properly welded and fixed at the top of the pole, suitable for mounting of luminaire. The pole shall include a weatherproof junction box / hand hole with cover, provided at suitable height, with terminal block arrangement for cable connection. The pole foundation shall be of reinforced cement concrete (RCC) of minimum M20 grade, with foundation size of 600 mm × 600 mm × 1000 mm depth, including excavation, PCC bed (if required), placement of foundation bolts with template, concreting, curing and backfilling complete. The erection shall include installation of pole on foundation with proper alignment, grouting with cement mortar, and tightening of foundation bolts. Proper earthing arrangement shall be provided as per IS 3043.

Schedule item no. : A-13 & B-13**SETC of LED street Light Roadway fittings in aluminium PDC housing, toughened glass cover with IP 66 protection, Wattage-45 watts, input voltage-240 volts ac, 50Hz. Complete.**

Supplying, erection, testing and commissioning of LED street light fitting of 45 Watt rating shall be carried out, suitable for 230V, single phase, 50 Hz AC supply. The luminaire shall be of aerodynamic design with pressure die-cast aluminium housing, powder coated finish. The fitting shall conform to IS 10322 (Part 5/Section 3) or latest applicable standards for street lighting luminaires. The luminaire shall have minimum IP-66 protection, suitable for outdoor applications, and shall be provided with integral mounting arrangement for pole/bracket. The fitting shall be complete with inbuilt constant current electronic LED driver, having high efficiency, power factor ≥ 0.9, low THD, and protection against short circuit, over-voltage and surge. The luminaire shall be provided with inbuilt surge protection device (minimum 5 kV).

The connection wiring shall be carried out using 1.5 sq.mm, 2 core PVC insulated FRLS copper conductor cable, conforming to IS 694, drawn through suitable PVC conduit/pipe, complete with all accessories. Proper termination shall be ensured using suitable connectors/lugs. The fitting shall be fixed on pole/bracket with suitable clamps/fasteners ensuring firm and vibration-free installation.

Schedule item no. : A-14 & B-14**SETC of astronomical automatic street light control panel out-door type CRCA sheet steal powder coated capacity 6 KW single phase consisting digital 24 Hr timer, 32 Amp TP contactor 40 A SPN (DP) MCB, Auto/ Manual switch with complete wiring suitable for mounted on channel/ angle fixed at electrical pole, protection - IP 32 with 100 AMP MCCB for main supply complete.**

Supplying, erection, testing and commissioning of astronomical automatic street light control panel of 6 kW capacity shall be carried out, suitable for operation on 230V, single phase, 50 Hz AC supply. The panel shall be of outdoor type, fabricated from CRCA sheet steel of minimum 16 SWG thickness, with powder coated finish, dust and vermin proof construction, complete with hinged door, locking arrangement, gasket and mounting arrangement suitable for fixing on MS channel/angle mounted on electrical pole. The panel shall have minimum IP-32 protection and shall be complete with the following components:

- Astronomical digital timer / 24-hour programmable timer for automatic switching operation
- 32 Amps TP contactor suitable for required load operation
- 40 Amps SPN (DP) MCB conforming to IS/IEC 60898-1
- 100 Amps MCCB as incomer for main supply, conforming to IS/IEC 60947-2, with minimum 16 kA breaking capacity
- Auto / Manual selector switch
- Indicating lamps for supply and load status
- Neutral link and earth bar
- Internal wiring, terminals and interconnections complete

The panel shall be complete with suitable size aluminium busbars mounted on insulated supports, properly sleeved and identified. All internal wiring shall be carried out using PVC insulated copper conductors conforming to IS 694, properly ferruled, dressed and terminated. Proper earthing arrangement shall be provided as per IS 3043 with suitable earthing terminals. The installation shall include fixing of panel on pole mounted structure, connection to incoming and outgoing cables, testing of timer operation, contactor functioning and complete commissioning. The work shall include supply of all materials, labour, tools and tackles, fabrication, installation, testing and commissioning complete in all respects, as per relevant IS standards and instructions of the Engineer-in-Charge.

Schedule item no. : A-15 & B-15

SETC of LED flood light fitting 90 Watt with wiring and fixing arrangements complete.

Supplying, erection, testing and commissioning of LED flood light fitting of 90 Watt rating shall be carried out, suitable for operation on 230V, single phase, 50 Hz AC supply. The luminaire shall be of pressure die-cast aluminium housing with powder coated finish and toughened glass cover, suitable for outdoor application. The fitting shall conform to IS 10322 (Part 5/Section 5) and relevant applicable standards for LED flood lighting luminaires.

The flood light shall be complete with high efficiency LED source and inbuilt constant current electronic LED driver, having power factor not less than 0.9, low THD, and protection against short circuit, over-voltage and surge. The luminaire shall have minimum IP-65 protection and shall be suitable for outdoor mounting under all weather conditions. The fitting shall be provided with adjustable mounting bracket for fixing on wall/pole/structure, complete with all necessary fixing accessories such as clamps, nuts, bolts, screws and fasteners. Connection wiring shall be carried out using 1.5 sq.mm, 2 core PVC insulated FRLS copper conductor cable, conforming to IS 694, drawn through suitable PVC conduit/GI flexible pipe as required, complete with proper termination and earthing arrangement as per IS 3043. The work shall include supply of all materials, labour, tools and tackles, fixing, connection, testing and commissioning complete in all respects, as per relevant IS standards and instructions of the Engineer-in-Charge.

Schedule item no. : A-16 & B-16

Provision of M.S. Work (i.e. Iron angle, Channel Nut bolt)

Supplying, fabrication, erection and fixing of M.S. work comprising iron angles, channels, flats, nuts, bolts and other associated hardware shall be carried out as required for supporting electrical equipment, cable trays, panels, lighting fixtures or other installations.

All structural members shall be fabricated from standard quality mild steel sections conforming to relevant IS standards, properly cut, drilled, welded, ground and finished to required dimensions and shape.

The work shall include supply and fixing of: MS angles, MS channels, MS flats/brackets/supports, Nuts, bolts, washers and clamps, Anchor fasteners and all associated hardware required for complete installation. All fabricated steel members shall be cleaned properly and provided with one coat of red oxide zinc chromate primer and two coats of synthetic enamel paint of approved shade, unless otherwise specified. The erection shall include alignment, welding, drilling, cutting, grouting and fixing complete with all labour, tools and tackles required for proper installation.

Schedule item no.: A-17, 18 & B-17, 18

SETC of LT XLPE insulated, Armoured, PVC sheathed Aluminium Conductor cable with aluminium lugs, glands suitable nut bolt etc.

Price shall cover for supply, erection/laying, connecting and commissioning of specified size of LT PVC armored aluminum conductor cables in the trench under the track/ under ordinary soil/ along the wall/truss/purl in of cover over shed with proper cleating arrangement. The cable shall be conforming to ISS 7098 (Part-1) or latest. The cable should be connected by providing heavy duty lugs of suitable size and heat shrinkage transparent sleeve to be provided by provision of suitable code numbering on both ends covering the portion of lugs sleeve and 2 "length of cable portion. After connection cable should be properly dressed up with the help of suitable clamping with rubber spacing or suitable plastic cable tie. While dressing the laying should be ensured straight and turning point it should be of 90 degree with suitable curve. Price also includes the Laying & saddling of cable on Wall/MS girder complete Lug glands etc. with MS clamps Hardware& painting as per site requirement. The sample and make of cable has to be got approved by Sr.DEE(G)NGP/ his authorized representative before installation at site.

a. 4 core 16 Sq. mm

b. 4 core 50 Sq. mm

Schedule item no. : A-19 & B-19

Provision of trench in all kind of normal Soil to depth 40x100cm & filling the trench (After laying cable) to bring the original condition.

Price shall cover for providing excavation and backfilling of the trench of size 400mm wide and 1000mm deep in all kinds of soil. The work shall also include providing bricks, sand layer of 200mm thick in the trench for embedding the cable and providing cable route marker made of M.S. angle of size 40x40x6mm in "J" shape 1300mm long in the trench before laying the cable. A nameplate of size 130x100x10mm indicating raised type letters for "C.R.-LT Cable or LT Cable" shall be provided on the top of angle size 40x40x6 mm duly riveted at two locations. The cable route marker shall be provided at a distance of 15 Mtrs apart.

Schedule item no. : A-20 & B-20

Provision of trench in hard rock/soil/road track crossing to depth 40x100cm & filling the trench (After laying to bring the original condition.

Price shall cover for providing excavation and backfilling of the trench of size 400mm wide and 1000mm deep under the railway track/ cement concrete / spun pipe/HDPE pipe in the trench, supply & laying of 150mm dia. circular HDPE pipes and providing cable route marker made of M.S. angle of size 40x40x6mm in "J" shape 1300mm long in the trench before laying the cable. A nameplate of size 130x100x10mm indicating raised type letters for "C.R.-LT Cable or LT Cable" shall be provided on the top of angle size 40x40x6mm duly riveted at two locations. The cable route marker shall be provided at a distance of 15 meters a part.

Schedule item no. : A-21 & B-21

Supply and laying of DWC pipe in the cable trenches /under track /along the poles/DP structures to be provided including all connected Accessories under other sch. items DWC pipe size-63 mm.

Supply and laying of 63 mm diameter DWC pipe (Double Wall Corrugated) shall be carried out in cable trenches/under track/ along the poles/DP structures, conforming to IS 14930 (Part 2) or relevant latest standards, suitable for underground cable protection. The pipe shall be laid on a properly prepared trench bed with necessary alignment and gradient, including cutting, jointing with suitable couplers, and sealing of ends to prevent ingress of moisture and dust. The work shall include supply of all accessories such as couplers, bends, end caps and sealing materials. The DWC pipe shall be properly placed and covered as per instructions of Engineer-in-Charge.

Schedule item no. : A-22 & B-22

Provision of maintenance free earthing as per RDSO specification no.RDSO/PE/SPEC/PS/0109- 008(REV'0') complete

Price shall cover for provision of maintenance free earthing of EHCC extra high current carrying capacity effective tubular earthing utilizing hollow pipe with GI electrode type EEE 5030 having length 3 mtrs and outer dia. 50mm connecting terminal dia 10mm with current carrying capacity 15 KA for 10 seconds duly galvanized & protected , X ray quality weld and filled with 2 bags (25 kg each bag) highly conductive anti corrosive conducting type packing materials as per relevant specification/Drawing (As per details given in this tender booklet.)

Schedule item no. : A-23 & B-23

Supply and laying of GI earthing strip, 25 x 4 mm with PVC sleeve -The price shall cover for supply and laying of G.I. earthing strip of 25 x4 mm size covered with black coloured PVC sleeve of superior quality from earth pit to control/distribution panel board. The earthing strip when laid on wall shall be fixed by means of suitable size of GI clamps and screws.

The price shall cover for supply and laying of G.I. earthing strip of 25 x 4 mm size covered with black coloured PVC sleeve of superior quality from earth pit to control/distribution panel board. The earthing strip when laid on wall shall be fixed by means of suitable size of GI clamps and screws.

Schedule item no. : A-24 & B-24

SETC of feeder pillar comprising with bus bar 200A, MCCB 200A-1 No, MCCB 100 Amps-2 Nos made with 18 SWG MS sheet of size 0.5x0.5 complete with earthing and foundation etc.

Supplying, erection, testing and commissioning of feeder pillar shall be carried out, suitable for operation on 415V, 3 phase, 4 wire, 50 Hz AC supply.

The feeder pillar shall be fabricated from 18 SWG M.S. sheet steel of size 0.5 m × 0.5 m, with powder coated finish, dust and vermin proof construction, complete with hinged door, locking arrangement, gland plate and suitable ventilation arrangement. The enclosure shall have minimum IP-54 protection suitable for outdoor application.

The feeder pillar shall comprise:

200 Amps, 4 Pole MCCB – 1 No. (Incomer)

100 Amps, 4 Pole MCCB – 2 Nos. (Outgoing)

All MCCBs shall conform to IS/IEC 60947-2, with minimum 25 kA breaking capacity and adjustable thermal magnetic release.

The panel shall be complete with suitable size high conductivity aluminium busbars of 200 Amps rating, mounted on SMC/DMC insulated supports with colour coded sleeves for phase identification. Separate neutral link and earth busbar shall be provided. All internal wiring shall be carried out using PVC insulated copper conductors conforming to IS 694, properly ferruled, dressed and terminated. The feeder pillar shall be erected on suitable cement concrete foundation, complete with foundation bolts, grouting and necessary civil works for proper installation. Proper earthing arrangement shall be provided with suitable earth terminals as per IS 3043. The installation shall include fixing of feeder pillar, termination of incoming and outgoing cables, testing for insulation resistance, continuity and functional operation complete in all respects. The work shall include supply of all materials, labour, tools and tackles, fabrication, installation, earthing, foundation work, testing and commissioning complete as per relevant IS standards and instructions of the Engineer-in-Charge.

Schedule item no. : A-25

SETC of Distribtuion box consisting with Industrial Plug and socket 20Amp, 2P+E+DP confirming to IEC 61439-3 suitable for flush mounting and surface mounting and to be supplied along with RCBO of rating 25A/20A/16Amps with 30 mA sensitivity confirming to IS12640-2. Make of Industrial Plug, socket and RCBO shall be Legrand, L&T, HAVELLS, INDO ASIAN, ABB, Schneider.

Supplying, erection, testing and commissioning of distribution box, suitable for 230V, single phase, 50 Hz AC supply, consisting of industrial type plug and socket rated 20 Amps, 2P+E, conforming to relevant IEC standards. The distribution box shall conform to IS/IEC 61439-3, and shall be of flush mounted, metal clad /high grade insulated enclosure, dust and vermin proof, complete with hinged cover and proper locking arrangement.

The DB shall be provided with 20 Amps, RCBO of rating 25A/20A/16Amps (as per site requirement) with 30 mA sensitivity, conforming to IS/IEC 61009, providing protection against overload, short circuit and earth leakage. The industrial plug and socket shall be of robust construction, suitable for heavy-duty application, with proper earthing provision and secure contact arrangement. The unit shall be complete with all internal wiring, termination and interconnections using suitable size PVC insulated copper conductors conforming to IS 694, properly ferruled and dressed. The installation shall include fixing of DB, connection to supply, and proper earthing as per IS 3043. The work shall include supply of all materials, labour, tools and tackles, complete installation, testing and commissioning in all respects.

The make of industrial plug, socket and RCBO shall be Legrand/L&T/Havells/Indo Asian/ABB/Schneider Electric.

Schedule item no. : A-26

SETC of self-contained drinking water cooler unit energy efficient compressor IS mark suitable for operation on 230 V +10 % 50 cycle single phase Ac supply storage capacity 150 Ltr cooling capacity 150 Ltr/Hr complete.

Supplying, erection, testing and commissioning of storage type self-contained water cooler of 150 litres storage capacity and 150 litres per hour cooling capacity shall be carried out, suitable for operation on 230V, single phase, 50 Hz AC supply.

The water cooler shall be complete with stainless steel body and inner tank made of SS 304 grade stainless steel, with adequate PUF insulation for efficient cooling and heat retention. The unit shall be fitted with a hermetically sealed compressor, air-cooled condenser, thermostat control and eco-friendly refrigerant suitable for continuous operation. The cooler shall be provided with minimum

2 Nos. stainless steel drinking taps, inlet and drain arrangement, and sturdy base/frame for proper installation. All water contact parts shall be of food-grade, corrosion resistant material. The unit shall conform to IS 1475 (Part 1) for storage type water coolers. The complete assembly shall be suitable for indoor use and designed for reliable and low-noise operation. Connection wiring shall be carried out using suitable size PVC insulated copper conductor cable conforming to IS 694, complete with proper earthing arrangement as per IS 3043. The work shall include supply of all materials, labour, tools and tackles, installation, connection to electrical and water supply system, testing and commissioning complete in all respects, as per relevant IS standards and instructions of the Engineer-in-Charge.

Schedule item no. : A-27

SETC of water purifier similar to Alfa make APARLE+ water filter cum purifier flow rate 2 Ltrs/min. complete.

Supplying, erection, testing and commissioning of water filter cum purifier having minimum flow rate of 2 litres per minute shall be carried out, suitable for operation on 230V, single phase, 50 Hz AC supply. The water purifier shall be wall mounted type and shall be provided with suitable multi-stage purification system comprising sediment filtration, activated carbon filtration and UV/UF/RO purification technology as applicable for potable water treatment. The unit shall be suitable for purification of drinking water and capable of removing suspended impurities, odour, bacteria and harmful contaminants. The body shall be made of high quality food-grade, corrosion resistant material suitable for continuous operation. The purifier shall be complete with internal pump (where required), storage arrangement, inlet/outlet connections, filter cartridges, mounting accessories and all associated components. The unit shall have minimum 2 litres per minute flow rate and shall be complete with indication/monitoring arrangement for operation and filter condition. Connection wiring shall be carried out using suitable size PVC insulated copper conductor cable conforming to IS 694, complete with proper earthing arrangement as per IS 3043. The work shall include supply of all materials, labour, tools and tackles, fixing, plumbing connection, electrical connection, testing and commissioning complete in all respects, as per relevant IS standards and instructions of the Engineer-in-Charge.

The make of water purifier shall be Alfa APARLE+ or equivalent.

CHAPTER-V

DETAILS OF TECHNICAL SPECIFICATION

SPECIFICATION FOR LAYING OF LT / HT CABLE

(A)The cable laying shall confirm to IS 1255/1983 or latest. The cable shall be laid by digging a trench in the ground and laying cables on a bedding of minimum 75mm riddled soil or fine sand at the bottom of the trench and covering it with additional riddled soil or sand of minimum 75 mm. The width of the trench should be at-least 300 mm(12") and make the surface as original/earlier.

(B)Cable should be covered with best quality of Bricks continuously on entire length of cable. Layer of bricks shall be ensured to protect the cable from damages. After that it shall be refilled properly upto the ground surface keeping a crown of 150mm (6") above the ground level. (FOR LT CABLE)

(C) The cable shall be covered with RCC Warning Cover of size 450mm X 175mm X 37mm (18"X7"X1.5") completely. After that it shall be refilled properly upto the ground surface keeping a crown of 150mm (6") above the ground level. (FOR HT CABLE)

(D) Cable marker should be provided at a spacing of 50 Mtrs. If not mentioned anywhere in this specification. On straight runs one marker at 50 Mtr shall be provided and ends of track or road crossing or as per instructions of railways engineer at every turning of cable as per standard (FOR HT CABLE)

(E) While terminating the cable on the wall, it shall be fixed with the help of “J” hooks and secured properly on walls. Size of hook shall depend on size and weight of the cable.

(F) Where cable has to be taken on pole the suitable size of clamp, nut Bolt shall be used. The cable shall go through GI pipe.

(G)The laying of RCC pipe /GI pipe /PVC pipe is also the part of cable laying cost under track /Road/ on pole. However, supply of RCC Hume pipe /GI pipe/PVC pipe shall be covered separately in schedule or supplied by Rly. at SSE’s depot.

(H) Wherever cables are to be taken through pipe on existing steel structures / walls, the pipe shall be supported on steel structures with suitable and proper clamps made from 50 X 6 mm thick GI flat, fixed to the structures with, 16 mm dia GI bolt, nut and plain, spring washer.

(I) On ends of the pipe suitable type bitumen painted teak wood grommets in two halves are also to be provided to avoid cutting of cable insulation. The work is to be done as per the directives of Railway representative.

(J) **MINIMUM PERMISSIBLE BENDING RADII** –The cable should not be bent to sharp radius. Wherever possible larger radii should be used. Minimum recommended Bending Radii are given as follows-

10.5	PVC & XLPE CABLE	
KV	Single core	Multi core
Upto 1.1	15 D	12 D
Above 1.1 to 11	15 D	15 D
Above 11	20 D	15 D

Note D’ is outer diameter of cable. Special precaution should be taken so as not to damage the cable. At joints and terminations bending radius for the individual cores should be above 12 times the diameter over the insulation.

(K) **DEPTH:-** The desired minimum depth of laying from ground surface to the top of cables is as follows-

- i) Cable up to 11 KV rating =0.9 mtr
- ii) 22 KV to 33 KV rating =1.05 mtr
- iii) Cables at road crossing =1.00 mtr
- iv) Cables at railway level crossing (measured From bottom of sleepers to the top of pipe)=1.00 mtr

Supply and laying of RCC Hume Pipe of size 6"(150mm) dia of 2 mtr. Length for each pipe of standard thickness as per IS 451 Type – NP-2 in provided depth below ground /Road/Track to enclose the cable and necessary back filling.The above dimension will be used if not mentioned anywhere in this booklet.

TESTING OF CABLE-

i. After laying the XLPE cable/PVC cable and making the cable end termination, it shall be tested by the contractor with high pressure testing equipment as per relevant IS specification in the presence of Railway representative. High pressure testing set shall be arranged by the contractor at site.

ii. Insulation resistance reading of the cable shall be taken before the contractor is allowed to lay the cable or allowed to carry out cable end termination work.

iii. Insulation resistance (IR) values of cable shall be taken in the presence of Railway representative before and after the high-pressure testing. Tenderer shall ensure the IR value does not reduce appreciably after carrying out the cable laying, making cable end termination and high-pressure testing

i The test results jointly be signed by the contractor and Sr.DEE(G)'s authorized representative.

Laying erection, testing and commissioning of LT 1100V grade PVC armored aluminum conductor cable of various size as per specification. Laying/Erection, testing and commissioning of XLPE armored cable with continuous GI Earth wire, Glands/lugs etc. On wall /trusses/pole/pipe etc as per the instruction of field engineer.

Route of the cable.

Before laying is under taken the route shall be marked in consultation with Railway's representative at site. While selecting cable route, corrosive soil, ground surrounding sewage effluent etc. shall be avoided.

Trenching:-

The width and depth of excavation shall be done as per standard practice for underground cables. Adequate protection shall be taken not to damage any existing cable(s), pipes or other such installations coming in the proposed route during excavation. Where brick, tiles or protective covers or bare cables are encountered, further excavation shall not be carried out without consultation and approval of the Railway's representative at site.

Existing Railway property exposed during trenching shall be temporarily supported or propped adequately as directed by Railway representative i.e. site engineer. The trenching in such cases shall be done in short length necessary pipes laid for passing cables there in and the trench refilled.

If there is any danger of trench collapsing or endangering adjacent structure, the sides should be well shored with timbering and or sheeting/as the excavation proceeds.

The bottom of the trench shall be leveled and free from stone, bricks bats etc. The trench shall then be provided with a layer of clean dry sand cushion of 10cm. Provision of bricks is to be made for cable laying in an approved manner. Approx 16 No bricks are required for the single cable trench and 28 bricks are required for the Double cable trench for the length of one-meter distance. The site of trench will be given as per requirement by site engineer of work.

Laying of cables in trench:

All cables before laying shall be tested with megger. The cable cores shall be tested for continuity, absence of cross phasing, insulation resistance between conductors to earth/sheath/armored and insulation resistance between conductors. At the time of installation approximately 3 meters. Of surplus cable shall be left on each end of the cable and at places as may be decided by the Railway. The surplus cable shall be left in the form of a loop. Contractor has to do laying of HDPE pipe and one, two or more cables in the pipe length. HDPE pipe will be laid as per site requirement and as instructed by SSE in charge.

Back fillings:

The trenches shall be back filled with excavated earth free from stones or other sharp edged debris and shall be rammed and watered. Unless otherwise specified a crown of earth should not be less than 50 mm in the center and tapering towards the sides of the trench filling as may be required.

Cable route markers:

Cable route markers shall be provided along straight runs of the cables at the locations approved by Railway. Route markers shall be made out as per sketch with information as size, cores and grade of cable shall be displayed. Cable route indicators with IR engraved on it to be provided at every 50meters.

Jointing:

Before jointing is commenced all safety precautions like isolation, discharging, earthing etc. shall be taken to ensure that the cable would not be inadvertently charged from live supply. Metallic armour and external metallic bondings shall be connected to earth. Where cable is to be jointed with the existing cable the sequence should be so arranged, as to avoid crossing of cores while jointing.

Provision of Trenching in all kind of soil

Price shall cover for providing excavation and backfilling of the trench of size 400mm wide and 1000mm deep in all kinds of soil. The work shall also include providing bricks, sand layer of 200mm thick in the trench for embedding the cable and providing cable route marker made of M.S. angle of size 40x40x6mm in "J" shape 1300mm long in the trench before laying the cable. A nameplate of size 130x100x10mm indicating raised type letters for "C.R.-LT Cable" shall be provided on the top of angle size 40*x*40x6 mm duly riveted at two locations. The cable route marker shall be provided at a distance of 15 mtrs apart.

The above details of dimension will be used as above, if not mentioned anywhere in this booklet.

SPECIFICATION FOR LT PANEL BOARD**1. SCOPE.**

The specification calls for supply of floor mounting type low tension powder coated panel board of suitable size for 415 volts, 3 phase, 50Hz, AC supply according to the description as mentioned here under.

2. SITE CONDITION.

- Ambient temperature - 46 degree centigrade.
- The panel board is required for operation in tropical and humid climate of RH 80%.

3. DESIGN AND MANUFACTURE.

- The panel board, indoor/Outdoor, floor-mounting type shall be robust in design and construction with easily accessible internal connection to facilitate inspection.
- The panel board shall be fabricated with MS sheet of 16/18 SWG as specified and as per schedule. The frame work shall be finished with standard stove tone battle ship gray painting after chemical degreasing and phosphate coating primer to remove completely basic rust as per standard practice.
- The insulated bus bar, coated with insulating varnish/heat shrinkable sleeve, of suitable capacity made out of electrolytic aluminum strips of 99.75% purity or equivalent copper strips or copper cable shall only be used for all inter connection in the panel board. No aluminum cables permitted for inter connection. Lugs shall be provided wherever necessary.

4. DETAILS OF ACCESSORIES IN PANEL BOARD.

LT panel board shall be consisting with the various switch gears, measuring & protective equipment's with internal wiring and as mentioned in the description of work for the subject schedule item. All electrical accessories, panel layout and SLD of power & control circuit should be approved by Sr. DEE(G) before manufacturing of electrical panel.

5. GUARANTEE.

The tenderer shall offer a guarantee of 12 months against design and manufacturing defects and the defective components shall be replaced by the tenderer free of cost during the guarantee period of 12 months.

6. INSPECTION & TESTING.

The panel will be inspected and tested by the purchaser or his representative at works before dispatch (stage inspection before painting also) and final performance test of the panel at site after installation.

7. SPECIAL CLAUSES.

- i). The equipment shall be provided on panel as per the specified make only.
 - ii). The successful tenderer shall supply on receipt of order 03 copies of each of the dimension drawing and wiring diagram of the panel, foundation drawing etc. for approval. Three copies of the instruction care and maintenance manual of the panel shall also be supplied after commissioning.
- The successful tenderer shall supply on receipt of order 03 copies of each of the dimension drawing and wiring diagram of the panel, foundation drawing etc. for approval. Three copies of the instruction care and maintenance manual of the panel shall also be supplied after commissioning. The Ammeter, VM and KWH meter to be provided as per instruction of site engineer on LT panel board.

Technical specification for Maintenance free Earthing

1. Scope of work:

Scope of work shall cover provision of EHCC certified grounding, extra high current carrying capacity dual conductor, Solid bar tubular earthing installation for improvement in the earth resistance values, wear resistant, permanent, low maintenance earthing for the critical assets & equipment which are microprocessor controlled & lightning protection devices which require high current carrying capacity (more than from 10kA) solid grounding for proper protection. The overall earthing system design must have been CPRI tested for (15kA for 01 second, test certificate to be enclosed with the tender documents), maintenance free & wear resistant permanent installations with good and reliable performance, improved pit efficiency & low earth resistance values. DDCP method of installation, in confirmation to the IS 3043 code of practice for vertical cylindrical shaped dual conductor electrode. Model EEE5030. Composite earth electrode, ready to use, Size 50mm outside diameter wear resistant cylindrical electrode length 2950, inside solid bar primary conductor, solid 16mm diameter wear resistant conductor, with proper arrangement for instrument connection as per requirement at the point of location, with copper nut bolts, 200mmx25mmx5mm copper bus bar with suitable number of holes.

2. Details of EHCC (extra high current carrying capacity)procedure:

The EHCC certified grounding is a proven earthing practice confirming to IS3043 code of earthing for wear resistant, improved life, maintenance free earth pits with considerably lower earth resistance values (even in difficult geographic areas) , either by single pit , or by multiple pit earth grid as the situation may be . It involves use of branded high quality, extra high current carrying capacity earth systems which are tested by CPRI & BSNL / VNIT respectively for short circuit current test, earth value, packing material test etc. The electrodes design must have been tested for short circuit current test (more than 01 second) for 15kA(rms) for 01 & from CPRI, low earth value certificate from BSNL, water adsorption test, pH value, water retaining at elevated temp., certificate from VNIT or Govt. approved laboratory. The earthing systems are installed with DDCP installation method. As earth is the final abode for the current to sink in, care is to be taken as for as soil preparation & giving conductive surrounding to the earth electrode by adding packing material (03 bags of 20 kgs each per electrode).

3. Details of cylindrical earth system:

The EHCC certified grounding, dual conductor, Solid bar tubular earth system consists of a primary solid conductor supported by a secondary cylindrical conductor & Packing Material.

The technical aspect is to increase the area of current dissipation (as per Wenner's). The secondary conductor is highly wear resistant & houses the primary conductor. Dimensions of the cylindrical tubular system are as follows: EHCC certified grounding electrodes should have trade mark EHCC logo & hologram at the terminal end on secondary conductor & EHCC& electrode model should be engraved on the terminal end of the primary conductor for quality assurance.

Secondary conductor- 50mm dia. x 2950 mm length (ISI grade 1239 class B) Adequately wear resistant.

Primary conductor- 16mm dia x 3000mm length.

Protective galvanizing on outer secondary conductor + Protective coating on inside solid conductor for improved wear resistant properties.

4. Details of PMC:

The Packing material must be anti-weathering, non-corrosive, and less soluble in water having hygroscopic properties with low resistivity so as to provide a uniform low resistance path around the earth electrode. Standard packing, weight of each unit, method of use & safety & quantity which will be used per installation must be provided with the tender documents. Water absorption, water retaining test, pH value test certificate from reputed laboratory to be necessarily enclosed with the tender documents (without which the tender will be treated as cancelled) having following properties: The Packing material bag should have DDCP logo

(1) Solubility in water less than 5%

(2) Water adsorption > 10% at 105 degree

(3) pH value between 7- 9

(4) Resistivity about 10-ohmmeter.

(5) Eco friendly & should contain natural clays & ionizing elements.

5. Installation as per DDCP (deep dug conductive pit) method confirming to IS3043 code of practice specifications:

As the current has to finally sink in to the earth, the earth pit preparation be given considerable importance. The pit to be made will be of standard size of and the back fill material (dug out soil from earth pit) be mixed with some quantity of Packing Material, the big stones or gravel to be removed from it & electrode be installed with care to see that the highly conductive Packing material, stays around the electrode during installation. Poking for removing the air pockets & proper ramming for pit settlement should be done through company trained technician / worker. The installation should be done as per **DDCP method & Sticker with DDCP trade mark be pasted on the electrode & the earth pit cover.**

6. Pit Safety ;

The earth pit should be ideally made at the low lying areas preferably near water table, drainage etc. with good earth mass & at least 1500mm away from any. The earth pit should be covered by suitable cement structure. EHCC certified grounding certificate to be pasted on the pit cover with earth values.

7. Connections ;

A copper bus bar of size 200mm x 25mmx5mm to be installed in the equipment room. The connecting terminal of the earth electrode to the bus bar must be connected by suitable length conductor. Inside connections from copper bus bar to the instruments are to be done by Railways as per their standard practice at their cost.

8. Testing of the pit

Earth resistance must be tested by a calibrated earth tester with proper method in presence of the railway authority as per IS3043 prescription, with all the connections to be removed before testing the earth resistance values. In case of earth grid of more than one earth connected together. The earth resistance of the connected earth grid be taken after connecting all the pits thus made, before connecting to the equipment.

9. Certification & guarantee:

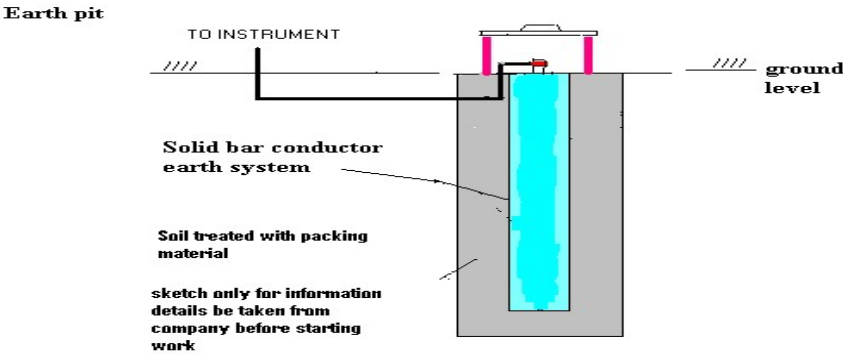
After testing the earth values of the pits & proper recording in presence of the railway authority, the company must provide EHCC certified grounding self-adhesive certificate for all such installations & the same will be displayed / pasted at the place of installation.

10. Completion report:

The last document for the completion of the procedure will be submission of the work completion report to the concerned railway authority.

Single electrode installation

Connection of electrode terminal with the equipment by strip buried inside a trench of 300mm depth & 200 mm width (strip size 25mmx03m for suitable length GI strip).



Sr. DEE (G) NGP

GENERAL CONDITIONS FOR TENDER-

1. Prices shall be inclusive of GST. Railway shall not accept any claim for taxes/duties/levies & no price variation. The Contractor shall comply with all the provision pertaining to newly introduced GST tax effective from 1.7.2017 in place of service tax and VAT including extant guidelines issued by Central Govt/Rly Bd's from time to time.
1. Before quoting the rates, the tenderer should read explanatory note. In case of any discrepancy between description of price schedule item and explanatory note the details specified in explanatory note shall be applicable. Final decision of Railway authority will be final as per railway requirement.
2. Tenderer is advised to visit location before quoting their rate. The work is to be done as per tender technical specification. In case of any doubt etc. the details as given in tender technical specifications will prevail. All the supply and erection work shall be done in accordance with relevant IS/ISS.
3. Contractor shall supply the material duly inspected by Railway representative or agency as nominated by Sr.DEE(G)NGP. Contractor shall deliver the material with all material testing/Inspection certificates and getting dispatch clearance accordingly.
6. Any kind of testing required to confirm suitability of material either at manufacturer's premises or at Rly. Stores before material is accepted by consignee shall be the responsibility of contractor. All testing charges for RITES & consignee inspection at manufacture premises shall be borne by the contractor.
7. Site survey shall be carried out by the contractor and Rly. Representative on award of LOA and before starting the work. Targeted Action Plan with material delivery schedule based on above survey shall be prepared by the contractor and one copy of same shall be submitted to Engineer for monitoring the progress.
8. All material to be used for work shall be duly supported with test/inspection reports shall be deposited with SSE(EL) in charge of execution for ensuing quality before fitment. Only after clearance and satisfaction of quality the material shall be taken to site for erection and commissioning. Contractor shall therefore supply material in bulk lots to avoid repetitions of inspections/ testing.
9. The contractor shall submit details of the material being offered before actual delivery so that the inspection can be arranged accordingly.
10. Any typographical error shall not be construed to be befit of the Contractor. In such cases the interpretation and decision of Sr. DEE(G)NGP shall be final and binding up on the tenderer.
11. Due care has been taken while framing technical specification, however if any deviation from prevailing standard norms is noticed at the time of execution the same shall be rectified and made good by the contractor. Contractor shall also bring such things if ever noticed by them to the knowledge of this office and to field Engineer.
12. The various technical specification given for guidelines; however, the work will be carried out in an approved manner and as per IS standard and IS specifications.
Abbreviation used, S- indicate for supply of item & E- indicate for erection, T=testing C= Commissioning, D-Dismantling of item.
- 13 Inspection and Testing: -The stores shall be inspected by Railway Representative nominated by Sr.DEE (G) NGP. All the inspection and testing charges shall be borne by the contractor. The contractor shall submit details of the material being offered before actual delivery so that the inspection can be arranged at manufactures premises/ consignee premises.
It is to be noted that the Railway representative/officer may inspect work site at any time with or without information to contractor and any activity /material/men power etc. is found not as per norms /specified in tender document/GCC it will invite strict action and necessary penalty may be imposed.
14. All released materials of any type shall be returned to concern Railway Engineer at their depot.
The released material will be assessed as per joint inspection at First stage and same to be returned in an approved manner to depot by loading and unloading as per instruction of concern SSE(EL)/nearest electrical depot.
- 15.** Approval Of Makes: -Successful tenderer will take approval of Make/Brand from nominated representative of Sr. DEE(G)/NGP prior to supply of material at site.
- 16.** The tenderer shall submit the proposed list of makes and materials for approval within 15 days from the date of issue of Letter of Acceptance (LOA). Failure to comply within the stipulated time may attract necessary action as deemed fit by the competent authority.
- 17.** The tenderer shall carry out a joint site survey in coordination with the concerned site in-charge/SSE/JE and shall submit the Joint Survey Report duly verified and signed by the concerned SSE to this office within 15 days from the date of issue of LOA.
- 18.** Material must be supplied as per the readiness of the site.
- 19.** Work tenderer to ensure that work is started within 7 days after the confirmation about readiness of the site by concern railway officials. Failure to comply within the stipulated time may attract necessary action as deemed fit by the competent authority.
Note-The tentative list of make acceptable against proposed work is given at the end of this document.
The makes is acceptable subject to fulfilment of technical specification/good performance in past.

Schedule of Item

Name of work- Electrical work in connection with Augmentation of SSE(T) SEGM & BTBR store depo due to commissioning 3rd line.						
SN	Item description	S&E	Unit	Unit Rate	Total Qty	Total Amount
A	Augmentation of SSE(T) SEGM store depo due to commissioning 3rd line.					
1	Concealed wiring for light, fan & 6 Amps plug points with PVC Pipe and PVC insulated copper conductor 1.5 sq.mm. size with modular board with supply of all materials.	S&E	Point	716.46	600	429876.00
2	Concealed Wiring for 6/16 Amps plug points with PVC Pipe and PVC insulated copper conductor 2.5 sq. mm. size with modular board supply of all materials.	S&E	Point	743.43	60	44605.80
3	Wiring for submain along with earth wire with the size 2X2.5 sq.mm+1X2.5 sq.mm earth wire of PVC insulated copper conductor, single core cable in concealed/surface/recessed PVC heavy gauge conduit as required. The work shall be done as per CPWD Pt. I, manual(1972) for general specification of electrical work. All materials should be IS marked.	S&E	Mtrs.	111.00	1000	111000.00
4	Wiring for submain along with earth wire with the size 2X4 sq.mm+1X4 sq.mm earth wire of PVC insulated copper conductor, single core cable in concealed/surface/recessed PVC heavy gauge conduit as required. The work shall be done as per CPWD Pt. I, manual(1972) for general specification of electrical work. All materials should be IS marked.	S&E	Mtrs.	131.00	800	104800.00
5	Wiring for submain along with earth wire with the size 2X6 sq.mm+1X6 sq.mm earth wire of PVC insulated copper conductor, single core cable in concealed/surface/recessed PVC heavy gauge conduit as required. The work shall be done as per CPWD Pt. I, manual(1972) for general specification of electrical work. All materials should be IS marked.	S&E	Mtrs.	179.00	500	89500.00
6	SETC of outdoor 2x20 wats LED surface/ suspended water proof industrial luminaries with polycarbonate housing and diffuser with 20 watts LED tube 2-no. for each fitting .The scope shall be inclusive of design to achieve the required level of illumination by utilising above luminaries.	S&E	Nos.	1132.55	10	11325.50
7	SETC of Energy Efficient, BLDC AC Ceiling fan,1200mm Sweep, Voltage 170 250v, Single Phase, Frequency 48 52 Hz, Input Power Not More Than 32W, Air Delivery 230cmm, Speed 380 RPM,Speed Control, Remote Handset, BEE 5 Star Rating With 3 Yrs. Warranty,	S&E	Nos.	2917.18	50	145859.00
8	SETC of 12" metal body type exhaust fan complete with motor guard, cover etc.	S&E	Nos.	3283.54	4	13134.16
9	SETC of energy efficient 80 W LED medium bay fitting with housing made of pressure die cast aluminum with protective toughened glass with dedicated LED with wide beam distribution suitable for surface / suspended mount.	S&E	Nos.	10275.80	6	61654.80

10	S.E.T.C. of Single phase DB capacity 300mA, 40 Amp. DP RCBO-1 No. for incomer and various type SPMCB 6 32 Amp. For outgoing 8 Nos.	S&E	Nos.	4812.54	3	14437.62
11	S.E.T.C. of Three phase Distribution Board having 63Amps 300 mA 4pole RCBO-1 no.and SP MCB 6 32Amps-8Nos on each phase as per requirement complete.	S&E	Nos.	13142.35	1	13142.35
12	SETC of Octagonal galvanized steel pole of 7 mtr height on cement concrete foundation complete with foundation bolts, single arm etc.	S&E	Nos.	22127.51	10	221275.10
13	SETC of LED street Light Roadway fittings in aluminium PDC housing, toughened glass cover with IP66 protection, Wattage-45 watts,input voltage-240 volts ac, 50Hz. Complete.	S&E	Nos.	3796.85	10	37968.50
14	SETC of astronomical automatic street light control panel out-door type CRCA sheet steal powder coated capacity 6 KW single phase consisting digital 24 Hr timer, 32 Amp TP contactor 40 A SPN (DP) MCB, Auto/ Manual switch with complete wiring suitable for mounted on channel/ angle fixed at electrical pole, protection - IP 32.with 100 AMP MCCB for main supply complete.	S&E	Nos.	11151.30	1	11151.30
15	SETC of LED flood light fitting 90 Watt with wiring and fixing arrangements complete.	S&E	Nos.	8367.91	10	83679.10
16	Provision of M.S. Work (i.e. Iron angle, Channel Nut bolt)	S&E	Kgs	81.67	100	8167.00
17	SETC of LT XLPE insulated, Armoured, PVC sheathed Alluminium Conductor cable with aluminium lugs, glands suitable nut bolt etc. Size: 4 Core 16 Sq. mm	S&E	Mtrs.	174.45	600	104670.00
18	SETC of LT XLPE insulated, Armoured, PVC sheathed Alluminium Conductor cable with aluminium lugs, glands suitable nut bolt etc. Size: 4 Core 50 Sq. mm	S&E	Mtrs.	422.03	200	84406.00
19	Provision of trench in all kind of normal Soil to depth 40x100cm & filling the trench (After laying cable) to bring the original condition.	S&E	Mtrs.	93.94	250	23485.00
20	Provision of trench in hard rock/soil/road track crossing to depth 40x100cm & filling the trench (After laying to bring the original condition.	S&E	Mtrs.	206.01	50	10300.50
21	Supply and laying of DWC pipe in the cable trenches/ under track/along the poles/DP structuers to be provided including all connected Accesories under other sch itemsDWC pipe of dia 63 mm.	S&E	Mtrs.	136.38	350	47733.00
22	Provision of maintenance free earthing as per RDSO specification no. RDSO/PE/ SPEC/ PS/0109- 008(REV'0') complete.	S&E	Nos.	15395.90	16	246334.40
23	Supply and laying of GI earthing strip, 25 x 4 mm with PVC sleeve -The price shall cover for supply and laying of G.I. earthing strip of 25 x4 mm size covered with black coloured PVC sleeve of superior quality from earth pit to control/distribution panel board. The earthing strip when laid on wall shall be fixed by means of suitable size of GI clamps and screws.	S&E	Mtrs.	73.96	100	7396.00
24	SETC of feeder pillar comprising with bus bar 200A, MCCB 200A-1 No, MCCB 100 Amps-2 Nos made with 18 SWG MS sheet of size 0.5x0.5 complete with earthing and foundation etc.	S&E	No	14528.75	1	14528.75

25	SETC of Distribtuion box consisting with Industrial Plug and socket 20Amp, 2P+E+DP confirming to IEC 61439-3 suitable for flush mounting and surface mounting and to be supplied along with RCBO of rating 25A/20A/16Amps with 30 mA sensitivity confirming to IS12640-2. for gyser. Make of Industrial Plug, socket and RCBO shall be Legrand, L&T, HAVELLS, INDO ASIAN, ABB, Schneider.	S&E	Nos.	2638.84	1	2638.84
26	SETC of self-contained drinking water cooler unit energy efficient compressor IS mark suitable for operation on 230 V +10 % 50 cycle single phase Ac supply storage capacity 150 Ltr cooling capacity 150 Ltr/Hr complete	S&E	Nos.	61093.23	1	61093.23
27	SETC of water purifier similar to Alfa make APARLE+ water filter cum purifier flow rate 2 Ltrs/min. complete.	S&E	Nos.	7566.13	1	7566.13
B	Augmentation of SSE(T) BTBR store depo due to commissioning 3rd line.					
1	Concealed wiring for light, fan & 6 Amps plug points with PVC Pipe and PVC insulated copper conductor 1.5 sq.mm. size with modular board with supply of all materials.	S&E	Point	716.46	200	143292.00
2	Concealed Wiring for 6/16 Amps plug points with PVC Pipe and PVC insulated copper conductor 2.5 sq. mm. size with modular board supply of all materials.	S&E	Point	743.43	10	7434.30
3	Wiring for submain along with earth wire with the size 2X2.5 sq.mm+1X2.5 sq.mm earth wire of PVC insulated copper conductor, single core cable in concealed/surface/recessed PVC heavy gauge conduit as required. The work shall be done as per CPWD Pt. I, manual(1972) for general specification of electrical work. All materials should be IS marked.	S&E	Mtrs.	111.00	600	66600.00
4	Wiring for submain along with earth wire with the size 2X4 sq.mm+1X4 sq.mm earth wire of PVC insulated copper conductor, single core cable in concealed/surface/recessed PVC heavy gauge conduit as required. The work shall be done as per CPWD Pt. I, manual(1972) for general specification of electrical work. All materials should be IS marked.	S&E	Mtrs.	131.00	500	65500.00
5	Wiring for submain along with earth wire with the size 2X6 sq.mm+1X6 sq.mm earth wire of PVC insulated copper conductor, single core cable in concealed/surface/recessed PVC heavy gauge conduit as required. The work shall be done as per CPWD Pt. I, manual(1972) for general specification of electrical work. All materials should be IS marked.	S&E	Mtrs.	179.00	300	53700.00
6	SETC of outdoor 2x20 wats LED surface/ suspended water proof industrial luminaries with polycarbonate housing and diffuser with 20 watts LED tube 2-no. for each fitting .The scope shall be inclusive of design to achieve the required level of illumination by utilising above luminaries.	S&E	Nos.	1132.55	20	22651.00
7	SETC of Energy Efficient, BLDC AC Ceiling fan,1200mm Sweep, Voltage 170 250v, Single Phase, Frequency 48 52 Hz, Input Power Not More	S&E	Nos.	2917.18	10	29171.80

	Than 32W, Air Delivery 230cmm, Speed 380 RPM,Speed Control, Remote Handset, BEE 5 Star Rating With 3 Yrs. Warranty,					
8	SETC of 12" metal body type exhaust fan complete with motor guard, cover etc.	S&E	Nos.	3283.54	4	13134.16
9	SETC of energy efficient 80 W LED medium bay fitting with housing made of pressure die cast aluminum with protective toughened glass with dedicated LED with wide beam distribution suitable for surface / suspended mount.	S&E	Nos.	10275.80	20	205516.00
10	S.E.T.C. of Single phase DB capacity 300mA, 40 Amp. DP RCBO-1 No. for incomer and various type SPMCB 6 32 Amp. For outgoing 8 Nos.	S&E	Nos.	4812.54	2	9625.08
11	S.E.T.C. of Three phase Distribution Board having 63Amps 300 mA 4pole RCBO-1 no.and SP MCB 6 32Amps-8Nos on each phase as per requirement complete.	S&E	Nos.	13142.35	1	13142.35
12	SETC of Octagonal galvanized steel pole of 7 mtr height on cement concrete foundation complete with foundation bolts, single arm etc.	S&E	Nos.	22127.51	5	110637.55
13	SETC of LED street Light Roadway fittings in aluminium PDC housing, toughened glass cover with IP66 protection, Wattage-45 watts,input voltage-240 volts ac, 50Hz. Complete.	S&E	Nos.	3796.85	5	18984.25
14	SETC of astronomical automatic street light control panel out-door type CRCA sheet steal powder coated capacity 6 KW single phase consisting digital 24 Hr timer, 32 Amp TP contactor 40 A SPN (DP) MCB, Auto/ Manual switch with complete wiring suitable for mounted on channel/ angle fixed at electrical pole, protection - IP 32.with 100 AMP MCCB for main supply complete.	S&E	Nos.	11151.30	1	11151.30
15	SETC of LED flood light fitting 90 Watt with wiring and fixing arrangements complete.	S&E	Nos.	8367.91	5	41839.55
16	Provision of M.S. Work (i.e. Iron angle, Channel Nut bolt)	S&E	Kgs	81.67	50	4083.50
17	SETC of LT XLPE insulated, Armoured, PVC sheathed Alluminium Conductor cable with aluminium lugs, glands suitable nut bolt etc. Size: 4 Core 16 Sq. mm	S&E	Mtrs.	174.45	300	52335.00
18	SETC of LT XLPE insulated, Armoured, PVC sheathed Alluminium Conductor cable with aluminium lugs, glands suitable nut bolt etc. Size: 4 Core 50 Sq. mm	S&E	Mtrs.	422.03	200	84406.00
19	Provision of trench in all kind of normal Soil to depth 40x100cm & filling the trench (After laying cable) to bring the original condition.	S&E	Mtrs.	93.94	150	14091.00
20	Provision of trench in hard rock/soil/road track crossing to depth 40x100cm & filling the trench (After laying to bring the original condition.	S&E	Mtrs.	206.01	50	10300.50
21	Supply and laying of DWC pipe in the cable trenches/ under track/along the poles/DP structuers to be provided including all connected Accesories under other sch itemsDWC pipe of dia 63 mm .	S&E	Mtrs.	136.38	250	34095.00
	Provision of maintenance free earthing as per RDSO specification no. RDSO/PE/ SPEC/ PS/0109- 008(REV'0') complete.	S&E	Nos.	15395.90	7	107771.30

22	Supply and laying of GI earthing strip, 25 x 4 mm with PVC sleeve -The price shall cover for supply and laying of G.I. earthing strip of 25 x4 mm size covered with black coloured PVC sleeve of superior quality from earth pit to control/distribution panel board. The earthing strip when laid on wall shall be fixed by means of suitable size of GI clamps and screws.	S&E	Mtrs.	73.96	50	3698.00
23	SETC of feeder pillar comprising with bus bar 200A, MCCB 200A-1 No, MCCB 100 Amps-2 Nos made with 18 SWG MS sheet of size 0.5x0.5 complete with earthing and foundation etc.	S&E	No	14528.75	1	14528.75
	Total					3149416.47

List of acceptable make Annex _I

SN	Item	Revised Approve Make list
1	Cables: LT/HT PVC/XLPE insulated	Polycab, Finolex, Havells, RR Kabel, KEI Industries, Plaza Cables, RPG Cables (KEC International), Vishal Cables, Kenter, Bharat cab Brand of Vardhaman Cables, Rotoplast.
2	Wires- LT PVC insulated single and multicore Copper/ Aluminium wires	Anchor by Panasonic, Polycab, Finolex, Havells, RR Kabel, KEI Industries, Plaza Cables, RPG Cables (KEC International), Vishal Cables, Kenter, Bharat cab Brand of Vardhaman Cables, Rotoplast.
3	LT/HT Cable joints & End Termination Kit (PVC/XLPE)	Rastriya Electrical & Engg. Corpo, 3M India, Cabseal, Raychem, Jainsons, Frontec or similar approved by Rly/MSEDCL.
4	Cables: Lugs & accessories	Kamlesh Industries, Kaycee, Amiable Impex, Jainsons, Dowells.
5	PVC Casing capping/PVC Pipe/ Column Pipe and its alied accessories	Precision, Prestoplast, MODI, Press Fit, Anchor by Panasonic, Greatwhite, Finolex, Supreme, Astral, Ashirvad, Super Plast.
6	Switch/ Socket/ Board Regulator/ Holder/ Ceiling Rose & wiring accessories.	Anchor by Panasonic, PM CONA, Havells, Legrand, Schneider Electric, Precision Electricals, Polycab, IndoAsian, Standard Electricals, Philips, C&S.
7	LED Lamps/ Luminaries (All Type)	Crompton, Philips, Bajaj, Wipro, Havells, Jaquar, Surya Roshni, Polycab, Orient Electric, Halonix.
8	Ceiling fan/ Wall bracket fan/ Exhaust fan/ Pedestral fan/ Air circulator (Conventional /BLDC) / Ventilation Fans	Crompton, Havells, Bajaj, Usha, Orient, Atomberg, Polycab, Kühl, Khaitan.
9	Geyser/ Water heater	Usha, Crompton, Haier, V-Guard, Kenstar, Havells, Bajaj, Jaquar.
10	water cooler	Blue Star, Voltas, Usha, Aquaguard, Sidwal, LG.
11	AC Unit (Windoe AC/ Split AC/ AC Plant/ Packaged Unit/ VRF Unit/ Ductable split unit inverter type	LG, Carrier, Hitachi, Blue star, Voltas, Ilyods, Samsung, Daikin, Panasonic, Godrej, Whirlpool.
12	LT Switchgears & Control gears/ Contactors	ABB, Schneider Electric, Siemens, Havells, GE, Lauritz Knudsen (L&T), HPL, C&S, IndoAsian, Legrand, Hager.
13	Circuit Breakers: MCB/ MCCB/ Metal Clad socket/ RCCB/ ELCB/ RCBO	ABB, Schneider Electric, Siemens, Havells, Legrand, GE, Lauritz Knudsen (L&T), Havells, HPL, C&S, IndoAsian, Hager.
14	Circuit Breakers: VCB	Havells, CG Power and Industrial Solutions Limited, Lauritz Knudsen (L&T), ABB, Siemens, Legrand, Megawin, BHEL, GE, HPL, Legrand.
15	Changeover switch	Havells, Schneider Electric, Siemens, ABB, GE, Lauritz Knudsen (L&T), C&S, HPL.
16	Astronomical timers	ABB, GIC, Lauritz Knudsen (L&T), Siemens, Legrand, Havells, Hager.
17	Single Phase Preventers/ Relays/ Controller Unit	Havells, Legrand, Schneider, ABB, GE, Lauritz Knudsen (L&T), Siemens, C&S.

18	Capacitors- PF correction/ APFC (Automatic Power Factor Correction Panel), Power Capacitors	Schneider Electric, Lauritz Knudsen (L&T), Havells, ABB, Siemens, Usha Electric, Tibcon, Alcon.
19	Instrument Transformers/ Distribution & Power Transformer	Bharat Bijlee, Power star, ABB, Kirloskar Electric, Alstom T&D India, Automatic Electric, CG Power and Industrial Solutions, JSL Industries, C&S, Lauritz Knudsen (L&T), Servocon, Siemens, Viat, BHEL, Tesla, Esennar.
20	Ammeters/ Voltmeters/ CTs & PTs	Hioki, Fluke, Meco, Schneider Electric, C&S, Legrand, Lauritz Knudsen (L&T), Siemens, Precise Electricals, Trinity Energy System any other MSEDCL approved or RDSO/CORE approved make
21	Thyrister/ Reactors/ Contactors	Schneider Electric, C&S, Legrand, Lauritz Knudsen (L&T), Siemens, ABB, Havells, Shreem.
22	GI Pipes/ M.S Pipes/GI Sheets/ M S Structure/ Beam/ Gurdar/ Channel	Tata, Zenith, Jindal, Surya Roshni, Asian, SAIL, Bansal, APL Apollo Tubes, Utkarsh.
23	HDPE/ DWC Pipe	Supreme Industries, Delton, Finolex Industries, Ashirvad Pipes, Astral Pipes, Prince Pipes, Tirupati Plastomatic, Utkarsh, Ketron Industries, Dutron, Delta Irrigation LLP, Super Plast.
24	All type of Valve (Sluice, NRV, Butterfly Valve, etc.)	L&T Valves, Amtech Valves, Amco, Oswal, Novel Valves India, Honeywell, Kirloskar.
25	Pumps: Submersible (OW/BW)/ Centrifugal/ Monoblock/ Vertical Turbines/ Sewage/ etc.	Kirloskar Brothers, Shakti Pumps, Oswal Pumps, Texmo Industries, Crompton Greave, Suguna Pumps, Lubi Pumps, Taro Pumps, Waterman, Mahendra Pumps, Wilo, CRI, Flowmore Pvt. Ltd.
26	Maintenance Free Erathing Elctrodes (as per RDSO Specification)	True power, Sabo, SG Power, Qube, U-Protec or any other CPRI approved make.
27	High Masts, Flag Mast poles, Octagonal/ Swaged Pole	Utkarsh, Bajaj, Hindustan Power, Transrail, Jindal Power Corporation, Bharat Power Projects, Wipro, Valmont Structures, Crompton, Surya Roshni.
28	Solar Panel	As per MNRE approved make
29	Solar inverter	As per BIS standard
30	SCADA System (As per RDSO Specification)	Lauritz Knudsen (L&T), Siemens, C&S Automation, Schneider, Synergy Systems & Solutions.
31	Intellegent Field Device (IFD)	Honeywell, NISSI Engineering solution, Yokogawa India Ltd, Emerson.
32	LT Panel	The panel shall be supplied by OEM or its authorised channel partner, based on OEM certified conforming to IS/IEC 61439 (Part 1 & 2).
33	Distribution Board shall be complete with all internal switchgears such as MCB, MCCB, Isolator, RCCB, RCBO and associated accessories of same OEM make.	Havells, Legrand, Schneider Electric, C&S, Lauritz Knudsen (L&T), Siemens, ABB, Hager, HPL.

END OF TENDER DOCUMENT