

## Schedule of Specification

### **NS-1: (a to g): DB & Junction box:**

**(a):** The contractor shall have to design, supply, install, test and commission of junction box **double door**, fabricated out of **1.6mm thick CRCA** sheet steel. **Canopy** at top will be provided. The junction box will be fix securely on the wall by drilling holes in the wall, reg bolt, nut & bolts or as per decided by the site engineer as per site requirement. The junction box shall be of totally enclosed cubical type, wall mounted, with **IP-54** protection. The junction box should have hinged doors and locking arrangement at the front. The junction box should be suitable for three phase 4-wire 415V 50 cycles A.C. The junction box should be treated with rust protection such as degreasing, phosphating & painted with 2 coats of red oxide primer & standard color with 60microns, finish textured powder coating. Knock out gland plates, lugs for cables etc. as applicable shall be provided in the junction box for incoming and outgoing cables. Circuit identifications by means of printed label shall be provided with paint.

**Bus Bar:** Three phase & neutral electrolytic **Aluminium bus bar 300A** rated, size **30mmx10mm** with colour PVC tape or sleeves and bus bar insulators as per requirement. Adequate space inside the box shall be provided for bus bar & cable alley to accommodate the incoming and outgoing cables in a proper manner.

All power connection shall be secured adequately with spring washer, flat washer/ bimetallic washer, whenever applicable, G.I. bolts, tinned brass washer.

The sheet steel enclosure/ angle/ channel etc. used in the fabrication of the box shall be special surface treatment to make them highly resistant to corrosion.

The box shall be supplied complete with cable gland of brass, completely wired ready for commissioning.

Caution board in English & Hindi shall be provided and shall be metallic type approved by Railway.

Minimum one earth terminal shall be provided.

Size of the Junction box shall be such as to be accommodate the following:-

**MCCB** – 01 No. - 100/125Amps, 4-Pole, Breaking capacity at 415V, AC, 50Hz, 36kA,  $I_{cs}=100\%=I_{cu}$ , thermal release, adjustable over load setting:  $0.8 - 1.0 \times I_n$ , fixed short circuit setting:  $9 \times I_n$ , conforms to IS/IEC 60947-2 & IEC 60947-2, similar to cat no. DPX<sup>3</sup>160 type of cat no. 4200 96 of Legrand make.

Three phase & neutral electrolytic Aluminium bus bar 300A rated, size 30mmx10mm with colour PVC tape or sleeves and bus bar insulators as per requirement.

Cable gland of brass for different size of cable as per requirement for incoming/outgoing cable supply. Complete internal wiring with multi strand aluminum cable.

**(b):** The contractor shall have to supply, install, test & commission **standard trade make** sub distribution board with incoming FP MCCB & outgoing TP MCBs. The SDB shall be **wall mounting, double door, with IP-54 protection, dust and vermin proof** suitable for three phase 50 C/S system. Knock out/gland plates as applicable shall be provided in the sub distribution board for incoming & outgoing cables. Earth terminal shall be provided on each sub distribution board.

**VTPN DB** - Vertical three phase distribution board with provision for 4-pole MCCB 125Amps as incomer with three phase TP MCB 63Amps outgoing, complete with insulated busbar arrangement similar to model no. DBVTL00454-DZ1 of L&T make.

**MCCB** – 01 No 4P, 125A, 36kA, adjustable overload setting:  $0.67-1.0I_n$ , adjustable short circuit:  $6-12I_n$ ,  $I_{cs}=I_{cu}=100\%$ , Type: DZ1-160D, similar to model no. DZ1F0125DXD1A0000 of L&T make confirming to IS/IEC 60947-2

**MCB** - 04 Nos.- Triple pole, 'C' series, 10kA, 63 amps, similar to cat no. BB30630C of L&T make.

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**(c to f):**

The contractor shall have to supply, install, test & commission of distribution board dust and vermin proof suitable for 250/415V single /Three Phase 50 C/S system. Knock out / gland plates as applicable shall be provided in the distribution board for incoming & outgoing cables. Earth terminal shall be provided on each distribution board. DB should be provided with danger notice / plate & earthing terminal.

**(c):** 04 Way TPN-DB, double door with (8+12) Module & IP-43 protection, similar to cat no. SHDB M 4 of ABB make.

**(d):** MCB-4pole, 63 amps Breaking capacity-10kA, "C" series as incomer similar to cat no. SB204M-C 63 of ABB make.

**(e):** RCCB-4pole, 63 amps, Sensitivity-100mA as incomer similar to cat no. FB204 AC-63/0,1 of ABB make.

**(f):** MCB-SP, 6-32 amps, "B" series, 10kA (As SDB Outgoing)

**(g):** The contractor has to supply, install, test and commission 3 phase, 440V, 63A capacity, ray roll plug & socket with 63A FP MCCB housed in MS box of size **450 mm (W) x 600 mm (H) x 330 mm (D)** suitable for outdoor mounting and fabricated with **14 SWG** thick MS sheet with dust and vermin proof enclosure. The box should be compact in design and suitable for 3 phase, 4 wire, 415V 50Hz supply system. The box shall have bottom opening with removable plate of **2mm** thickness. The box shall have the following arrangements:-

1 No. **MCCB 63A**, 25kA, 4 pole, Ics=Icu=100%

1 No. **De contactor socket 63A**, 440V, 5 pin type with wall box

1 Set **Aluminum bus bar** of size **20x5 mm** for three phase and neutral with insulators.

The box shall be internally wired by PVC insulated, single core flexible copper cable suitable size with lugs. The door of the box shall have locking arrangement in the middle and two nos. screwed knobs also on the bottom and top. The box should be treated with rust proofing process and painted with two coats of anti corrosive red oxide primer and final two coats of gray enamel paint. The box shall be provided with earthing terminals on both the sides and danger board on the front side shall be provided. The box shall be fixed on the rail poles/ existing walls/portals with proper size of clamps and nuts & bolts.

The pre-cooling points along with bus bar chamber etc. are to be fixed/erected & commissioned at different places at platform line with on rail poles, where it shall be fixed/tightened on MS channel / angle of size 50 x 50 x 6 mm of suitable length with MS clamps of size not less than 50 x 6 mm or size as per site requirement. **The proto type fabricated cubical complete in all respect shall be got approved by Sr. DEE/All office before manufacturing.**

#### **NS-2: (a): Earth Station:**

**(a):** The contractor shall have to supply of material and construct earth pits / electrodes of G.I. strip as under:

Earth Electrode: 25x6mm G. I. Strip Approximate single piece of 15 meters length, Galvanized coating, relevant IS .

Inspection Chamber: Square earth station C.C. Block, C.C. Ratio: 1:3:6, chamber with RCC/G.I. cover & handle.

Method of Earthing: - The equipment shall be connected to the main by G.I. earth wire from the earth pit.

The strip electrode of cross section shall not be less than 25 mm x 6 mm of GI and buried in horizontal trenches of minimum 45 cms in width and 0.5 mtrs depth, laying of GI strip, refilling it with charcoal and salt in successive layers, connection with 8 SWG GI wire and complete in all respect of installing, testing & commissioning of earth electrode.

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The electrode shall be as widely distributed as possible in a single straight or circular trenches radiating from a point.

The measurement of the earth resistance shall be carried out as per IS.

The contractors at his own cost shall bring Instrument/ meters required for testing.

Each earth pit shall give a minimum resistance as specified in IE rules.

Earth conductor shall be properly supported by G.I. Saddles supports by T.W. Blocks/rowl plugs grouted on the walls.

Earth conductors crossing the floor shall be buried at a depth of 6" and then cemented.

Earth conductors underground laid at a depth of not less than 0.6 meter.

Earth conductors running vertically along the wall also shall be embedded and to be covered with plaster.

The earth pit shall have to be covered in a cement concrete cover and top cover of G.I. or RCC slab with handle.

The value of earth resistance should be written on the earth pit with date of reading as per direction of site engineer.

The contractor and Railway representatives shall measure Earth resistance at each electrode jointly. No Earth electrode shall have a greater ohmic resistance between 5 to 8 ohms for service buildings and staff quarters in the driest of season except in the case of Sub stations.

**NS-3: (a to e): Cable laying with associate accessories:**

**(a):** This item covers drilling of Horizontal bore by pushing method (trenchless technology) in all types of soil/rock for laying of RCC/HDPE/DWC pipe upto 100mm by pushing method in presence of Railway representative taking all necessary safety precautions related track and movement of trains. Horizontal boring will be done at minimum 1.5 mtrs. Below from ground level at railway track portion but in case, where bank height of track is high then boring should be such that outer side and under track RCC/HDPE/DWC pipes are in same alignment.

All work will be done in presence of Railway representative without disturbing the Railway track taking all necessary safety precautions related track and movements of trains.

**(b):** The minimum width of trench for laying single cable shall be 0.4 m x 0.8 m in case of LT cable. The depth of trench is increase to 1.2M in case of cable above 1.1kV. Adequate precaution should be taken not to damage any existing cable, pipe or other such installation in the proposed route during excavation. The bottom on trench shall be level and free from stones, bricks bats etc. The trench shall be provided with a layer of clean dry sand cushion of not less than 10cm in depth. The trench shall be refilled with same soil free from stone and other sharp edged debris and shall be restored to original position & shall be possible to withdraw the cable for repair or replacement.

**Where more than one cable is to be laid in same trench:-** In case of more than one cable in a trench additional brick layer is to be laid between cables to maintain interaxia distance. Horizontal formation of the cables laying more than one cable should be increased such that interaxia distance between the cable must be 20 cm at least and brick is to be laid.

**(c):** The contractor shall have to supply and laying of Cablefit (Double wall corrugated) category 750N Pipe of size 63mm dia (OD- 63mm & ID-51mm), ISI marked for HT/LT cable along with all the accessories like ring coupler, bend, socket etc. conforming to IS 16205 PART 24, Part II or latest complete with fitting and cutting, jointing etc. for in the existing trench.

**(d):** Cables shall not be bent sharp to a small radius while handling or during installation. The minimum safe bending radius for PVC/XLPE (MV) cables shall be 12 times the

overall diameter of the cable. Before and after laying the cable the I.R. value should be checked, all the instruments for testing shall be arranged by the contractor. Armouring of cable should be earthed at both the ends.

The contractor shall have to laying cable open in Wall/pole/ceiling as per decided by the site Engineer. Cable should be properly terminated with standard size of lug. The cable along the wall should be provided with suitable size of M.S. clamps, Reg Bolts / J bolts shall be provided to supporting the cable. The distance between two supports not more than 0.50 meters. Breaking of wall to make holes for the contractor shall do cable entry in the building shall be restored to original levels to the satisfactions of the railway. Cable entry in the wall shall be adequately sealed.

**(e):** The contractor shall have to laying cable in already laid Trench / PVC pipe / Hume pipe / GI pipe / wall / ceiling without fixture.

#### **NS-4: (a to m): Wiring:**

**(a):** The contractor shall have to supply, install & commission of ISI marked, medium class, PVC conduit 20mm dia. with accessories confirming to IS:9537 (Part-III) 1983 or latest. Saddles for fixing conduit shall be heavy gauge PVC/metallic type with base. The colour of the PVC conduit shall be cream/white colour or other colour as approved by the Engineer. The PVC conduit shall be fixed with rawl plugs, saddles at equal distance of 50cm/60cm (approximate) and should have necessary junction boxes, elbows for surface wiring as per requirement. Saddles shall be fixed at a closer distance on either sides of couplers or bends or similar fittings.

**For concealed wiring**, the contractor shall have to make and filling of chase for 20/25mm dia PVC/MS conduit and then laying of conduit pipe in this chase by using proper couplers and solvent cement, with bends, clamps for supporting. After plastering and curing, wires shall be pulled through the conduit using a fish tape / steel wire.

**(b):** Supply of material & surface point wiring of phase/half, neutral & earth wire shall be carried out with PVC insulated multi strand 1.5 sq mm FR grade single core 1.1kV grade copper conductor confirming to IS:694 of 1990 or latest preferably with ISI certification mark wherever existing for Phase/Half, Neutral & Earth.

The point shall be complete with 03plate ceiling rose / batten / angle holder & piano type switch (taken in separate NS-4m), wherever required junction box (1/2/3/4 way or as per site requirement) shall be provided. Size of junction box shall be as per concealed PVC conduit pipe.

Standard colour code shall have to be maintained for lighting circuits such as Phase/Half-**Red**, Neutral-**Black** and Earth-**Green/Grey**. No joints shall be permitted in point wiring.

Ceiling rose – 03plate, 6A, 240V, AC, ISI. Holder – 2A, 240V AC, ISI.

Point wiring shall be done in already laid PVC conduit/ casing capping.

Any discrepancy occurred in engineering work during the wiring/rewiring should be restored in the original condition by the contractor, at his own cost.

**(c,d&e):** Supply of material & sub/service main wiring of phase, neutral shall be carried out by FR grade PVC insulated single core multi strand copper conductors of 1.1kV grade confirming to IS:694 latest of 1990 or latest preferably with ISI certification mark wherever existing. Standard colour code shall have to be maintained. No joints shall be permitted in the sub main / main wiring.

Standard colour code shall have to be maintained for lighting circuits such as Phase-**Red**, Neutral-**Black** and Earth-**Green/Grey**.

Phase & Neutral – 2.5 sq mm & earth wire 1.5 sq mm.

Phase & Neutral – 4.0 sq mm & earth wire 2.5 sq mm.

Phase & Neutral – 6.0 sq mm & earth wire 4.0 sq mm.

**(f to h):** The contractor shall have to supply of material and fixing of 12, 8 & 3 way modular PVC boxes with suitable size cover plate (inner and outer) complete in all respect.

**(i):** The contractor shall have to supply, install, test & commission of Modular type socket –06amps, 2/3 Pin (5-Pin), 240V, AC, 2 modular type Universal (two pins & earth).

**(j):** The contractor shall have to supply & fixing of 1 modular blank plate at vacant space in the modular box as per requirement.

**(k):** The contractor shall have to supply, install, test & commission of shuttered 2 Modular socket – 6/16amps, 240V, AC, ISI marked.

**(l):** The contractor shall have to supply, install, test & commission of Modular switch – 16amps, One way/SP, 1 modular, 240V AC, ISI marked.

**(m):** The contractor shall have to supply, install, test & commission of Modular switch – 10Amps, One way/SP, 1 modular, 240V AC, ISI marked.

**NS-5: (a to b): Outdoor Lighting:**

**(a to d):** The contractor shall have to supply & erection of 5 m high with single/ double arm as per requirement (similar to model no. BOP-5030 of Bajaj make), hot dip galvanized steel octagonal pole with inside cable termination and earth connection arrangement, weather proof flush door locking facility (both allen key locking arrangement and two hinges), galvanized base plate of **200x200x12mm**, foundation PCD **200mm** junction box with bakelite sheet with 6Amps MCB and stud terminals (for mounting inside the base compartment of pole), foundation bolt size **4x16mm** dia. **600mm** length including excavation and making foundation as per standard specification/drawing of the manufacturer. It shall be galvanized internally and externally by single dipping method as per BS EN ISO 1461. The drawing of pole and foundation shall be submitted by the firm from manufacturer. Cable termination arrangement inside the octagonal pole will be at junction box for easy maintenance. It includes supply & connection of **3 core** multistrand copper cable of size **0.75 sqmm**. The depth of foundation shall be **1200mm**, length x width of foundation shall be 500x500mm. Foundation consists **(1:3:6)** RCC with steel reinforcement having **8 nos. of 10mm** iron rod and rings shall be min. **5 nos. of 8mm** iron rod. Curing shall be done by the contractor for foundation as per satisfaction of site engineer.

**(b):** The contractor shall have to supply, install, test & commission of box with timer, MCB, contactor & toggle switch.

**Box:** CRCA sheet of size **300 x 300 x 150 mm IP-65 protection** with powder coated, foamed in PU gasket, Gland plate, cam locking arrangement, wall/Rail as per site requirement mounting bracket.

**Time switch:** FM/1, QT, One Daily Dial, 240V AC similar to cat.no. J648B1 of L&T(GIC) make.

**Contactor:** ML-1.5, 25amps, AC-1 rating, coil voltage 240V, 50 Hz

**MCB:** Single pole, “B” series, Conforms to IS- 8828:1996 or latest, Capacity – 6-32 amps (AC), Phase/Voltage – 1Ph / 240V, Frequency – 50 Hz, Breaking capacity – 10kA.

**Toggle Switch:** One/Two way toggle switch suitable for by pass the automation of lighting.

**1. Standard Specification**

Wherever a reference to any I.S. specification appears in this tender paper, the same shall be taken as a reference to the latest version of the said specification.

**2. Standard Makes**

- (i) All items endorsed by BEE under star rated labeling scheme should be of 3 star or above rated of BEE approved make (preferably 5 Star).
- (ii) The contractor shall have to supply the material as per specifications of BIS, IEC, MNRE etc.
- (iii) Items not covered in above para should be ISI marked of reputed brand and as per technical specifications given in tender document. List of applicable IS codes is attached as **Annexure A**.

**Rules & Regulations of work:**

- 1. Work will be executed as per Indian Electricity rules.
- 2. The rules & regulations for this work shall be governed by the GCC & guidelines issued from Railway board time to time.
- 3. Various materials under various NS items shall be inspected & checked by the Railway representative before starting the work.

**Scope of work:**

It includes supply, installation, testing & commissioning of point & sub main wiring, DB, MCB's, VTPN DBs & junction boxes, earthing, cable & its laying, outdoor lighting etc. complete in all respect as per satisfaction of the site engineer.

**Approvals:**

Approval of samples / documents / drawings/ design of **NS-1a to 1g, 3c, 4a to 4m, 5a to 5b** be obtained from Sr. DEE/G/Ajmer office.

**Inspection clause:**

Factory inspection will be carried out of **NS-3c** by Railway representative at manufacturer's premises & all costs shall be borne by the contractor.

**Others:**

- 1. Schedule of rates are only the brief idea of items, Quantity & Rates but work will be carried as per specification.
- 2. All the work shall be carried out as per IE rules & regulation, Code of practice for Electrical Wiring Installation as per schedule of rate & specification.
- 3. After completion of Electrical work the contractor will under take the Civil Engg. Work to re patch the wall, ceiling, road, plaster and fill up the recesses etc. of the same.
- 4. No extra payment shall be be paid to the contractor for transportation, loading & unloading.

**Payment Conditions:**

- 1. 60% payment will be made of NS items after receiving & acceptance of material at site. **(60% payment against supply will be made for NS-1a to 1g, 3c, 4a, 4f to 4m, 5a to 5b only)**
- 2. 20% payment will be made after successful installation of NS items.
- 3. 20% payment will be made after successful commissioning of NS items.

**Location & Jurisdiction of work:**

SN	Location / Station	Jurisdiction
1	Track Machine depot, Marwar Junction	SSE-P-Marwar Junction

**Eligibility Criteria:**

The contractor or executing agency from which the electrical work is to be executed should have valid electrical contractor license issued by government before execution of work.

**--END OF DOCUMENT--**

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