

North Western Railway - Jodhpur Division - Electrical/G Department					
Schedule of Rate & Quantities					
Name of work:- JU/Gen-Rewiring of staff quarters, service buildings, station buildings and LC gates & other important locations under JU & JSM power depot of JU Division.					
S. N.	Description of Item	Unit	Qty	Rate	Amount (Rs)
1	Digging and filling of trench size 0.4 x 0.8 mtr as per spec (trench work may be on kuchcha/pucca land and all type of soil as per site requirement and without protective layer of brick). Surface of trench shall be made good in all respect and satisfaction of site engineer.	Mtrs	2000	40.69	81380
2	laying cable in Air/Wall/Pole with fixture(02 nos. per mtrs) as per specification	Mtrs	500	24.32	12160
3	Supplying., laying of GI pipe size 50 mm dia. B class as per IS1239 for cable use as per specification enclosed	Mtrs	160	344.26	55081.6
4	Supplying., laying of GI pipe size 100 mm dia. B class as per IS1239 for cable use as per specification enclosed	Mtrs	125	675.06	84382.50
5	Supply & laying of HDPE pipe of 75/80mm dia, wall thickness3mm. The work involves laying of HDPE pipe & laying cable in HDPE pipe. As per specification	Mtrs	2000	102.78	205560
6	Drilling of horizontal bore below track/road by pushing method for laying of RCC/HDPE/DWC pipe of various sizes (As per specifications)	Mtrs	1500	1424.4	2136600.00
7	Supply & laying of HDPE pipe, dia 160 mm under road/ground/floor/railway track or as per site requirement in already excavated trench. (As per specification)	Mtrs	500	790.16	395080.00
8	Laying, connecting & commissioning of cable in pipe/trench etc. with complete lug, glands & transportation of cable etc. as per specification	Metre	500	242.11	121055.00
9	J' type cable route marker made of cast iron as per approved Railway drawing.	Nos	200	217.32	43464.00
10	Digging of pacci (Pakki) trench as per specification	Mtr	3000	292.75	878250.00
11	Supply of material & wiring of sub-main with 2x6 sq mm PVC insulated multi-strand ( 84 / .30 mm ) copper conductor cable in existing laid ( surface / recessed ) PVC conduit pipe and continuous running of PVC insulated copper earth wire of 1 Sq.mm. as per specifications attached as required.	Mtr	1000	125.62	125620.00
12	Supply of material & wiring of sub-main with 2x4 sq mm PVC insulated multi-strand ( 56 / 0.3 mm ) copper conductor cable in existing laid ( surface / recessed ) PVC conduit pipe and continuous running of PVC insulated copper earth wire of 1 Sq.mm as per specifications attached as required.	Mtr	15000	88.9	1333500.00
13	Wiring of main (for individual qtr.) with 2x4 sq mm 56/.30 PVC insulated multi-strand copper cable in 19/20 mm dia MS conduit pipe to be fixed properly with saddles, gutties & other	Mtr	3000	130.17	390510.00

	fixtures and continuous running of PVC insulated copper earth wire as per specifications attached. Including supply of material as required.				
14	Supply of material & wiring of sub-main with 2x2.5 sq mm PVC insulated ( 36 /0.3 mm ) multi-strand copper conductor cable in existing laid ( surface / recessed ) PVC conduit pipe and continuous running of PVC insulated copper earth wire of 1 Sq.mm. as per specifications attached as required	Mtr	25000	69.82	1745500.00
15	Supply and Fixing of 20 mm dia medium class P.V.C. Pipe along with accessories as required in recess on walls/roof properly including cutting of wall /roof and making good the damages as per specifications attached.	Mtr	30000	81.29	2438700.00
16	Supply and Fixing of 20 mm dia medium class PVC Pipe along with accessories as required in surface on walls/roof properly with saddles and wooden gutties etc. complete as per specifications attached.	Mtr	2000	53.26	106520.00
17	Supply of material & commissioning of PVC casing caping 25X12 mm with accessories for surface wiring as per specification.	Mtr	500	24.49	12245
18	Assembling, fixing, hanging and making connection of Surface pendent mounted box type tube light fitting/street light fitting as per specification.	Nos	2000	73.19	146380.00
19	Supply of material and wiring of LP/TP/FP/Ex. Fan point with 1.5sqmm PVC single core multi-stranded copper wire insulated concealed in stone/brick masonry wall in 19/20 mm PVC conduit with 1.5sqmm PVC wire insulated copper for earth wire 1-way /2-way switch 5/6A as required and good quality ceiling rose including connection. This item includes modular switch, modular ceiling rose, PVC conduit and required chase as per site requirement.	Nos	12000	386.13	4633560.00
20	Supply and fixing 2 module modular switch board plate for fixing of modular switches -plug with sheet metal box of good quality concealed fixing of MS/PVC as per site requirement..	Nos	600	142.09	85254.00
21	Supply and fixing 3 module modular switch board plate for fixing of modular switches -plug with sheet metal box of good quality concealed fixing of MS/PVC as per site requirement..	Nos	1200	206.25	247500.00
22	Supply and fixing 4 module modular switch board plate for fixing of modular switches -plug with sheet metal box of good quality concealed fixing of MS/PVC as per site requirement..	Nos	1000	217.29	217290.00
23	Supply and fixing 6 module modular switch board plate for fixing of modular switches -plug with sheet metal box of good quality concealed fixing of MS/PVC as per site requirement..	Nos	1000	237.13	237130.00

24	Supply and fixing 8 module modular switch board plate for fixing of modular switches -plug with sheet metal box of good quality concealed fixing of MS/PVC as per site requirement..	Nos	1600	330.35	528560.00
25	Supply and fixing 12 module modular switch board plate for fixing of modular switches -plug with sheet metal box of good quality concealed fixing of MS/PVC as per site requirement..	Nos	850	348.86	296531.00
26	Supply and fixing ceiling of modular (2 module) fan regulator electronic type 5-step (suitable for BLDC fan)as per specification.	Nos	1000	445.17	445170.00
27	Supply and fixing 5/6A plug, modular 3/5-pin 230Vincluding modular switch in the modular board and connection as per site requirement.	Nos	5000	272.48	1362400.00
28	Supply and fixing 15/16Aplug, modular 6-pin 230Vincluding modular switch in the modular board and connection as per site requirement.	Nos	2500	306.68	766700.00
29	Supply, install, test &commission of Modular blank plate as per specification	Nos	1302	12.65	16470.30
30	Wiring of shed LP/TP in covered shed with 1.5sqmm copper wire PVC insulated & multi-stranded in PVC conduit, ISI mark 1.5mm thick, size19/20mm dia and 1.5sqmm PVC insulated multi stranded copper earth wire with ceiling rose fixed with saddles or tied properly and junction box as per spec.	Nos	3000	187.93	563790.00
31	Supply, fixing and connecting modular type exhaust fan 225/250mm as per spec	Nos.	620	830.41	514854.20
32	Supply, install, test & commission of Ray roll plug socket 20amp SPN Ray Roll Plug socket including connection /wiring of "C" series 32 amps SP-MCB as per specification.	Nos	500	895.89	447945.00
33	Supply, installation, testing and commissioning of callbell220/230V as per specification	Nos	500	237.33	118665.00
34	Supply, Fixing of MCB to be provided in the MCBDB given above including supply of material as required & as per specifications attached-MCB (SP-) 6-32 A	Nos	2000	240.4	480800
35	Supply, Fixing of MCB to be provided in the MCBDB given above including supply of material as required & as per specifications attached-RCCB - 25 A/30mA	Nos	600	2534.52	1520712
36	Supply. fixing, testing and commissioning of SPN DB 8-way with provision of incoming MCB of 63A,IP 43/IK09, double door at suitable locations.	Nos	500	2562.7	1281350
37	Supply, Fixing, testing and commissioning of TPN DB 8-way with provision of incoming MCCB of 125A, IP43/IK09, double door at suitable locations.	Nos	6	15418.98	92513.88
38	Supply, Fixing of MCB to be provided in the MCBDB given above including supply of material as required & as per specifications attached- MCCB 4-pole 100/125A, 25 KA	Nos	6	13883.9	83303.4

39	Supply, fixing, testing and commissioning of RCBO 25A,RCBO double pole, 30mA with Earth leakage, overload and short circuit protection as per spec	Nos	100	2125.53	212553
40	Supply, fixing, testing and commissioning of RCBO 63A,RCBO Four pole, 30mA with Earth leakage, overload and short circuit protection as per spec	Nos	50	3350.86	167543
41	Supply, fixing, testing & commissioning of three phase Electronic KWH meter make HPL Long Range meter model no. TPPB1U2314 or similar model (as per specifications attached) complete and earthed properly including supply of material.	Nos	5	14564.32	72821.6
42	Supply, fixing, testing & commissioning of AC single phase static Energy Meter 5-30 A capacity to measure & display of unit (KWH), Ampere (I), Voltage (V), Load (KW), maximum demand (KW) including last six month history of Energy etc. of accuracy class 1.0, 240 V, 50 Hz with backlit LCD display confirming to IS:13779 or latest. Make: Indotech, L&T, HPL, CG, Genus.	Nos	10	2573.68	25736.8
43	Provision of meter box for single phase meter PVC/M.S.with two no. single pole MCB as per specification	Nos	200	617.87	123574
44	Provision of meter box for three phase electronic meter as per specification	Nos	10	1213.67	12136.7
45	Supply. fixing, testing and commissioning of SPN DB 12-way with provision of incoming MCB of 63A,IP 43/IK09, double door at suitable locations.	Nos	30	1397.41	41922.3
46	Supply and fixing of Double Door MCB DB SP 10 way(8+2 module), neutral and earth link, with one no. DPMCB 40 amp, one no. DPRCCB 40 amp. 30 mA and six nos. SP MCB 32/25/16/10amp. 'C' series. Breaking capacity not less than 10 kA MCB, RCCB and DB should be as per tech spec. and of same make.	Nos	60	5878.1	352686
47	Supply, installation, testing and commissioning of SPNDB 12 Way with suitable IP protection having 1 No. RCBO 40 Amp Cap., sensitivity 30 mA in the incoming and in outgoing 06Nos. 10-32 Amp. SP MCB, 10kA, 'C' curve, 10KA as required with bus bar, neutral bar and necessary wire sets. As per specification. MCB, RCBO and DB should be as per tech spec. and of same make.	Nos	20	7589.32	151786.4
48	Supplying, fixing and commissioning of street light fitting accessories e.g. GI pipe of suitable bore as per fitting, clamps, nuts, bolts, cable etc as per instruction of site engineer.	Nos	400	150.49	60196
49	Supply, Testing & Fixing of wall mounted cabin fan with regulator three speed, suitable for 220- 230 volt ,50HZ AC supply .Model No-Media BW 04 of Bajaj or similar to Usha/ Crompton Greaves /Philips .	Nos	200	1966.54	393308.00

50	Supply and provide MS flat of iron size 40x3mm with spacers and fixing clamps as per spec	nos	160	147.4	23584
51	Fixing of ceiling fan with clamp, hooks and down rod as per requirement and connection as per spec	nos	225	185.37	41708.25
52	Supply, fixing, testing and commissioning of Distribution Board double door, 3-phase and neutral with incoming 63A 4-pole MCB and outgoing 12Nos. MCB 6-32A single pole as per spec.	nos	40	5053.93	202157.2
53	Led batten with battery/Invertor, Power 20 Watt, as per spec	nos	1000	890	890000.0
54	Supply and fixing of fancy light LED fitting / Mirror light fitting (3-5 watt) as per site requirement and approved by railway.	nos	800	1040.87	832696.0
55	Supply and fixing of TV point as per site requirement.	nos	400	118.57	47428.0
56	Supply and fixing of co-axial wire as per site requirement.	Metre	1000	14.82	14820.0
57	"B" Class 50 mm dia GI pipe earth Station with digging pit & refilling with charcoal & salt as per specification.	Nos	50	1385.53	69276.5
58	Inspection Chamber with cover as per specification	Nos	50	386.44	19322
59	Supply & laying of earth connection from earth electrode with 4 mm GI wire properly fixed on wall with wooden gutties etc. as required.	Mtr	500	11.73	5865
60	SITC Beanbag Cool DX split AC thermostat (a solution for split AC monitoring and control) BT5000-000-split/window AC, 230 V AC, wi-fi, BLE	Nos	130	10030.00	1303900
61	Annual subscription charges per thermostat for mobile App and web services for remote monitoring and controlling of thermostat from a central location. (For 3 years , 3x130=390 Nos.)	Nos	390	590.00	230100
					<b>2,95,47,607.63</b>

CTA/W/JU

DEE/TRD/SMR

Sr.DEE/G/JU

## **TECHNICAL SPECIFICATION**

**Name of Work: JU/Gen-Rewiring of staff quarters, service buildings, station buildings and LC gates & other important locations under JU & JSM power depot of JU Division.**

All the work shall be carried out as per IE rules & regulation and also as per IS-732 Code of practice for Electrical Wiring Installation.

All electrical installations works shall conform to relevant Indian Standard Code of Practice and carried out as per relevant safety code of Practices, Guide for Safety Procedures in Electrical work as per I.S 5216/Pt.I& II /1982 shall be observed.

### **1. SCOPE OF WORK INVOLVES**

1.1 The Electrical work shall be carried out as per standard at locations under JU & JSM power depot of Jodhpur Division to the satisfaction of Railways.

1.2 Any damage to building or railway property should be made good to the satisfaction of railway by contractor; else it will be recovered by contractor.

1.3 The list of standard and approved make of equipment and other items is enclosed in tender document. After completion of Electrical work the contractor will undertake the Civil Engg Work to repatch the wall plaster and fill up the recesses etc. in the wall occurred during dismantling of old wiring and rewiring/fitting of the same.

### **NOTE- INSPECTION OF MATERIAL-**

1. The major/high value items costing more than Rs 5 lakh shall be inspected by RITES/TPI or as decided by Sr.DEE/G/JU, if not explicitly mentioned. Inspection shall be at manufacturer's premises to conduct the test, if necessary. Contractor shall provide all necessary assistance in carrying out test.

2. The inspection charges for RITES inspection shall be borne by Railways, if not explicitly mentioned in NS specification.

3. For remaining items sealed samples should be submitted by contractor/supplier to site engineer. He will submit the samples with sample register and get it approved from ADEE/DEE/Sr.DEE.

4. Any sample, if necessary, may be sent by Railway's representative to manufacturer/test house for ascertaining originality /parameters as per specifications and cost of test shall be borne by the contractor. Pre commissioning test if needed on various equipment may be carried out jointly by the contractor.

### **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.

(ii) 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. The contractor has to supply & provide ancillary materials such as nut, bolt, clamps, brackets etc required for the work even if they are not mentioned in the tender schedule.

(iii) If any disputes arise during execution, then decision of Sr.DEE/G/JU/NWR will be final & binding upon contractor. For any contradiction in schedule of rate and specification; decision of Railway authority will be final & binding to contractor as per railway requirement.

- (iv) The unit rate in the rate schedule includes supply, installation, testing, & commissioning including all contingent material if not specified in the rates schedule.
- (v) Electrical works shall be carried out by the contractor in supervision of the railway Engineers and contractor shall inform the railway representative before starting the work. All the hidden work i.e. foundation work, laying of cables etc. shall be carried out in the presence of railway supervisor / representative.

### **Special conditions and guidelines:**

1. Electrical installation shall be planned considering load requirement and future expansion with utmost priority to occupants.
2. Power supply system shall be well distributed with sub main circuits and final circuits segregation.
3. Wiring shall be done in concealed conduit (preferred in buildings). Surface conduit/trunking wiring is to be done only where unavoidable.
4. All wires/cables must have proper colour coding. Cable identification system is to be provided for all circuits for ease of maintenance.
5. The scale of fitting should be as per latest railway board guideline issued and site supervisor to ensure it.
6. Proper segregation shall be done for lighting circuits and power circuits and each circuit shall be protected by MCB/RCCB. In case of three phase supply, try to maintain load balancing.
7. Wiring shall terminate in proper distribution boards, DBs must include MCBs and RCCB.
8. Wiring must include continuous earth wire. Proper earthing of DBs and equipment is to be ensured.
9. Protection against electric shock, short circuits and overcurrent is to be done in various circuits. Proper insulation and termination and fire sealing of cable entry points is also to be ensured.
10. Fire safety to be ensured during wiring.
11. Proper testing and commissioning of complete installation.

Technical specification details NS wise is being given as below:-

<b>N.S.</b>	<b>Description of Item</b>
NS 01	Digging and filling of trench size 0.4 x 0.8 mtr as per spec (trench work may be on kuchcha/pucca land and all type of soil as per site requirement and without protective layer of brick). Surface of trench shall be made good in all respect and satisfaction of site engineer. 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 1.2 mtr in case of cable above 1.1 KV. 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 then be provided with a layer of clean dry sand cushion of not less than 10cm in depth. The trench shall be than back filled in with excavated earth free from stone and other sharp edged debris and shall be rammed in successive layers not exceeding 30 cm up to top. The cable shall be protected by HDPE pipe as a protection cover. Where more than one cable is to be laid in same trench Horizontal formation of the cables laying should be such that inter axis distance between the cable must be 20 cm at least and brick is to be laid. No extra payment will be paid for laying more than one cable in one trench.
NS 02	The cable shall be laid in Air/Wall/Pole/pipe with suitable fixture as per direction of site engineer.

NS 03	The contractor shall have to supplying, laying of GI pipe size 50 mm dia. B class as per IS1239 for cable use as per site requirement and supervision of site engineer.															
NS 04	The contractor shall have to supplying, laying of GI pipe size 100 mm dia. B class as per IS1239 for cable use as per site requirement and supervision of site engineer.															
NS 05	The contractor shall have to supply & fixing / laying of HDPE pipe in trench/under floor/road/railway track etc. or as per site requirement. It involves laying of cable in HDPE pipe. HDPE pipe should be ISI marked & confirming to IS 4984-2016 or latest. Dimensions of HDPE pipes: Outer dia -75/80 mm, wall thickness -3.6 to 4.1 mm, PN-4 PE-63 grade. It shall be possible to withdraw the cables for repair or replacement without disturbing the Railway work. The pipes shall be laid with a gradient to facilitate drainage of water and it shall be at right angle to the track.															
NS 06	Drilling of horizontal bore below track/road by pushing method for laying of RCC/HDPE/DWC pipe of various sizes. 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 from 50 to150 mm to 450 mm by pushing method in presence of Railway representative without disturbing the Railway track taking all necessary safety precautions related track and movement of trains. Horizontal boring will be done at minimum 1 Mtr. 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.															
NS 07	<p>This item covers supply &amp; laying of HDPE pipe including laying of cable in HDPE pipe in already excavated trench/bore under road/ ground/floor/railway track etc. as per requirement with technical specification 160 mm dia (OD), wall thickness between 6.2 mm to 7.1 mm, material grade PE-80 and class of pipe should be PN-4 with confirming to IS:4984/1995 or latest. Make:-Sangir, Dutron, NOCIL, Hasti, Reliance, Supreme or equivalent.</p> <p>After laying of HDPE pipe, the trench/horizontal bore should be refilled with same soil and restored to original position &amp; pipe should be laid in trench such that possible to withdraw the cable for repair or replacement. The pipe shall be laid in already excavated trench below the ground level with a gradient to facilitate drainage of water and it shall be right angle to the track. For each power line track crossings, contractor shall have to lay two length of pipe, for 02 Nos. of cable to be laid or as per direction of site engineer.</p> <p>Accessories related with laying of HDPE pipe like fittings, bends, joints/coupler, junction, flange, end cap etc. as per site requirement will be provided by contractor and no extra payment will be given for above items. The contractor shall have to submit manufacturer's test reports of HDPE pipe.</p>															
NS 08	<p>Installation of cable underground include excavation of a trench of 40 to 45 cms in width and 0.8m to 1m depth or Suitable as per cable rating &amp; site requirement, shall be made and while laying the cable a layer of sand 8cms Thickness should be placed at the bottom of trench and then the cable should be laid over it. After laying the cable a layer of 17 cm thick sand should be placed above the cable and then for mechanical protection good quality of brick/RCC cover should be placed on both sides and top i.e. 18 bricks per meter, After doing this, trench can be filled up with solid/sand available there by. Brick partition also shall be provided under the trench between the two cables.</p> <p><b>Depth-</b> The desired minimum depth of laying from ground surface to the top of cable is as follows:-</p> <p><b>Minimum Depth</b></p> <table><tr><td>High Voltage cables, 3.3 KV to 11 KV rating</td><td>:</td><td>1 m</td></tr><tr><td>High voltage cables, 22 KV, 33 KV rating</td><td>:</td><td>1.05 m</td></tr><tr><td>Low voltage and control cables</td><td>:</td><td>0.75 m</td></tr><tr><td>Cables at road crossings</td><td>:</td><td>1.00 m</td></tr><tr><td>Cables at railway level crossings (measured From bottom of sleepers to the top of pipe)</td><td>:</td><td>1.00 m</td></tr></table> <p>The duct/pipe joints should be covered by collars to prevent settlement of in between pipes. It may be desirable to leave a pilot wire inside the duct.</p> <p>The diameter of the cable conduit or pipe or duct should be at least 1.5 times the outer diameter of the cable. The ducts/ pipes should be mechanically strong to withstand forces due to heavy traffic when they are laid across road/railway tracks.</p> <p>Cables below Railway crossing- When the cables are laid under railway tracks the cables should be laid in reinforced spun concrete or cast iron or steel pipes at such depths as specified in the track crossing regulations-1987 but not less than 1 m measured from the</p>	High Voltage cables, 3.3 KV to 11 KV rating	:	1 m	High voltage cables, 22 KV, 33 KV rating	:	1.05 m	Low voltage and control cables	:	0.75 m	Cables at road crossings	:	1.00 m	Cables at railway level crossings (measured From bottom of sleepers to the top of pipe)	:	1.00 m
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	<p>bottom of sleepers to the top of the pipe. In the case of single-core cables the cast iron or steel pipes should be large enough to contain all the three single core cables forming the circuit in the same pipe.</p> <p>When the cables are laid under the tracks, the same shall be laid as per the track crossing regulation 1987.</p> <p>All cables should be properly terminated with standard size of lugs.</p> <p>Before and after laying the cable the I.R. value should be checked, all the instruments for testing shall be arranged by the contractor.</p> <p>Armouring of cable should be earthed at both the ends.</p> <p>Wherever the cables emerge out of ground at least one loop of sufficient radius should be provided under the ground.</p> <p>While laying the cable it should be ensured that no obstruction should come in way like drainage power cables, telecommunications cables, etc. The water logging area should be avoided. Wherever the cable route changes or takes a turn a cable marker of approved design should be provided.</p> <p>While terminating the cable to the overhead rail pole a 3 meter long 100 mm dia heavy duty 'B' class GI pipe is also provided on each Rail pole. One end of which should be grouted in the two muffing and the other end of which should be provided with PVC bushing. M.S. flat clamps of size 40 x 6mm shall be provided to secure the pipe.</p> <p>The cable other than overhead track crossing be along the wall/pole above the ground level and floor level should be protected by G.I. pipe up to a height of 1.5 mtrs of suitable dia to prevent the cable from external damage.</p> <p>After completing laying of cable as per above instructions remaining refilling of the trench with soil as above proper ramming and surfacing similar to surrounding should be done by contractor to the satisfaction of railway.</p>
NS 09	Supply and fixing of 'J' type cable route marker made of cast iron as per site requirement. Drg. Should be approved before supply.
NS 10	<p>This item includes excavation of trench in cement Pebble block / CC Flooring for laying of cables on a bedding of sand at the bottom of the trench and covered the cable with layer of sand. The desired minimum depth of trench for laying cable shall be as under-</p> <p>The minimum depth of trench for laying low voltage cable below 3.3 KV shall be 0.8 meter. Width of trench should be 0.4 meter minimum. For laying cable at Railway level crossing/track (shall be laid in RCC pipe / HDPE Pipe Grade PE-80 &amp; Class PN-4 of suitable dia as per IS 4984-1995 or latest), the minimum depth from bottom of sleepers to the top of pipe shall be 01 meter. This also covers excavation of trench for laying of cable in all type of cemented flooring / Platform / Pebble block. In trench different sizes Cables shall be laid horizontally together &amp; then all these cables shall be covered by 100mm thick layer sand at bottom &amp; top of the cable. There is no need to keep bricks in Pakki trench. After laying the cable the trench should be refilled by Gutties (grommets) &amp; re-flooring by cement, sand mixture / Pebble block or as per site requirement. At locations where digging is not feasible, payment will be made in proportional to actual depth &amp; length dug and there is no need to keep bricks in trench where cable is passed through RCC pipe / HDPE Pipe / GI pipe.</p>
NS 11	Supply of material & wiring of sub-main with 2x6 sq mm PVC insulated multi-strand copper conductor cable in existing laid (surface / recessed) PVC conduit pipe and continuous running of PVC insulated copper earth wire of 1 Sq.mm as per direction of site engineer.
NS 12	Supply of material & wiring of sub-main with 2x4 sqmm PVC insulated multi-strand copper conductor cable in existing laid (surface / recessed ) PVC conduit pipe and continuous running of PVC insulated copper earth wire of 1 Sq.mm as per direction of site engineer.
NS 13	Wiring of main (for individual qtr.) with 2x4/6sqmm PVC insulated multi-strand copper cable in 20 mm dia MS conduit pipe to be fixed properly with saddles, gutties & other fixtures and continuous running of PVC insulated copper earth wire. This is including supply of material as required.
NS 14	Supply of material & wiring of sub-main with 2x2.5 sq mm PVC insulated multi-strand copper conductor cable in existing laid (surface / recessed) PVC conduit pipe and continuous running of PVC insulated copper earth wire of 1 Sq.mm. as site required.
NS 15	Supply and Fixing of 20 mm dia medium class PVC Pipe along with accessories as required in recess / surface on walls/roof properly including cutting of wall /roof and making good. PVC pipe shall be confirming to IS 9537 (part-III) 1987 or latest. The PVC conduit shall have minimum wall thickness of 1.5mm and shall have ISI marking. Saddles for fixing conduit shall
NS 16	

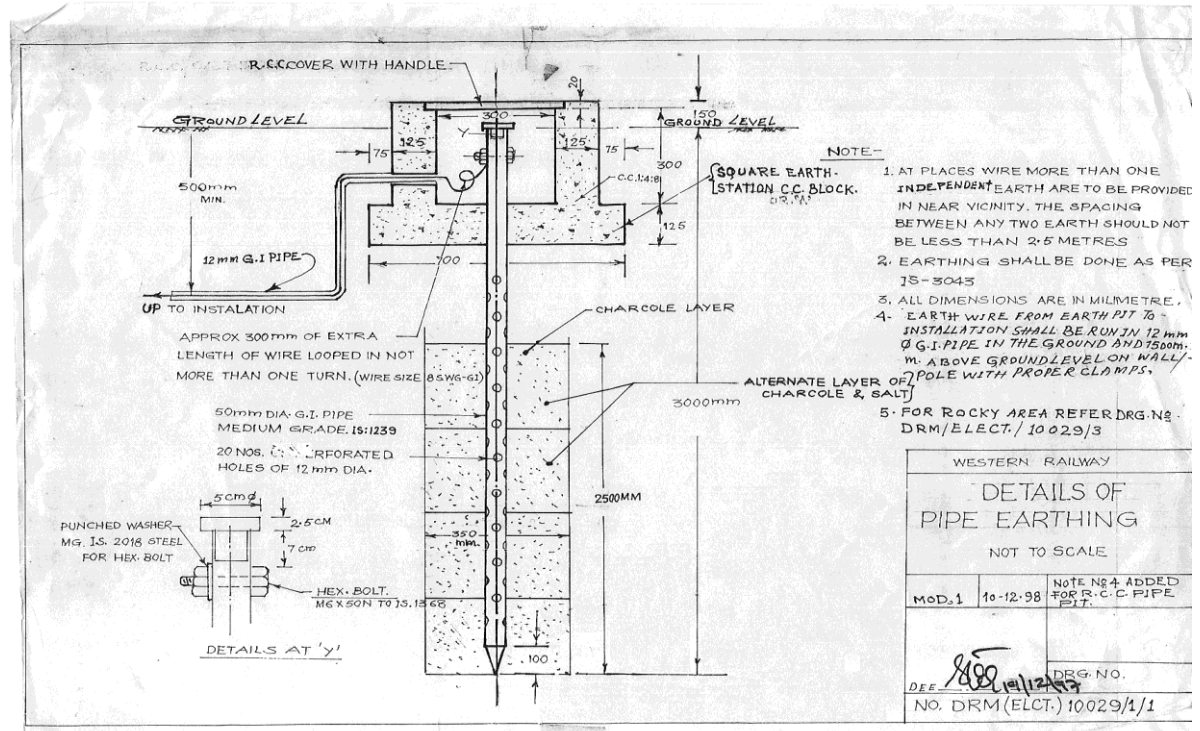
	<p>be heavy gauge non-metallic type with base. Higher size of PVC conduit shall be used wherever required for accommodating more number of wires.as per railway requirement. The colour of the PVC conduit shall be cream/white colour or other colour as approved by the Engineer.</p> <p>The surface PVC conduit shall be fixed with raw plugs saddles at equal distance of 50cm/60cm and should have necessary junction boxes, elbows as per requirement. Saddles shall be fixed at a closer distance on either sides of couplers or bends or similar fittings. After completion of Electrical work the contractor will undertake the Civil Engg Work to repatch the wall plaster and fill up the recesses etc. in the wall occurred during wiring and rewiring/fitting of the same.</p>
NS 17	<p>The contractor shall have to supply, install &amp; commission of ISI marked, PVC casing &amp; capping size 25mm x12mm (WXH) with accessories confirming to IS:14927 Part-2 or latest. The color of the PVC casing capping shall be cream/white color or other color as approved by the Engineer. The PVC casing capping shall be fixed with rawl plugs at equal distance of 50cm/60cm (approximate) and should have necessary junction boxes, elbows as per requirement. The fixing of the casing capping at a closer distance on either sides of couplers or bends or similar fittings as per site requirement.</p>
NS 18	<p>The contractor shall have to fix surface pendent mounted box type LED tube light fitting/street light /flood light fitting, batten lights or any other type light fittings as per requirement. The fitting shall be connected with the ceiling rose with PVC insulated flexible pvc pipe cord having multi strand copper conductor size 48/0.2mm (three core) or as per site requirement. Any damage to building or railway property should be made good to the satisfaction of railway by contractor else it will be recovered from contractor.</p>
NS 19	<p>Supply of material and wiring of LP/TP/FP/Ex-Fan point wiring shall be done by 03 x 1.5 Sqmm multi stranded copper flexible PVC insulated ISI marked Copper wire 1100 volts grade wire, confirming to relevant IS specifications and make of reference list shall be used for point wiring wire /switches for phase, neutral and earth shall be laid / done in concealed with heavy duty ISI marked PVC Conduit pipe, minimum 19/20 mm dia and thickness 01.5 mm along with bend / junction, inside PVC duct/ conduit as per instruction of site Engineer. Oneway modular type modular switch type 5/6A and good quality ceiling rose. Switches shall be provided on phase wire. The entire M.S. box shall have modular plate for switches and 05 Amp modular plug with required modular design groove cutting for fixing of switches / sockets etc. The wiring shall be done in such fashion that minimum conduit pipes run inside the room as far as possible. Modular type switches, 05 amp. Modular Sockets, ceiling rose, batten holder etc. shall be of reference list. The contractor shall dismantle old wiring completely in case it is replaced with new wiring. Samples of all wiring items shall be got approved from Railway before installation.</p> <p>The copper wire used for earthing purpose shall not be less than wire used for wiring. Wire shall be ISI marked confirming to relevant IS specifications and make of reference list shall be used. The sub wiring shall be done in such fashion that minimum conduit pipes run inside the room as far as possible. The contractor shall dismantle existing /old wiring completely in case it is replaced with new wiring. The circuit wiring in is to be done by 03 x1.5 sqmm insulated multi-strand copper wire for phase, neutral and earth inside PVC duct/ conduit 19/20 mm as per instruction of site Engineer. The PVC conduit shall be properly fixed with the help of MS clamps /rawl plugs as per the instructions of site Engineer. The contractor will be responsible for proper plastering and distempering / fixing of tiles to restore the original finish of wall such that it matches with original surface and colour of wall on which conduit pipe has been laid. There should be no loose connections and joints in the wiring circuit. Bends or flexible conduits should be used as per the site requirement. The wiring should be in well dressed up manner.</p> <p>Any discrepancy occurred in engineering work during the wiring should be restored in the original condition by the contractor, at his own cost. All metallic parts, fittings etc. shall be connected to the earth wire.</p>
NS 20	<p>Module Plate MS/PVC: Supply and fixing 2,3,4,6,8 &amp; 12 module modular plate for fixing of switches and sheet metal box of good quality with suitable size cover base frame as per satisfaction of site engineer and concealed fixing of MS/PVC as per site requirement.</p>
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NS 26	FAN REGULATOR: Supply and providing modular type electronic fan regulator 5step type on existing board and connection as per Railway requirement.
NS 27	Supply and fixing 5/6A plug 3/5-pin 230V or above modular type switch socket on existing board and connection with suitable PVC CU cable. A switch for controlling power supply of plug shall be connect in phase wire and earth wire size shall be same size of wiring to flow maximum fault current.
NS 28	Supply and fixing modular type 15/16A plug 6 -pin power plug 230V or above and switch modular type with metal box concealed in wall and connection with suitable PVC CU cable. A switch for controlling power supply of plug shall be connect in phase wire and earth wire size shall be same size of wiring to flow maximum fault current.
NS 29	The contractor shall have to supply, install, test & commission of Modular blank plate made of polycarbonate FR Grade & UV stabilized, ISI marked.
NS 30	Wiring of shed LP/TP in covered shed with 1.5sqmm copper wire PVC insulated & multi stranded in PVC conduit, ISI mark 1.5mm thick, size 19/20mm dia and 1.5sqmm PVC insulated multi stranded copper earth wire with ceiling rose fixed with saddles or tied properly and junction box as per railway requirement.
NS 31	Supply and fixing modular type exhaust fan 225/250mm including air curtain and making hole in wall if not exist including repairing the same properly with cement-sand or concrete and connection complete in all respect.
NS 32	Supply, install, test & commission of box type metal clad plug & socket of 20-32 Amps capacity as per site requirement. The metal clad socket shall be provided with 20-32 amps SP MCB "C" series 10kA confirms to IS: 8828:1996 or latest. The wiring shall be carried out with earth wire and to be tapped from available MDBs / SDBs etc or as per decided by the site engineer. The metal clad plug shall be fixed on the wall on 04nos. wooden gitties with suitable steel screws and washers etc as per direction of site engineer.
NS 33	Supply, installation, testing and commissioning of call bell 220/230V as per Railway requirement & make from reference list.
NS 34	The contractor shall have to supply, Fixing of MCB (SP-) 6-32 A to be provided in the MCB DB including supply of material as required as per direction of site engineer. The MCB shall comply to IS:8828/IEC 60898. The MCB housing shall have unique property of di-electric strength, arc resistance, insulation, flame retardancy and temperature resistance. The MCB shall have Minimum Breaking Capacity of 10kA as per IS/IEC 60898.
NS 35	Supply, Fixing of RCCB, 2 Pole to be provided in the MCBDB given above including supply of material as required -RCCB - 25 A/30mA
NS 36	Supply, fixing, testing and commissioning of SPN DB 8-way with provision of incoming MCB of 63A,IP 43/IK09, double door at suitable locations as per direction of site engineer.
NS 37	Supply, fixing, testing and commissioning of TPN DB 8-way having provision for incoming MCCB of 125A, IP 43/IK09, double door enclosure for outdoor purpose and having provision for SP/TP MCB for outgoing- a. The DBs shall comply with IEC 61439. b. The DBs should have IP 43(double door) for indoor application and IP 54 for outdoor application. c. The DB shall have good quality gasket to provide IP 43 and IP 54 protection. d. It should be IK09 protection confirming to IS-8623 with latest amendments. e. The DBs should be made of CRCA steel with minimum thickness of 20 gauge. f. It should have factory made 125 amp copper bus bar assembly for mounting the MCB/MCCB g. It should have insulated neutral bar and bus bar assembly. h. The DB shall be supplied with all insulated N. Bar riveted on Din channel frame and should not restrict cable entry from top or bottom. i. It should be fixed on walls /Floor properly with nuts & bolts /screws./Foundation as required.
NS 38	Supply, installation, testing &commissioning of 4-POLE MCCBs THERMO-MAGNETIC BASED: - 125Amps. MCCB rating should be confirming to IEC 60947-2. MCCB shall be capable of clearing faults up to $I_{cs} = 100\%I_{cu}$ This is to be installed in VTPN type metal double door type 8 way DB/LT panels /DB etc for

	outdoor purpose and complete in all respect as per direction of site engineer.
NS 39	Supply, fixing, testing and commissioning of RCBO double pole. Confirming to IEC 61009 or latest, sensitivity 30mA with connections capacity 25A, 230V or above, 50Hz AC on existing/separate main board as per site requirement. The RCBO to be connected in the existing/Separate board as per requirement by making proper connection in the main board and fixing the RCBO. Any alteration in the wiring of main board if required is to be done by the contractor. The features of RCBO should have inclusive of following features: (a) Isolation with positive break indication. (b) Immune to nuisance tripping due to transit over voltage (Lighting, switching surges) (c) Trip indication.
NS 40	RCBO: Supply, fixing, testing and commissioning of RCBO. Confirming to IEC 61009 or latest, sensitivity 30mA with connections capacity 63A, 4-pole, 50Hz AC on separate main board as per site requirement. The RCBO to be connected in the Separate board as per requirement by making proper connection in the main board and fixing the RCBO. Any alteration in the wiring of main board if required is to be done by the contractor. The features of RCBO should have inclusive of following features: Isolation with positive break indication. (b) Immune to nuisance tripping due to transit over voltage (Lighting, switching surges) (c) Trip indication.
NS 41	<p>The contractor shall have to supply &amp; fixing of Three phase electronic KWH energy meter surface mounting type with bottom connection and terminal cover similar to HPL Long Range meter model No.TPPB1U2314 or similar of any reputed make viz- L&amp;T/Secure/Genius etc.</p> <p>Technical specification-Three-phase, 4-wire static type (Electronic)  Accuracy -Class 1.0 as per ISI 13779:99 Voltage rating-3X240V(25%to+20%)  Current rating- 40-200amps. Frequency-50Hz+/-5%  Insulation Class-4kV Registering mechanism-Six digit impulse center with one decimal  Enclosure-Double insulated glass filled Poly carbonate  Operating temperature--10<sup>0</sup>Cto55<sup>0</sup>C  Relevant Standard-IS-13779/1999orlatest  Communication- Optical port, RS 232.</p> <p>The energy meter should have terminal cover plate with sealing arrangements for meter body cover and terminal board. Anti temper features. The complete demo should be given by OEM representative to substation staff for measurement of reading and other associating data.</p>
NS 42	Supply of AC single phase static Energy Meter 5-30/40 A capacity to measure & display of unit (KWH), Ampere (I), Voltage (V), Load (KW), maximum demand (KW) including last six month history of Energy etc. of accuracy class 1.0, 240 V, 50 Hz with backlit LCD display confirming to IS:13779 or latest. Make: Indotech, L&T, HPL, CG, Genus or similar Insulation Class-4kV, Registering mechanism-Six digit impulse center with one decimal Enclosure Double insulated glass filled Poly carbonate, Operating temperature- -100Cto550C, Relevant Standard-IS-13779/1999 or latest, Communication- Optical port, RS 232. The energy meter should have terminal cover plate with sealing arrangements for meter body cover and terminal board including Anti temper features.
NS 43	<p>Supply &amp; fixing of PVC single door with suitable fronted glass window poly carbonate box for Electronic energy meter with 20-32Amp DP isolator in existing meter box for suitable for single phase SMC 10-40A electronic energy meter and fixing on wall as per Railway requirement.</p> <p>Supply &amp; fixing of Bakelite sheet 6mm thick with suitable required bolt/fasteners and proper fixing in all respect back side of the meter box as per Railway requirement.</p>
NS 44	Supply, installation, testing and commissioning of weather proof, tamper-proof meter box made of polycarbonate/CRCA sheet steel suitable for housing 3-phase, 4-wire electronic energy meter, having minimum IP54 protection, complete with hinged door, transparent window, locking and sealing arrangement, cable entry provisions, earthing stud, mounting accessories, including all necessary hardware as required at site.
NS 45	Supply. fixing, testing and commissioning of SPN DB 12-way with provision of incoming MCB of 63A,IP 43/IK09, double door at suitable locations as per site requirement.
NS 46	Contractor shall Supply and fixing of Double Door MCB DB SP 10 way(8+2 module), neutral and earth link, with one no. DPMCB 40 amp, one no. DPRCCB 40 amp. 30 mA and six nos. SP MCB 32/25/16/10amp. 'C' series. Breaking capacity not less than 10 kA MCB, RCCB and DB should be as per tech spec. and of same make.
NS 47	Contractor shall SITC 12 way double door SPN DB having suitable IP and IK protection for

	indoor installation having one No. RCBO of 40A Capacity, Sensitivity 30mA in the incoming & having 3Nos. 16A SP MCB & 3Nos. 32A SP MCB all MCB used should be of 'C' series – 10 kA having 35 Sq.mm incoming and outgoing terminal capacity, insulated sliding shutters at terminals for safety, two position DIN rail clamps & ISI marked (conforming to Legrand Cat. No.603234 & 603237 or similar).
NS 48	Supplying, fixing and commissioning of street light fitting accessories e.g. GI pipe of suitable bore as per fitting, clamps, nuts, bolts, cable etc as per instruction of site engineer.
NS 49	Supply, Testing & Fixing of wall mounted cabin fan with regulator three speed, suitable for 220- 230 volt ,50HZ AC supply .Make- Bajaj, Usha/ Crompton Greaves /Philips or similar.
NS 50	MS Flat 40x3mm: Supply and fixing of MS flat of iron size 40x3mm with nut bolts, spacers and fixing clamps complete in all respect as per Railway requirement
NS 51	FIXING OF FAN: Fixing of ceiling fan 1200/1400mm sweep with MS flat clamp 25x3mm and 12 mm dia hook and nut bolts, GI down rod as per site requirement and connection with 2.5 sq mm PVC insulated multi-stranded Copper cable.
NS 52	DISTRIBUTION BOARD 63A: Supply fixing testing and commissioning of distribution board double door 3-phase and neutral concealed in wall with 63A four pole, 10kA incoming MCB and 12 Nos. outgoing MCB 6-32A single, as per site requirement pole with front cover locking arrangement, 4 MCB per phase as required by Railway.
NS 53	Contractor shall Supply & Fix of battery-enabled emergency LED tube light fitting, 20 W, batten type, operating voltage 140V to 230V 50 Hz, 4-feet long, complete with in-built Li-ion battery, the capacity of battery should meet at least 4 Hrs. backup, including all accessories as per specifications. The LED light fitting should be LM-79 and LM-80 certified. Make- Orient, Crompton, Phillips, Surya, Havells, Jaguar Halonix, Bajaj, Wipro and Eveready or similar with warranty of 02 years. Light should maintain minimum 25% backup lumen when its working on its inbuilt battery. Minimum life of the fitting should be 13000 burning Hrs and its battery should have minimum 500 charging-discharging life cycle. Light shall have auto cut facility after battery fully charged. Lumen efficacy should be 100 lumen/watt or above and fitting driver efficiency should be more than 85%. Emergency light shall be fixed mechanically at the required place as instructed by site supervisor including all the accessories. Light shall be fixed properly and as per satisfaction of Railways. The optimum distance between two inverter/emergency type fitting should be 5-10 meter to maintain uniform illumination in case of power failure.
NS 54	Contractor shall supply and fix of mirror fancy light LED fitting 3-5 watt as per site requirement.
NS 55	Contractor shall supply and fix of TV point as per per site requirement to the satisfaction of Railways.
NS 56	Contractor shall supply and fixing of co-axial wire as per site requirement to the satisfaction of Railways.
NS 57	<p><b>General</b> - Governing Specification – IS: 3043</p> <p><b>Earth Pipe:</b> 50-mm dia, "B" class, Medium, ISI marked, Approximate single piece of 03 meter length, Galvanized coating, relevant IS, perforated holes of 12mm dia.</p> <p><b>Protection Pipe for GI wire:</b> 12mm dia, "A" class, Light, ISI marked, Galvanized coating, relevant IS.</p> <p><b>Nuts &amp; Bolts:</b> with Galvanized coating.</p> <p><b>Inspection Chamber:</b> Square earth station C.C. Block, C.C. Ratio: 1:4:8, chamber with RCC cover &amp; handle.</p> <p>The measurement of the earth resistance shall be carried out as per relevant 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 conductors 4 mm GI wire crossing the pucca floor shall be buried at a depth of 6inch inside GI pipe of 12mm dia and then cemented. Earth conductors should be laid underground at a depth of 0.6 meter inside GI pipe of 12mm dia in all other cases. Earth conductors running vertically along the wall also shall be embedded inside protection pipe along with suitable cleats. Provision of watering the earth pits periodically shall be provided as per IS. The earth pit shall have to be covered in a cement concrete cover and top cover of G.I. or RCC slab as per standard practice. 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 ohmic resistance more than 8 ohms. If</p>
NS 58	

the above stated earth resistance is not achieved, necessary improvement shall be made by the contractor by provision of additional electrode or by artificial treatment of soil etc. as may be directed by the engineer in charge. The Earth pipe should be covered by suitable metal threaded cap/top.



NS 59 Contractor must supply & laying of earth connection from earth electrode with 4 mm GI wire properly fixed on wall with wooden gutties etc as per the satisfaction of site supervisor.

NS 60 **Technical Specification- Smart Thermostat for Air conditioning System Applications**

**1. General Description:** The smart thermostat shall be a microprocessor based, wall mounted, WI-FI and BLE enabled digital controller designed for use with split/DX systems, the thermostat shall operate either standalone or network connected via secure wireless communication for centralized monitoring and controlling using Mobile/Wen app. It shall feature energy saving modes, occupant comfort control and Economy mode for automatic DG detection.

## 2. Electrical & Mechanical Specification:

Parameter	Specification
Power Supply	90-265 V, AC, 50Hz
Temperature Control Range	18°C-30°C (Adjustable)
Accuracy	±0.5 °C
User interface	Free rotating dial
Wireless Connectivity	Wi-fi (2.4 GHz IEEE 802.11 b/g/n) and BLE (Bluetooth Low Energy)
Operating Temperature	0°C - +50°C
Storage Temperature	-20 °C to +70 °C
Relative humidity	10% to 95% RH (non-condensing)
Enclosure Material	Flame retardant Polycarbonate (PC FR)
Protection Class	IP30
Impulse Voltage Rating	2.5kV, Category II
Mounting	Key hole wall-mounted
Dimensions (Approx.)	96x96x28 mm
Weight	≤ 104g

## 3. Functional Requirements:

Feature	Requirement
Operating Modes	Smart mode/Manual modes/Default

	Control Type	Proportional (0-10 V DC) and/or On-Off control
	Temperature Sensing	Built-in NTC /Semiconductor sensor (optional BLE remote sensor support)
	Set point adjustability	User configurable, lockable by administrator
	Connectivity	Local BLE (and/or) Wi-Fi
	Configuration & Commissioning	Through mobile/web app; offline operation possible
	Power-fail Retention	Non-volatile memory for parameters
	Display Indications	Cool, Slightly Cool, Comfort, Slightly Hot, Hot
	Safety Features	Short-circuit and overload protection on outputs
	Compatibility	Compatible with split units, or packaged AC units
	<b>4. Others:</b>	
	<b>Feature</b>	<b>Requirement</b>
	Control Resolution	0.5°C
	Response Time	≤ 1 second for digital output change
	Communication Security	WPA2/WPA3 compliant
	Standards & Certifications	CE, RoHS, and compliance with EN 60730-1, EN 60730-2-9 and Ratio ETSI EN 300 328
	Testing & Quality	Each thermostat shall undergo factory calibration and 100% functional testing before dispatch
	<b>5. Installation &amp; Commissioning Requirements:</b>	
	<ul style="list-style-type: none"> <li>The thermostat shall be supplied with a screw kit suitable for wall mounting.</li> <li>It shall be possible to connect it via 230V AC power on site.</li> <li>Commissioning shall be possible through mobile application (via BLE) without requiring network connectivity.</li> <li>The thermostat shall have auto-recovery capability after power failure without data loss.</li> <li>Firmware upgradation shall be possible through OTA (Over-The-Air) method.</li> </ul>	
	<b>6. Energy &amp; Comfort Features:</b>	
	<ul style="list-style-type: none"> <li>Adaptive temperature recovery for maintaining set point accuracy.</li> <li>Auto fan speed adjustment based on temperature deviation.</li> <li>Configurable comfort bands for occupant comfort optimization (Warm/Neutral/Cool).</li> <li>Optional remote sensor integration for accurate room sensing.</li> </ul>	
	<b>7. Environmental &amp; Safety Compliance:</b>	
	<ul style="list-style-type: none"> <li>The product shall be RoHS compliant and made from flame-retardant materials.</li> <li>Shall conform to safety standard EN 60730-1 (Automatic Electrical Controls for Household and Similar use).</li> <li>Shall maintain full functionality under 10%-95% RH non-condensing environments.</li> </ul>	
	<b>8. Guarantee &amp; Documentation:</b>	
	The manufacturer/supplier shall provide minimum 60 months of warranty from date of commissioning.	
	Thermostat shall be supplied with Operation and installation manual, wiring diagram and commissioning guide.	
	All the necessary accessories required for installation shall be provided by Contractor.	
NS 61	Annual subscription charges per thermostat for mobile App and web services for remote monitoring and controlling of thermostat from a central location for 3 years.	

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