SUPPLY, ERECTION & COMMISSIONING OF CONSTRUCTION POWER SUPPLY SYSTEM
AT
1 X 800 MW SUPER CRITICAL EXPANSION UNIT, DEEN BANDHU CHOTU RAM TPP YAMUNA NAGAR, HARAYANA

VOLUME – I
CONSISTING OF:

- **Volume-IA: Technical Conditions of Contract,**

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northren Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301 (INDIA)

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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CONTENT

1.0 PROJECT INFORMATION

PROJECT: 1 X 800 MW SUPER CRITICAL EXPANSION UNIT, DEEN BANDHU CHOTU RAM TPP YAMUNA NAGAR, HARAYANA

HPGCL has awarded the work for 1x800 MW coal based thermal power Unit as expansion of 2x300 MW DCRTPP plant at Yamuna Nagar, Haryana on EPC basis

Project Information is as follows:

Sl. No.	**Title**	**Description**	
1	Owner/Customer	HARYANA POWER GENERATION CORPORATION LIMITED, PANCHKULA, HARYANA.	
2	Project Title	Deen Bandhu Chhotu Ram Thermal Power Plant (1X800 MW Expansion Unit), Yamuna Nagar.	
3	Owner's Consultant	DESEIN PRIVATE LIMITED, NEW DELHI	
4	Project Site Location	PLACE	KALANAUR
		DISTRICT	YAMUNA NAGAR
		STATE	HARYANA
		COUNTRY	INDIA
5	Latitude & Longitude of project site	North	30º 06' 34" N
		East	77º 19' 43" E
6	Nearest Railway Station	Kalanaur	2 Km
7	Nearest Town	Yamuna Nagar	8 Km
8	Nearest Water Body	Western Yamuna Canal, adjacent to site	
9	Station Graded Level Elevation from Mean sea level (MSL)	Land Contour varies from RL Plant FGL 270.00 M Plant FFL 270.50 M	
10	Nearest Airport	The nearest major airport is Chandigarh at about 110 km by road.	
11	Nearest Highway	National Highway- 344	
12	Nearest Water Body	Western Yamuna Canal, adjacent to site	
13	Station Graded Level Elevation from Mean sea level (MSL)	Land Contour varies from RL Plant FGL 270.00 M Plant FFL 270.50 M	
15	Basic Wind Speed	As per IS 875 latest revision For wind resistance design of structure & equipment refer relevant civil section	

Note: - The bidder is advised to visit and examine the site of WORKS and its surroundings and obtain for himself on his own responsibility all information that may be necessary for preparing the bid and entering into the CONTRACT. All costs for and associated with site visits shall be borne by the bidder.

2.0 SCOPE OF WORK

The proposed construction power supply network shall have:

a) Supply and E&C of 11kV VCB and other allied works.
b) 10 nos substations of rating 500kVA, 11/0.433kV each. All the substations shall be connected to 11 kV ring main feeder through 11kV Overhead line and underground cables. The number of substations may vary depending on site requirements.
c) 3 PHASES of overhead lines of ring main system for Construction Power
d) Power supply network extend from Power plant area to BHEL laydown area.
e) Erection and commissioning of 2.5 MVA 11/11.5 KV Transformers
f) Laying of HT & LT Cables as per the project requirement.
g) Erection of pre-stressed cement concrete poles (PSCC) and Pole ISMB-250 are in scope of vendor
h) Erection of Pole 9 meter made of sheet steel for area lighting. Each pole shall have one 90W & 150 W LED street light.
i) Area Lightning works
j) Any other work which required to complete the job.
k) Supply and Erection & commissioning of 10 nos 30-Meter-High Mast
l) Operation & Maintenance
m) Supply of items as per BOQ
n) The total work is divided into two different packages:

2.01 PACKAGE - A

- The scope of work of this package covers design of construction power network, supply of items as mentioned in BOQ (actual requirement shall be in line with the design) required for completion of work apart from the BHEL supplied items, further identification of items at stores / yards, checking, reporting the damages if any, taking delivery at storage yard / stores, loading, transportation, unloading at Contractor's stores / working yard, keeping in safe custody in contractor's stores, pre-assembly, calibration, checking, erection, testing and commissioning, & post-commissioning activities obtaining statutory clearances along with the supply of all consumables, tools and tackles, testing instruments, supply of consumables like electrodes, gas, cable dressing materials, HT / LT insulation tapes, tag plates, PVC sleeves for wire marking, lugs, fasteners, paints and its consumables. Deployment of skilled / unskilled manpower, engineers / supervisors, Tools & Plants (T & P), Material handling equipments, testing instruments, returning of un-used materials / items to BHEL stores. The installation and commissioning of all the electrical equipments / items shall confirm to the technical requirements specified elsewhere in the tender.
- All the erection material is stored at BHEL laydown area. The distance to be traversed for shifting of the material from BHEL laydown area to erection site is approx.3-5 km, as per the designated route and identified material entry/exit gates of HPGCL.
- The scope of Package A also includes Operation and maintenance of construction power distribution system till commencement of contract period of package B.

2.02 PACKAGE - B

- Deployment of minimum 2 (Two) Electricians (with minimum experience of 5 years in HT system) & minimum 1 (One) Helper with required T&P per shift for three shifts per day and 1 (One) Supervisor for day shift for the works of operation and maintenance of construction power distribution system which consists of all the components and equipments erected and

commissioned under package A. **The man power should be available throughout the year inclusive of all holidays and Sundays.**

- Operation & maintenance of High Masts, Electrical works in BHEL Offices, BHEL Stores, BHEL yards, etc. inside the Main Plant boundary erected and commissioned by other agencies will be part of this package. The Electrical works of storage areas outside the main plant boundary (if any) erected and commissioning by other agencies shall also be covered under this O&M package.
- The scope of O & M work includes identification of items at stores / yards, checking, reporting the damages if any, taking delivery at storage yard / stores, loading, transportation to working yard, pre-assembly, calibration, checking, replacing, testing and commissioning, & post-commissioning activities using vendor's own tools and tackles and testing instruments along with the supply of all consumables like insulation tapes, HT tapes, electrodes, gas, paints, cable dressing materials, tag plates, PVC sleeves etc.
- The supply of faulty parts and spares are excluded from the contractor's scope and will be provided by BHEL free of cost.
- All necessary Hand tools, multi-meters, Megger, earth tester, earthing rods etc. shall be in the contractor's scope. Fire extinguishers supplied under package-A shall be maintained by the contractor till the of end O & M period.
- Any other special tools & tackles required to maintain the System shall be arranged by the contractor.
- During the maintenance period, if the contractor fails to deploy adequate manpower continuously for two weeks, BHEL shall engage a maintenance agency at the risk and cost to contractor. All the tools and plants required for preventive maintenance and breakdown maintenance shall be arranged by the contractor.
- During the maintenance period, Contractor shall also replace any defective items from spares at free of cost for all electrical installation. The replacement materials/ spares for the items supplied by the contractor shall be replaced by the contractor free of cost. The replacement materials / spares for the items supplied by BHEL shall be supplied by BHEL as free issue.

2.03 BHEL SUPPLIED ITEMS

The following items will be supplied by BHEL (free of cost) for completion of the construction power network:

a) 1 No 11Kv/11.KV Transformer to be used at the primary side of the network.

b) 10 Nos. of 11/0.433kV Package substations (500kVA) comprising of HT switchgears, 11/0.433kV transformer and LT switchgears

c) HT (11kV) Cables for Ring Main System and Interconnection of Packages substations and interconnection of ring main system to CHP area and BHEL Laydown area.

d) LT Cables (1.1kV) for power feed to LT Distribution boards, Offices, High Masts feeder, Interconnection of control system, UPS, etc. as per the project requirement.

2.04 BROAD SCOPE OF WORK:

THE SCOPE OF THE WORK WILL COMPRISE OF BUT NOT LIMITED TO THE FOLLOWING:
(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

a) This work involves the provision of construction power for the **1x800MW Yamunanagar** Project. Since the customer is not providing any input power source, BHEL shall arrange its own **2.5 MVA** connection from **M/s UHBVN.** 11kV Ring is in the scope of this work. The power from this construction power substation shall feed the 11kV overhead line to be formed in the form of

Ring Main System and shall be used for providing construction power to the complete project with occasional interconnection through underground HT cables at special places like road crossings, etc. 10Nos. Package substations of rating 500kVA, 11/.433 kV shall be fed from this ring main system for further distribution to end consumers. The scope also includes obtaining of statutory clearances for charging of the system.

b) The scope also includes obtaining of statutory clearances from electrical inspector before charging of network.

c) Any other items that are required for completion of construction power supply system but are not explicitly mentioned in the contract are also part of the contract on mutually acceptable rates. Sufficient evidence shall be provided for deriving the rates of these items.

d) The drawings provided along with the tender are only schematic, typical and tentative. The contractor shall prepare final detailed drawings in consultation with site engineers after carrying out the route survey for distribution. These drawings shall be prepared in accordance with IE-Rules and have to be approved by the electrical statutory authorities. Obtaining approval from statutory authority shall be the responsibility of the contractor and any expenditure involved in getting approval from statutory authority for the drawings and documents generated by the contractor shall be borne by the contractor. Based on the detailed drawings, contractor shall procure/ fabricate, install all construction power supply equipment as required and erect as per drawing. After CEA if any modification/correction is required in line with applicable IE standards the same has to be done by vendor.

e) The work shall be done as per the final layout decided in consultation with BHEL Engineer at site which may vary with proposed drawings as above. This shall be done without any additional financial implication on BHEL.

f) Contractor shall perform Erection, Testing & Commissioning Including Obtaining Approval of entire installation from appropriate statutory authority. Contractor shall bear all the statutory fees/ levies/ charges and all other expenses in connection with the approval of installations.

g) Construction of entire system shall also include cutting/ trimming of branches of trees or clearing of any other obstruction that may come in the way of overhead line, however this must be done with the approval of HPGCL/ BHEL.

h) Contractor shall provide the services of Operation & Maintenance of entire system to ensure reliable availability of the system and shall attend to the break downs and replace the defective components promptly. Failing which BHEL will get the same done at the risk and cost of the contractor.

i) Contractor shall provide Materials, Equipment, and Devices etc. as per finally approved documents. These should be of reputed make and the equipment/components shall conform to BIS specification and IE rules.

j) Operation and Maintenance of the system as mentioned in **Package-B.**

k) Agency shall quote for complete **Package – A & Package – B**. Incomplete bid shall not be acceptable.

Package – A

FOR CONTRACTOR SUPPLIED ITEMS:

The scope of work covers identification of items at stores/ yards, checking, reporting the damages if any, supply, taking delivery at storage yard / stores,loading, transportation, unloading at Contractor's stores/ working yard, keeping in safe custody in contractor's stores, pre-assembly, calibration, checking,erection, testing and commissioning, & post-commissioning activities along with the supply of all consumables, tools and tackles, testing instruments, supply of consumables like electrodes, gas, cable dressing materials, HT/ LT insulation tapes, tag plates, PVC sleeves for wire marking, lugs, fasteners,

paints and its consumables. Deployment of skilled/ unskilled manpower, engineers /supervisors, Tools & Plants (T&P), Material handling equipment, testing instruments, returning of un-used materials / items to BHEL stores. The installation and commissioning of all the electrical equipment/ items shall conform to the technical requirements specified elsewhere in the tender

FOR BHEL SUPPLIED ITEMS:

The scope of work covers identification of items at stores/ yards, checking, reporting the damages if any, taking delivery at storage yard/ stores, loading, transportation, unloading at Contractor's stores/ working yard, keeping in safe custody in contractor's stores, pre-assembly, calibration, checking, erection, testing and commissioning, & post-commissioning activities along with the supply of all consumables, tools and tackles, testing instruments, supply of consumables like electrodes, gas, cable dressing materials, HT/ LT insulation tapes, tag plates, PVC sleeves for wire marking, lugs, fasteners, paints and its consumables. Deployment of skilled/ unskilled manpower, engineers / supervisors, Tools & Plants (T & P), Material handling equipment, testing instruments, returning of un-used materials / items to BHEL stores. The installation and commissioning of all the electrical equipment/ items shall conform to the technical requirements specified elsewhere in the tender.

Note:
The scope of Package-A also includes Operation and maintenance of construction power distribution networks including PSS and all other system of Package-A till commencement of contract period of Package-B.

HT ELECTRICAL LICENCE:
Contractor should possess valid "HT Electrical Contractor Licence" issued by Haryana STATE Electricity authorities for executing 11kV electrical works before start of work. Copy of the certificate shall be furnished to BHEL site engineer before the start of work.

ANOTHER TECHNICAL REQUIREMENT

1.All Civil works as required for Installation of this complete system and other incidental civil works e.g. grouting of poles/ stays/ posts, foundations, substations including necessary earthwork like excavation, backfilling and formwork, provision of all requisite materials like cement, sand & grit, reinforcement steel, T&P, shuttering etc. are in scope of contractor.
2.The substation area shall be fenced as per Indian electricity rules & regulation and shall have provision of lockable door.
3.Earthing of all the sub-station equipment and overhead line shall be carried out as per IS: 3043.

MATERIALS / CONSUMABLES TO BE ARRANGED BY THE CONTRACTOR FOR ERECTIONAND COMMISSIONING AS PART OF THE SCOPE WITHIN THE QUOTED RATE / PRICE

a) All types of welding electrodes, filler wires, Gases

b) Provision for Temporary Scaffoldings.
c) Insulation tape (HT/ LT).
d) Paints required for primer & final coating and for protective coating.
e) Solder wire (Lead) -(60/40)
f) Protocol / Calibration report sheets as per BHEL Format.
g) Panel/ JB sealing compound material (for cable entry from bottom / top of Panel).
h) Materials required for cable dressing (GI/ aluminum flats, PVC cable ties etc.).
i) PVC wire marker sleeves and Tag plate.
j) Lugs of all size.
k) Anchor fasteners for fixing of frames, GI pipes & LDBs / JBs.
l) All Material/ Consumables are in the contractor's scope for efficient working of the system excluding BHEL supplied items mentioned explicitly in this contract.

2.05 NOTE TO CHAPTER-II:

a) Detailed BOQ with detailed specification of various equipments and items are given in the Chapter – XII: Bill of Quantity & Weightages/ Factor. The rate schedule is the summary of BOQ i.e. consolidated list of BOQ. Contractor shall go through the detailed BOQ with respective rate schedule Id no. and specification before filling the rate in the rate schedule.

b) FOR FURTHER DETAILED SCOPE OF WORKS REFER RELEVANT CHAPTERS IN THIS BOOK.

3.0 SCOPE MATRIX

Sl. No.	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.1	**ESTABLISHMENT**			
3.1.1	**For construction purpose**			
a	Open space for office (as per availability)	Yes		Location will be finalized after joint survey with BHEL
b	Open space for storage (as per availability)	Yes		Location will be finalized after joint survey with BHEL
c	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	
d	Bidder's all office equipment, office / store / canteen consumables		Yes	
e	Canteen facilities for the bidder's staff, supervisors and engineers etc		Yes	
f	Firefighting equipment like buckets, extinguishers etc		Yes	
g	Fencing of storage area, office, canteen etc of the bidder		Yes	
3.1.2	**For living purpose**			
a	Open space for labour colony (as per availability)		Yes	Contractor has to make his own arrangements for space, shelter and transportation of labors as per their requirement.
b	Labour Colony with internal roads, sanitation, complying with statutory requirements		Yes	
3.2	**ELECTRICITY**			
3.2.1	**Electricity for construction purposes 3 Phase 415/440 V**			**Contractor has to make his own arrangement.**
a	Single point source of 440 V		Yes	
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.2	**Electricity for the office, stores, canteen etc. of the bidder (to be specified whether chargeable or free)**			**Contractor has to make his own arrangement.**
a	Single point source		Yes	

Sl. No.	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.3	**Electricity for living accommodation of the bidder's staff, engineers, supervisors etc**		Yes	**Contractor has to make his own arrangement.**
a	Single point source		Yes	
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.3	**WATER SUPPLY**			
3.3.1	**For construction purposes (to be specified whether chargeable or free)**			**Contractor has to make his own arrangement.**
a	Making the water available at single point		Yes	
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.3.2	**Water supply for bidder's office, stores, canteen etc**			**Contractor has to make his own arrangement.**
a	Making the water available at single point		Yes	
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.3.3	**Water supply for Living Purpose**			**Contractor has to make his own arrangement.**
a	Making the water available at single point		Yes	
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.4	**LIGHTING**			**Contractor has to make his own arrangement.**
a	For construction work (supply of all the necessary materials) 1. At office/storage area 2. At the preassembly area 3. At the construction site /area		Yes	
b	For construction work (execution of the lighting work/ arrangements) 1. At office/storage area 2. At the preassembly area 3 At the construction site /area		Yes	

Sl. No.	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
c	Providing the necessary consumables like bulbs, switches, etc during the course of project work		Yes	
d	Lighting for the living purposes of the bidder at the colony / quarters		Yes	
3.5	**COMMUNICATION FACILITIES FOR SITE OPERATIONS OF THE BIDDER**			Contractor has to make his own arrangement.
a	Telephone, fax, internet, intranet, e-mail etc.		Yes	
3.6	**COMPRESSED AIR (wherever required for the work)**		Yes	Contractor has to make his own arrangement.
3.7	**DEMOBILIZATION OF ALL THE ABOVE FACILITIES**		Yes	Contractor has to make his own arrangement.
3.8	**TRANSPORTATION**			Contractor has to make his own arrangement.
a	For site personnel of the bidder		Yes	
b	For bidder's equipments and consumables (T&P, Consumables etc)		Yes	

S. No. 3.9	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.9.1	**Engineering works for construction**			Not Applicable
a	Providing the erection/constructions drawings for all the equipment covered under this scope		Yes	In consultation with BHEL
b	Drawings for construction methods		Yes	In consultation with BHEL
c	As-built drawings – where ever deviations observed and executed and also based on the decisions taken at site- example – routing of small bore pipes		Yes	Changes are to be marked in drawing & handover to BHEL on completion of work.
d	Shipping lists etc for reference and planning the activities			NOT APPLICABLE
e	Preparation of site erection schedules and other input requirements		Yes	In consultation with BHEL
f	Review of performance and revision of site erection schedules in order to achieve the end dates and other commitments		Yes	In consultation with BHEL
g	Weekly erection schedules based on Sl. No. e		Yes	In consultation with BHEL
h	Daily erection / work plan based on Sl. No. g		Yes	In consultation with BHEL

S. No.	Description	Scope / to be taken care by		Remarks
3.9	**PART II ERECTION FACILITIES**	**BHEL**	**Bidder**	
i	Periodic visit of the senior official of the bidder to site to review the progress so that works is completed as per schedule.		Yes	
j	Preparation of preassembly bay		Yes	
k	Laying of racks for gantry crane if provided by BHEL or brought by the contractor/bidder himself			Not Applicable
L	Arranging the materials required for preassembly		Yes	

3.1 LAND FOR SITE OFFICE/Storage area

a) To establish a temporary site office at site and storage area. Contractor has to make his own arrangements for labour colony.

b) BHEL shall not provide to the contractor any residential accommodation to any of his staff and the contractor has to make his own arrangements.

c) Location and area requirement for office shall be discussed and mutually agreed to.

3.2 CONSTRUCTION WATER

a) Construction water to be arranged by Contractor (Bidder).

3.3 CONSTRUCTION POWER

a) LT Power may be taken from first charged substation as mentioned below.

b) Electricity for construction purpose LT power will be provided by BHEL at one single point on non-chargeable basis. Further distribution of electricity shall be arranged by the contractor at his cost.

c) Any duty, deposit involved in getting the Electricity shall be borne by the bidder. As regards contractor's office shed also all such expenditure shall be borne by the contractor.

d) Provision of distribution of electrical power from the given single central common point to the required places with proper distribution boards, approved cables and cable laying including supply of all materials like cables, switch boards, pipes etc., observing the safety rules laid down by electrical authority of the State / BHEL / their customer with appropriate statutory requirements shall be the responsibility of the tenderer / contractor.

e) BHEL is not responsible for any loss or damage to the contractor's equipment as a result of variations in voltage / frequency or interruptions in power supply.

3.4 MATERIALS / CONSUMABLES TO BE ARRANGED BY THE CONTRACTOR FOR ERECTION AND COMMISSIONING AS PART OF THE SCOPE WITHIN THE QUOTED RATE / PRICE

a) All types of welding electrodes, filler wires, Gases

b) Provision for Temporary Scaffoldings.

c) Insulation tape (HT/LT).

d) Paints required for primer & final coating and for protective coating.

e) Solder wire (Lead) -(60/40)

f) Protocol / Calibration report sheets as per BHEL Format.

g) Panel/ JB sealing compound material (for cable entry from bottom / top of Panel).

h) Materials required for cable dressing (GI / aluminium flats, PVC cable ties etc.).
i) PVC wire marker sleeves and Tag plates
j) Lugs of all size.
k) Anchor fasteners for fixing of frames, GI pipes & LDBs / JBs.

4.0 T&Ps and MMEs TO BE DEPLOYED BY CONTRACTOR

4.1 **The following minimum major (T&P) shall be deployed by the contractor for execution of this contract with in the quoted rate:**

S. No.	Description	quantity
1	Oil filtering machine with BDV kit	APR
2	Man-lifter	APR
3	Farana	APR
4	Trailer	APR

4.2 All the tools & plants required for this scope of work are to be arranged by the contractor within the quoted rates. Necessary accessories for the tools & plants shall also be provided by the contractor.

4.3 **EQUIPMENT/ T&P FOR TESTING & COMMISSIONING: APR**

The following testing equipment / T&P shall be made available at site by contractor in sufficient number to carry out the job simultaneously in more than one area.

1) Insulation tester:
   a) Motorised megger: 0 - 1000 - 2000 - 5000V, 0 - 25000 M ohms
   b) Hand operated megger: 0.5 kV/1.0 kV/2.5 kV, 200 - 100 M ohm
2) Earth resistance tester: 0 to 1, 10, 100 ohms
3) Torque wrench
4) Voltmeter AC: 0 - 125 - 250 - 625 V
5) Ammeter AC: - 0 - 2A - 10A.
6) Wattmeter AC/DC: 0 - 125 - 250 V 0-5-10A.
7) Multimeter analogue: AC: V 2.5V - 2500V,
   AC: A 100 mA - 10 A, 10A- 200A
   DC- V 25.V - 2500V, DC- A - 50mA - 10A
   Resistance - 0 - 200 M ohms
8) Multimeter - digital:
   Voltages AC&DC: 100mv - 1000V
   Current: 10mA - 10A
   Resistance: 0-20 M ohms
9) Variac - 1 /3 phase - 5A, 15A 3 phase - 10A, 20A.
10) Secondary injection kit - 0-5A.
11) HV Test kit - 50 kV AC 400kVA.
12) Vacuum cleaner.
13) Phase sequence meter - 110V - 450V - 25 to 65Hz.
14) Frequency meter - 0 - 115 - 230 - 4500 - 45 - 601/s.
15) Tong tester - 0 - 5A - 10A, 30A, 60A, 150A - 600A, 500A-1000A.
16) Tachometer etc.
17) mA Source
18) Contact resistance measurement kit
19) Micro ohm meter
20) Air blower.

21) Earth Discharge Rod: Minimum 04Nos.

4.4 **EQUIPMENT / T & P FOR OPERATION AND MAINTENANCE: APR**

The following testing equipment / T&P shall be made available at site by contractor in sufficient number to carry out the job simultaneously in more than one area.

1) Insulation tester:
   a) Motorised megger - 0 - 1000 - 2000 - 5000V, 0 - 25000 M ohms
   b) Hand operated megger - 0.5 KV/1.0 KV/2.5 KV, 200 - 100 M ohm
2) Multimeter–Digital / analogue:
   AC: 2.5V - 1000V,
   AC: 100 mA - 10A, 10A- 200A
   DC: 25.V - 2500V,
   DC: 50mA - 10A
   Resistance: 0 - 200 M ohms
3) Vacuum cleaner, Aluminium ladder
4) Phase sequence meter - 110V - 450V - 25 to 65Hz.
5) Tong tester - 0 - 5A - 10A, 30A, 60A, 150A - 600A, 500A-1000A.
6) Air blower, earthing rods, Manila ropes for Changing of Disc insulator
7) Tool box set.
8) Man-lifter shall be arranged by the vendor for operation and maintenance of street light poles and any other height works as per requirement.

4.5 **ACCURACY REQUIREMENT OF TESTING INSTRUMENTS**

S. No.	INSTRUMENT / TOOL	RANGE	ACCURACY
1	Power Pack	0 to 50V DC, 3A	± 2%
2	Analog Multimeter	Voltage 2.5 to 2500V AC	± 1.0%
		Current 100 mA to 10A AC	± 2.0%
		Current 250 micro A to 1A DC	± 1.5%
		Resistance upto 100 ohms	± 3.0%
		Voltage 2.5V to 2500V DC	± 1%
3	Digital Multimeter	Voltage 200mV to 1000 V DC	± 1% + 1 digit
		Philips Voltage 200mV to 1000 V AC	± 1% + 1 digit
		Hcl Current 200mA to 20 A AC	± 0.8% + 1 digit
		Philips Current 20 mA to 20 A AC	± 0.8% + 1 digit
		Resistance (Hcl) 2120 200* to 200M*	± 0.5% + 1 digit
		Resistance (Hcl) 2105 200* to 200M*	± 0.25% + 1 digit
		Hcl Voltage 200mA to 750 V	± 0.8% + 1 digit
		Philips Current 20 mA to 20 A DC	± 0.5% + 1 digit
		Hcl Current 200 mA to 010A AC	± 1% + 1 digit
5	Secondary Injection Kit	Upto 5A	± 0.5mA
6	Motor operated Megger	Upto 200 Ohms	± 5% at Centre scale
7	Tongue tester	0/300/600A AC	± 5%
		0 to 300A DC	± 5%

S. No.	INSTRUMENT / TOOL	RANGE	ACCURACY
8	Tachometer (Hand held	0 to 4000 rpm	± 5%
9	Phase Sequence Meter		N/A
10	Three Phase Variac	15 A Capacity	N/A
11	Feeler gauges	300 mm long and 100 mm long	± 2 microns
12	Dial gauges	0 to10mm	± 0.01 mm
13	Hand operated Megger 500V / 1000V	Upto 200 M Ohms	± 5% at Centre Scale ± 10% at end of Scale
14	Motorised Megger 2.5 kV	Upto 1000 M Ohms	± 5% at Centre Scale ± 10% at end of Scale
15	Motorised Megger 2.5 kV	Upto 200 M Ohms	± 5% at Centre Scale ± 10% at end of Scale
16	Earth Resistance tester (Megger)	0 to 1, 10, 100 Ohms	± 5% at Centre Scale range
17	AC tongue Tester	0 to 300A AC	± 3%
18	DC Tongue Tester	0 to 300A DC	± 5%
19	High Voltage test Kit	Upto 50 KV AC	± 10%
		Upto 70 KV DC	± 10%
20	Tacho Generator (Mech)	0 to 4000 rpm	± 0.25%
21	DC Ammeter	0 to 300 A	± 10%
22	DC Voltmeter	0 to 500 V	± 10%
23	Micro ohm meter	10V and 100 V	
24	Primary Injection Kit	0-10000A	
25	Single Phase Variac	0-15 Amps	
26	Motor direction tester		
27	DC Tong Tester (mA)	0-500 mA	
28	Contact resistance tester for breaker contact resistance measurement		
29	Motorised Megger 5kV	10000 M ohms	

4.6 **NOTES FOR THIS CHAPTER:**

a. List of T & Ps and testing equipments are for illustrative purpose only. Any other T & Ps and testing equipments required for successful completion of the scope of the contract shall also be arranged by the contractor within the quoted rates.

b. All testing instruments shall have calibration certificate issued by recognized / accredited agencies.

c. The above instruments / equipment will be sent for testing and calibration wherever from time to time and maintained by contractor as required by BHEL.

d. List of such agencies and periodicity of calibration with calibration certificate required for different instruments will be furnished to BHEL at site.

e. Contractor shall maintain calibration records as per the BHEL format and produce them whenever called for by BHEL Engineers.

f. Contractors shall arrange experienced/ qualified persons for using these calibration instruments at laboratory and also at work spot.

g. Wherever frequent calibration is required, contractor shall arrange adequate number of instruments such that the work does not suffer for want of test instruments.

h. Equipment, vehicles, tools and plants and materials brought to site by the contractor from his resources shall have distinctive identification marks and the contractor shall intimate the description and quantity to BHEL in writing.

i. All construction materials brought by the contractor shall have prior approval regarding quality and quantity by BHEL. The contractor shall also provide without any extra cost necessary enclosure containers and protective materials for proper storage of materials inside while the materials are in their custody, whenever so instructed by the purchaser without any extra cost.

j. No material or equipment or tools etc. shall be taken out of the work-site without the written consent of BHEL.

k. BHEL shall not be responsible for the safety and protection of the materials of the contractor and the contractor shall make his arrangements for proper watch and ward for his materials.

l. The above list is only indicative and these T&Ps may not be required for entire contract period but contractor shall ensure the availability of the T&Ps as per work requirement and T&P Deployment schedule. T&P Deployment schedule shall be finalized at site in consultation with BHEL Engineer based on the work fronts/work requirement. BHEL decision shall be final and binding regarding the T&P deployment schedule. Contractor shall mobilize / maintain the T&P's as per the deployment schedule notified time to time by BHEL Engineer.

m. APR- Contractor has to deploy T&P, MMD, IMTE as per requirement of site and as decided by BHEL Engineer.

n. In case BHEL had to deploy its own T&P, hire charges of T&P applicable for outside agencies as per extant guidelines for "Hire Charges on issue of Capital Tools & Plants" shall be recovered.

o. In case BHEL had to deploy the T&P from outside agency, actual hiring cost plus applicable overheads shall be recovered.

5.0 T&Ps AND MMEs TO BE DEPLOYED BY BHEL ON SHARING BASIS

NILL

6.0 TIME SCHEDULE

6.1 CONTRACT PERIOD FOR Package A

The entire work of erection, testing and commissioning of all electrical components including Supply & Application of Final Painting, as detailed in the Tender Specification shall be completed within 8 months from the date of commencement of work at site. However minimum 11 kV O/H line, 11kV/11.5kV substation, and 11kV O/H line network for charging of 4 nos. of 11kV/433V substation shall be commissioned within 04 months from date commencement of work at site.

6.2 During the total period of contract of package- A, the contractor has to carry out the supply, erection, testing and commissioning activities in a phased manner as required by BHEL and the program of milestone events.

6.3 CONTRACT PERIOD FOR Package B

The operation and maintenance period of the construction power distribution system & yard lighting shall be 48 months from the date of start of commencement of operation and maintenance.

6.4 COMMENCEMENT OF CONTRACT PERIOD of Package A

The date of commencement of contract period shall be the mutually agreed date between the bidder and BHEL engineer to start the work. In case of discrepancy the decision of BHEL engineer is final.

6.5 COMMENCEMENT OF CONTRACT PERIOD of Package B

The date of commencement of contract period shall be the date of acceptance of the commissioning of the Main construction power 11/11.5kV substation & charging of 10 Nos. PSS (11kV/433V) by BHEL Engineer as per original scheme. Till the start of Package-B the contractor has to operate & maintain the Package-B works free of cost within the Package-A rates. In case of discrepancy the decision of BHEL engineer is final.

6.6 MOBILISATION FOR ERECTION, TESTING, COMMISSIOING ETC. of Package A

The activities for erection, testing etc. shall be started as per directions of Construction manager of BHEL. The contractor has to augment his resources in such a manner that following major milestones of erection & commissioning are achieved on specified schedules:

Description	Milestone month for package A
Start of work **(Expected)**	Fifteen days from LOA
Completion of 11/11.5 kV SS & first 04 substations of 11kV/ 433V. **(M1)**	4th months from start of work
Completion of next 6 substations**(M2)**	7th month
Completion of balance work	8th month

In order to meet above schedule in general, and any other intermediate targets set, to meet customer / project schedule requirements, contractor shall arrange & augment all necessary resources from time to time on the instructions of BHEL.

6.7 MOBILISATION FOR Package B

The contractor has to provide the resources from the first day of commencement of contract period of package B.

6.8 GUARANTEE PERIOD FOR CONTRACTOR SUPPLIED ITEMS under Package -A

The guarantee period of twelve months shall commence from the date of acceptance of BHEL Engineer for start of operation and maintenance (after commissioning) of that particular equipment.

6.9 GUARANTEE PERIOD FOR WORKMANSHIP OF THE CONTRACTOR EXECUTED AND COMMISSIONED ITEMS under Package -A

The guarantee period shall be 12 months from the date of commissioning as certified by the BHEL Engineer.

Note: The guarantee period of Workmanship for Pkg-B shall be NIL.

6.10 PROVISION OF PENALTY IN CASE OF SLIPPAGE OF INTERMEDIATE MILESTONES IN PACKAGE-A

In case of slippage of Two Major Intermediate Milestones, mentioned as M1 & M2 hereunder, Delay Analysis shall be carried out on achievement of each of these two Intermediate Milestones in reference to F-14.

M1 Milestone - Completion of 11/11.5 kV SS & first 04 substations of 11kV/ 433V.
M2 Milestone – Completion of next 6 substations.

Provision of Penalty in case of slippage of Intermediate Milestones:

i) Two major Intermediate Milestones are mentioned as M1 & M2

ii) In case of slippage of these identified Intermediate Milestones, Delay Analysis shall be carried out on achievement of each of these two Intermediate Milestones in reference to Form 14.

iii) In case delay in achieving M1 Milestone is solely attributable to the contractor, 0.5% per week of Executable Contract Value*, limited to maximum 2% of Executable Contract Value, will be withheld.

iv) In case delay in achieving M2 Milestone is solely attributable to the contractor, 0.5% per week of Executable Contract Value*, limited to maximum 3% of Executable Contract Value, will be withheld.

v) Amount already withheld, if any against slippage of M1 milestone, shall be released only if there is no delay attributable to contractor in achievement of M2 Milestone.

vi) Amount required to be withheld on account of slippage of identified intermediate mile-stone(s) shall be withheld out of respective milestone payment and balance amount (if any) shall be withheld @10% of RA Bill amount from subsequent RA bills.

vii) Final deduction towards LD (if applicable as per clause above), on account of delay attributable to contractor shall be based on final delay analysis on completion / closure of contract. Withheld amount, if any due to slippage of identified intermediate milestone(s) shall be adjusted against LD or released as the case may be.

viii) In case of termination of contract due to any reason attributable to contractor before completion of work, the amount already withheld against slippage of intermediate mile-stones shall not be released and be converted into recovery.

* Executable Contract Value - Value of work for which inputs/ fronts were made available to contractor and were scheduled for execution till the date of achievement of that milestone.

7.0 TERMS OF PAYMENT

7.1 **Terms of payment: No advance payment will be made.**

7.2 The progressive payment against monthly running bills for erection, testing and commissioning as per the percentage mentioned below on accepted rate / price of contract value will be released as mentioned below on Pro rata basis (References are from Chapter XI: Bill of Quantity)

S. No.	Activity / Work Description	% of unit rate
7.2.1	**Preparation of drawings and obtaining statutory clearances etc. (BOQ ref 1.01)**	
7.2.1.1	On completion of route survey and preparation of drawings.	50%
7.2.1.2	On getting of charging clearance from Statutory Authority.	50%
7.2.2	**Supply of Materials (BOQ ref 2.0.1, 2.0.2, 2.0.3 & 2.0.4)**	
7.2.2.1	On receipt of material, verification of documents and on acceptance at site.	90%
7.2.2.2	On charging of material	5%
7.2.2.3	Final bill of Package-A.	5%
7.2.3	**Laying of HT / LT cable (BOQ ref 2.0.6.16, 2.0.6.17,2.0.7.1, 2.0.7.2, 2.0.7.3, 2.0.7.4, 2.0.7.5, 2.0.7.6, 2.0.7.7, 2.0.8.4, 2.0.8.13, 2.0.8.14, 2.0.8.15&2.0.8.16)**	
7.2.3.1	On laying of cable.	45%
7.2.3.2	Termination of cables with respective equipment.	25%
7.2.3.3	On Charging.	30%
7.2.4	**Laying of 11 kV O/H line (BOQ ref 2.0.5.2.1 to 2.05.10 excluding2.0.5.2.11 and 2.0.6.1 to 2.0.6.19 excluding 2.0.6.2 ,2.0.6.3, 2.0.6.16 & 2.0.6.17)**	
7.2.4.1	On completion of line stringing	45%
7.2.4.2	On completion of end connection	25%
7.2.4.3	On Charging	30%
7.2.5	**Erection and Commissioning of PSS & VCB of Main 11/11.5kV substation (BOQ ref 2.0.6.20 & 2.0.5.2.14)**	
7.2.5.1	Construction of foundation plinth for PSS & VCB (if applicable)	35%
7.2.5.2	Receipt, positioning, end termination of cables and earthing of equipments etc.	25%
7.2.5.3	Fencing, substation flooring, lighting and lightning poles erection etc., as applicable for each substation	20%
7.2.5.4	Testing, Commissioning and charging of each substation	20%
7.2.6	**Erection and testing of Distribution Boards (BOQ ref 2.0.8.6,2.0.8.10 & 2.0.8.12)**	
7.2.6.1	On erection of Distribution boards	65%
7.2.6.2	On charging of Distribution boards	35%
7.2.7	**Erection of RCC poles/ Steel poles (BOQ ref 2.0.5.2.11 ,2.0.6.2 ,2.0.6.3 ,2.0.8.1 &2.0.8.8)**	
7.2.7.1	On completion of erection including foundation	65%

S. No.	Activity / Work Description	% of unit rate
7.2.7.2	On completion of line stringing/cable laying/light fixing	20%
7.2.7.3	On Charging	15%
7.2.8	**SUPPLY & ERECTION PORTION OF BOM FOR CIVIL RELATED WORKS**	
7.2.8.1	As per BOQ item (2.09.01, 2.09.02, 2.09.03, 2.09.06 & 2.09.07) on pro rata basis i.e as per actual executed qty.	100%
7.2.8.2	As per BOQ item (2.09.04, 2.09.05 & 2.09.08) on pro rata basis i.e as per actual executed qty.	100%
7.2.9	**Erection of any other item, not covered above, the terms of payment shall be as follows**	
7.2.9.1	On Erection	65%
7.2.9.2	On Charging	35%

7.3 The dismantling works if any are required with written permission from Construction Manager/ Project Director shall be paid for the erection/ laying/ stringing rate of that item.

7.4 Payment for O&M portion shall be made on submission of monthly running Bills at the quoted/ accepted monthly charges and as certified by BHEL engineer.

8.0	TAXES & DUTIES
8.1	The contractor shall pay all (save the specific exclusions as enumerated in this clause) taxes, fees, license, charges, deposits, duties, tools, royalty, commissions, other charges, etc. which may be levied on the input goods & services consumed and output goods & services delivered in course of his operations in executing the contract. In case BHEL is forced to pay any of such taxes/duties, BHEL shall have the right to recover the same from his bills or otherwise as deemed fit. However, provisions regarding GST on output supply (goods/service) and TDS/TCS as per Income Tax Act shall be as per following clauses.
8.2	GST (Goods and Services Tax)
8.2.1	GST as applicable on output supply (goods/services) are excluded from contractor's scope; therefore, contractor's price/rates shall be exclusive of GST. Reimbursement of GST is subject to compliance of following terms and conditions. BHEL shall have the right to deny payment of GST and to recover any loss to BHEL on account of tax, interest, penalty etc. for non-compliance of any of the following condition.
8.2.2	The admissibility of GST, taxes and duties referred in this chapter or elsewhere in the contract shall be limited to direct transactions between BHEL & its Contractor. BHEL shall not consider GST on any transaction other than the direct transaction between BHEL & its Contractor.
8.2.3	Contractor shall obtain prior written consent of BHEL before billing the amount towards such taxes. Where the GST laws permit more than one option or methodology for discharging the liability of tax/levy/duty, BHEL shall have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with regard to assessment of the liability. The option chosen by BHEL shall be binding on the Contractor for discharging the obligation of BHEL in respect of the tax liability to the Contractor.
8.2.4	Contractor has to submit GST registration certificate of the concerned state. Contractor also needs to ensure that the submitted GST registration certificate should be in active status during the entire contract period.
8.2.5	Contractor/Vendor has to issue invoice indicating HSN/SAC code, Description, Value, Rate, applicable tax and other particulars in compliance with the provisions of relevant GST Act and Rules made thereunder.
8.2.6	Vendor has to submit GST compliant invoice within seven days from the due date of invoice as per GST Law. In case of delay, BHEL reserves the right of denial of GST payment if there occurs any hardship to BHEL in claiming the input thereof. In case of goods, vendor has to provide scan copy of invoice & GR/LR/RR to BHEL before movement of goods starts. Special care should be taken in case of month end transactions.
8.2.7	Vendor has to ensure that invoice in respect of such services which have been provided/completed on or before end of the month should not bear the date later than last working day of the month in which services are performed.

8.2.8	Subject to other provisions of the contract, GST amount claimed in the invoice shall be released on fulfilment of all the following conditions by the Contractor: - a. Supply of goods and/or services have been received by BHEL. b. Original Tax Invoice has been submitted to BHEL. c. Contractor/ Vendor has submitted all the documents required for processing of bill as per contract/ purchase order/ work order. d. In cases where e-invoicing provision is applicable, vendor/contractor is required to submit invoice in compliance with e-invoicing provisions of GST Act and Rules made thereunder. e. Contractor has filed all the relevant GST return (e.g. GSTR-1, GSTR-3B, etc.) pertaining to the invoice submitted and submit the proof of such return along with immediate subsequent invoice. In case of final invoice/ bill, contractor has to submit proof of such return within fifteen days from the due date of relevant return. f. Respective invoice has appeared in BHEL's GSTR - 2A for the month corresponding to the month of invoice and in GSTR-2B of the month in which such invoices has been reported by the contractor along with status of ITC availability as "YES" in GSTR-2B. Alternatively, BG of appropriate value may be furnished which shall be valid at least one month beyond the due date of confirmation of relevant payment of GST on GSTN portal or sufficient security is available to adjust the financial impact in case of any default by the contractor. g. Contractor has to submit an undertaking confirming the payment of all due GST in respect of invoices pertaining to BHEL. h. Contractor shall be required to submit an acknowledgment (in the specified format) confirming the receipt of payment in cases where amount due in respect of the invoice(s) raised by the contractor are directly paid by BHEL to the labour / employee of such contractor or any other third party at the request of such contractor.
8.2.9	Any financial loss arises to BHEL on account of failure or delay in submission of any document as per contract/purchase order/work order at the time of submission of Tax invoice to BHEL, shall be deducted from contractor's bill or otherwise as deemed fit.
8.2.10	TDS as applicable under GST law shall be deducted from contractor's bill.
8.2.11	Contractor shall comply with the provisions of e-way bill wherever applicable. Further wherever provisions of GST Act permits, all the e-way bills , road permits etc. required for transportation of goods needs to be arranged by the contractor.
8.2.12	Contractor shall be solely responsible for discharging his GST liability according to the provisions of GST Law and BHEL will not entertain any claim of GST/interest/penalty or any other liability on account of failure of contractor in complying the provisions of GST Law or discharging the GST liability in a manner laid down thereunder.
8.2.13	In case declaration of any invoice is delayed by the vendor in his GST return or any invoice is subsequently amended/altered/deleted on GSTN portal which results in any adverse financial implication on BHEL, the financial impact thereof including interest/penalty shall be recovered from the Contactor's due payment.
8.2.14	Any denial of input credit to BHEL or arising of any tax liability on BHEL due to non-compliance of GST Law by the Contractor in any manner, will be recovered along with liability on account of interest and penalty (if any) from the payments due to the Contactor.
8.2.15	In the event of any ambiguity in GST law with respect to availability of input credit of GST charged on the invoice raised by the contractor or with respect to any other matter having impact on BHEL, BHEL's decision shall be final and binding on the contractor.

8.2.16	Variation in Taxes & Duties: Any upward variation in GST shall be considered for reimbursement provided supply of goods and services are made within schedule date stipulated in the contract or approved extended schedule for the reason solely attributable to BHEL. However downward variation shall be subject to adjustment as per actual GST applicability. In case the Government imposes any new levy/tax on the output service/goods after price bid opening, the same shall be reimbursed by BHEL at actual. The reimbursement under this clause is restricted to the direct transaction between BHEL and its contactor only and within the contractual delivery period only. In case any new tax/levy/duty etc. becomes applicable after the date of Bidder's offer but before opening of the price Bid, the Bidder/Contractor must convey its impact on his price duly substantiated by documentary evidence in support of the same before opening of price bid. Claim for any such impact after opening the price bid will not be considered by BHEL for reimbursement of tax or reassessment of offer.
8.3	Income Tax: TDS/TCS as applicable under Income Tax Act, 1961 or rules made thereunder shall be deducted/collected from contractor's bill.
8.4	BUILDING & OTHER CONSTRUCTION WORKERS (REGULATION OF EMPLOYMENT AND CONDITIONS OF SERVICE) ACT, 1996 (BOCW Act) AND RULES OF 1998 READ WITH BUILDING & OTHER CONSTRUCTION WORKERS CESS Act, 1996 & CESS RULES, 1998.
	In case any portion of work involves execution through building or construction workers, then compliance to the above titled Acts shall be ensured by the contractor and contractor shall obtain license and deposit the cess under the Act. In the circumstances it may be ensured as under:-
8.4.1	It shall be the sole responsibility of the contractor in the capacity of employer to forthwith (within a period of 15 days from the award of work) apply for a license to the Competent Authority under the BOCW Act and obtain proper certificate thereof by specifying the scope of its work. It shall also be responsibility of the contractor to furnish a copy of such certificate of license / permission to BHEL within a period of one month from the date of award of contract.
8.4.2	It shall be the sole responsibility of the contractor as employer to ensure compliance of all the statutory obligations under these act and rules including that of payment / deposit of 1% cess on gross payment made for value of work involving building or construction workers engaged by the contractor within a period of one month from the receipt of payment.
8.4.3	It shall be the responsibility of the sub-contractor to furnish the receipts /challans towards deposit of the cess together with the number, name and other details of beneficiaries (building workers) engaged by the sub-contractor during the preceding month.
8.4.4	It shall be the absolute responsibility of the sub-contractor to make payment of all statutory payments & compensations to its workers including that is provided under the Workmen's Compensation Act, 1923.
8.4.5	The contractor shall, however ensure before deposit of any BOCW Cess, that customer is not depositing the same in order to avoid excess deposit of cess.
8.4.6	The contractor shall bear cost of BOCW cess either by way of deposit or through recovery by BHEL in case the same is deposited by the customer.
8.4.7	In case of failure in above mentioned compliances, BOCW Cess @ 1% as well as applicable penalty as specified in BOCW Act/Rules shall be deducted from the contractor's bill.

Note:

1	The Gross amount is to be construed as cost of construction in line with the provisions of the BOCW of the BOCW Cess act and in case of compliance by customer by way of deduction at source in line with clause No 8 (4) of the act an equitable adjustment to the relatable cost of construction attributable to the bidder shall be made in terms of clause no. 8.2 of TCC.
2	In case compliance by customer by way of deduction at source in line with clause no 8(4) of the act is not resorted to, the compliance of BOCW Cess act shall be ensured by the bidder in line with the provisions of BOCW Cess act in terms of clause no. 8.4.2 of TCC.
3	The bidder may consider the cost of construction for levy of BOCW Cess inclusive of GST, however, due to whatsoever reason if the GST does not form the cost of construction for levy of aforesaid Cess an equitable adjustment thereof shall be made to the contract price.

9. STANDARDS APPLICABLE

9.1 All equipment and materials shall be designed, manufactures and tested in accordance with the latest applicable Indian Standards (IS) except where modified and / or supplemented by this specification.

9.2 Equipment and materials conforming to any other standard which ensures equal or better quality may be accepted. In such case, copies of the English version of the standard adopted shall be submitted along with the bid.

9.3 The electrical installation shall meet the requirement of Indian Electricity Rules as amended up to dates, relevant IS codes of Practice and Indian Electricity Act. In addition, other rules or regulations applicable to the work shall be followed. In case of any discrepancy, the more restrictive rule shall be binding. A list of applicable standards is given below for reference.

S. No.	List of IS applicable	Description
1	IS: 10028: 1981 (Part-II & III)	Code of practice for Installation and maintenance of transformers (superseding IS: 1886)
2	IS: 10322: 1982 (Part-I)	Luminaires General Requirements
3	IS: 10322: 1982 (Part-II)	Luminaires Constructional Requirements
4	IS: 10322: 1984 (Part-III)	Luminaires Screw and screwless terminals
5	IS: 10322: 1984 (Part-IV)	Luminaires Methods of tests
6	IS: 10322: 1985 (Part-V) Sec-I	Luminaires Particular requirements Section 1 General purpose luminaires
7	IS: 10322: 1985 (Part-V) Sec-II	Luminaires Particular Requirements Section 2 Recessed Luminaires
8	IS: 10322: 1987 (Part-V) Sec-III	Luminaires Particular requirements Section 3 Luminaires for road and street lighting (superseding IS:2149)
9	IS: 10322: 1987 (Part-V) Sec-IV	Luminaires Particular requirements Section 4 Portable general purpose luminaires
10	IS: 10322: 1987 (Part-V) Sec-V	Luminaires Particular requirements Section 5 Flood light (superseding IS 1947)
11	IS: 104: 1979: (Second Revision)	Ready mixed paint, brushing, zinc chrome, priming
12	IS: 11171: 1985	Dry type power transformers
13	IS: 1180: 1989 (Part-I,II)	Outdoor type three phase distribution transformers up to and including 100kVA 11kV
14	IS: 1248: 2003 (Part I to IX)	Electrical measuring instruments and their accessories
15	IS: 1255: 1983	Code of practice for installation and maintenance of power cables up to and including 33kV rating
16	IS: 13118: 1991	Specification for High Voltage Alternating Current Circuit Breakers
17	IS: 13234: 1992	Guide for short circuit current calculation in three phase AC systems

18	IS: 13947: 2004 (Part-V)	Low voltage switchgear and control gear: Control circuit devices and switching elements
19	IS: 1445: 1977	Porcelain insulators for overhead lines with a nominal voltage up to and including 1000 V
20	IS: 15086: 2001 (Part-I)	Nonlinear resistor type gapped surge arresters for AC systems.
21	IS: 15086: 2001 (Part-V)	Surge Arresters selection and application recommendations.
22	IS: 15086: 2003 (Part-III)	Artificial Pollution Testing of Surge Arresters
23	IS: 15505: 2004	HCFC Blend- A Fire Extinguishing System
24	IS: 1554 (Part-I): 1988	PVC insulated (Heavy duty) electric cables for working voltages up to & including 1100 volts (Third Revision)
25	IS: 1554 (Part-II): 1988	PVC insulated (Heavy duty) electric cables for working voltages from 3.3kV up to & including 11kV (second Revision)
26	IS: 15652: 2006	Insulating Mats for Electrical Purposes - Specification
27	IS: 1678: 1998	Specification for pre-stressed concrete poles for overhead power, traction and telecommunication lines
28	IS: 1866: 2000	Electrical maintenance & supervision of mineral insulating oil in equipment (Third Revision)
29	IS: 1885: 1961 (Part-I)	Fundamental Definition
30	IS: 1885: 1966 (Part-XI)	Electrotechnical Vocabulary Electrical Measurement
31	IS: 1885: 1971 (Part-XXX)	Electrotechnical Vocabulary Overhead Transmission Line and distribution of electrical energy
32	IS: 1885: 1992 (Part-IX)	Electrotechnical Vocabulary: Electrical Relays
33	IS: 1885: 1993 (Part-LIV)	Electrotechnical Vocabulary Insulators
34	IS: 1885: 1993 (Part-LXXVII)	Electrotechnical Vocabulary Overhead Lines
35	IS: 1885: 1993 (Part-LXXXI)	Electrotechnical Vocabulary electrical measuring instruments
36	IS: 1885: 1993 (Part-XXVIII)	Electrotechnical Vocabulary Instrument Transformers
37	IS: 1885: 1993 (Part-XXXVIII)	Electrotechnical Vocabulary Power Transformers and Reactors
38	IS: 1885: 2008 (Part-X)	Electrotechnical Vocabulary Electrical power system protection
39	IS: 2026: 1977 (Part-I)	Power Transformers General
40	IS: 2026: 1977 (Part-II)	Power Transformers Temperature rise
41	IS: 2026: 1977 (Part-IV)	Power Transformers Terminal marking, tappings and connections.
42	IS: 2026: 1981 (Part-III)	Power transformers Insulation level and dielectric tests
43	IS: 2026: 1994 (Part-V)	Power Transformers/Reactor bushings minimum external clearance in air specification
44	IS: 2099: 1986	Bushings for alternating voltages above 1000 V

45	IS: 2121: 1981 (Part-I)	Conductors and earth wire accessories for overhead power lines Armour rods, binding wires and tapes for conductors
46	IS: 2121: 1981 (Part-II)	Conductors and earth wire accessories for overhead power lines Mid span joints and repair sleeves for conductors
47	IS: 2121: 1991 (Part-II)	Conductors and earth wire accessories for overhead power lines Non tension joints
48	IS: 2121: 1992 (Part-II)	Conductors and earth wire accessories for overhead power lines Accessories for earth wire
49	IS: 2171: 1976	Portable fire extinguishers, dry powder (cartridge type)
50	IS: 2486: 1974 (Part-III)	Insulator fittings for overhead power lines with nominal voltage greater than 1000V Locking Devices
51	IS: 2486: 1981 (Part-IV)	Insulator fittings for overhead power lines with nominal voltage greater than 1000V Tests for Locking Devices
52	IS: 2486: 1989 (Part-II)	Insulator fittings for overhead power lines with nominal voltage greater than 1000V Dimensional requirements
53	IS: 2486: 1993 (Part-I)	Metal fittings of insulators for overhead power lines with nominal voltage greater than 1000V General Requirements and tests.
54	IS: 2544:1973	Porcelain post insulators for systems with nominal voltage greater than 1000 Volts.
55	IS: 2675: 1983	Enclosed distribution fuseboards and cutouts for voltages not exceeding 1000 V Ac and 1200 V Dc
56	IS: 2705: 1992 (Part-I)	Current Transformers General Requirements
57	IS: 2705: 1992 (Part-II)	Current Transformers Measuring Current Transformers
58	IS: 2705: 1992 (Part-III)	Current Transformers Protective Current Transformers
59	IS: 2705: 1992 (Part-IV)	Current Transformers Protective Current Transformers for special purpose applications.
60	IS: 2878: 2004	Fire Extinguisher, Carbon Dioxide Type (Portable and Trolley Mounted) – Specification
61	IS: 2932: 2003 (First Revision)	Enamel, Synthetic, Exterior (a) Undercoating (b) Finishing – Specification
62	IS: 3043: 1987	Code of practice for earthing
63	IS: 3070: 1993	Lightning Arresters for Alternating Current Systems - Specification - Part 3 Metal Oxide Lightning Arresters Without Gaps
64	IS: 3156: 1992 (Part-I)	Voltage Transformers General Requirements
65	IS: 3156: 1992 (Part-II)	Voltage Transformers Measuring Voltage Transformers
66	IS: 3156: 1992 (Part-III)	Voltage Transformers Protective Voltage Transformers
67	IS: 3156: 1992 (Part-IV)	Voltage Transformers Capacitor Voltage Transformers
68	IS: 3188: 1980	Characteristics of String Insulator Units
69	IS: 3347: 1965	HV Porcelain Bushing for transformer
70	IS: 335: 1993	New Insulating Oils
71	IS: 3427: 1997	A.C. Metal Enclosed Switchgear and Controlgear for Rated Voltages Above 1 kV and Up to and Including 52 kV
72	IS: 3637: 1966	Gas operated relays

73	IS: 3639: 1966	Specification for Fittings and Accessories for Power Transformers
74	IS: 3961: 1967 (Part-I)	Recommended current ratings for cables: Part 1 Paper insulated lead sheathed cables
75	IS: 3961: 1967 (Part-II)	Recommended current ratings for cables: Part 2 PVC insulated and PVC sheathed heavy duty cables
76	IS: 3961: 1968 (Part-III)	Recommended current ratings for cables: Part 3 Rubber insulated cables
77	IS: 3961: 1968 (Part-V)	Recommended current ratings for cables: Part 5 PVC insulated light duty cables
78	IS: 398: 1976 (Part-III)	Aluminium conductors for overhead transmission purposes: Part 3 Aluminium conductors, aluminized steel reinforced
79	IS: 398: 1994 (Part-IV)	Aluminium conductors for overhead transmission purposes: Part 4 Aluminium alloy stranded conductors (aluminium magnesium silicon type)
80	IS: 398: 1996 (Part-I)	Aluminium conductors for overhead transmission purposes: Part 1 Aluminium stranded conductors
81	IS: 398: 1996 (Part-II)	Aluminium conductors for overhead transmission purposes: Part 2 Aluminium conductors, galvanized steel reinforced
82	IS: 4012: 1967	Specification for Dust-proof Electric Lighting Fittings
83	IS: 4013: 1967	Dust-tight electric lighting fittings
84	IS: 4257: 1981 (Part-I)	Dimensions for Clamping Arrangements for Porcelain Transformer Bushings - Part 1 : For 12 kV to 52 kV Bushings
85	IS: 4770: 1991	Rubber Gloves - Electrical Purposes - Specification
86	IS: 5: 2007	Colours for Ready Mixed Paints and Enamels
87	IS: 5216: 1982 (Part-I)	Recommendations on Safety Procedures and Practices in Electrical Work - Part I General
88	IS: 5216: 1982 (Part-II)	Recommendation on Safety Procedures and Practices in Electrical Work - Part II Life Saving Techniques
89	IS: 5613: 1985 (Part-I) Sec-I	Code of Practice for Design, Installation and Maintenance of Overhead Power Lines - Part 1 Lines Up to and Including 11 kV - Section 1 Design
90	IS: 5613: 1985 (Part-I) Sec-II	Code of practice for design, installation and maintenance of overhead power lines Part 1 Lines up to and including 11 kV, Section 2 Installation and maintenance
91	IS: 5613: 1985 (Part-II) Sec-I	Code of practice for design, installation and maintenance of overhead power lines Part 2 Lines above 11 kV and up to and including 220 kV, Section 1 Design
92	IS: 5613: 1985 (Part-II) Sec-II	Code of practice for design, installation and maintenance of overhead power lines Part 2 Lines above 11 kV and up to and including 220 kV, Section 2 Installation and maintenance
93	IS: 5819: 1970	Recommended Short-circuit Ratings of High Voltage PVC Cables
94	IS: 6103: 1971	Method of test for specific resistance (resistivity) of electrical insulating liquids
95	IS: 6262: 1971	Method of Test for Power Factor and Dielectric Constant of Electrical Insulating Liquids

96	IS: 6600: 1972	Guide for loading of oil immersed transformers
97	IS: 6792: 1992	Method for Determination of Electric Strength of Insulating Oils
98	IS: 694: 1990	PVC Insulated cables for working voltages upto and including 1100 V
99	IS: 731: 1971	Porcelain insulators for overhead power lines with a nominal voltage greater than 1000 V
100	IS: 732: 1989	Code of Practice for Electrical Wiring Installations
101	IS: 800: 2007	General Construction in Steel - Code of Practice
102	IS: 8130: 1984	Conductors for insulated electric cables and flexible cords
103	IS: 8270: 1976: (Part-I)	Guide for preparation of diagrams, charts and tables for electrotechnology: Part 1 Definitions and classification
104	IS: 8270: 1976: (Part-II)	Guide for preparation of diagrams, charts and tables for electrotechnology: Part 2 Item designation
105	IS: 8270: 1976: (Part-V)	Guide for preparation of diagrams, charts and tables for electrotechnology: Part 5 Interconnection diagrams and tables
106	IS: 8270: 1977: (Part-III)	Guide for preparation of diagrams, charts and tables for electrotechnology: Part 3 General requirements for diagrams
107	IS: 8270: 1977: (Part-IV)	Guide for preparation of diagrams, charts and tables for electrotechnology: Part 4 Circuit diagrams
108	IS: 8270: 1983: (Part-VI)	Guide for preparation of diagrams, charts and tables for electrotechnology: Part 6 Unit wiring diagrams and tables
109	IS: 8623: 1993: (Part-I)	Specification for Low-Voltage Switchgear and Controlgear Assemblies - Part 1 : Requirements for Type-Tested and Partially Type-Tested Assemblies
110	IS: 8623: 1993: (Part-II)	Specification for Low-voltage Switchgear and Controlgear Assemblies - Part 2 : Particular Requirements for Busbar Trunking Systems (Busway
111	IS: 8623: 1993: (Part-III)	Specification for Low-Voltage Switchgear and Controlgear Assemblies - Part 3 : Particular Requirements for Equipment Where Unskilled Persons have Access for Their Use
112	IS: 9920: 1982: (Part-III)	Specification for Alternating Current Switches for Voltages Above 1 000 V - Part III Design and Construction
113	IS: 9920: 1985: (Part-IV)	Specification for Alternating Current Switches for Voltages Above 1000 V - Part 4 Type Tests and Routine Tests
114	IS: 9920: 2001: (Part-II)	High-voltage Switches - Specification - Part 2 High-voltage Switches for Rated Voltages of 52 kV and Above
115	IS: 9920: 2002: (Part-I)	High Voltage Switches - Part 1 Switches for Rated Voltages Above 1 kV and Less Than 52 kV
116	IS: 9921: 1981: (Part-I)	Specification for Alternating Current Disconnectors (Isolators) and Earthing Switches for Voltages Above 1 000 V - Part I General and Definitions
117	IS: 9921: 1982: (Part-II)	Alternating current disconnectors (isolators) and earthing switches for voltages above 1000 V Part 2 Rating
118	IS: 9921: 1982: (Part-III)	Specification for Alternating Current Disconnectors (Isolators) and Earthing Switches for Voltages Above 1000 V - Part III Design and Construction

119	IS: 9921: 1985: (Part-IV)	Specification for Alternating Current Disconnectors (isolators) and Earthing Switches for Voltages Above 1000 V - Part 4 Type Tests and Routine Tests
120	IS: 9921: 1985: (Part-V)	Specification for Alternating Current Disconnectors (Isolators) and Earthing Switches for Voltages Above 1 000 V - Part 5 Information to be Given with Tenders, Enquiries and Orders
121	IS: 9974: 1981: (Part-I)	High pressure sodium vapour lamps - Part 1 General requirements and tests
122	IS: 9974: 1981: (Part-II)	High pressure sodium vapour lamps - Part 2 Standard lamp data sheets

9.4 In addition to the standards mentioned above, all works shall conform to the requirements of the following rules and regulations.

a. Indian Electricity Act and Rules framed thereunder
b. Fire insurance regulations
c. Regulations laid down by the Chief Electrical Inspector of State and CEA
d. Regulations laid down by the Factory Inspector of State
e. Any other regulations laid down by the authorities.

9.5 In case any clause of contradictory nature arises between standards and this specification, the latter shall prevail.

ADDITIONAL DRAWINGS ATTACHED.

Drawing No.: (PLOT PLAN)

DETAILED TECHNICAL SPECIFICATIONS

10.1 GENERAL

10.1.1 Identification of equipment at storage yard, technical assistance for checking and making the shortage/ damage reports, taking delivery at storage yard and pre-assembly of equipment wherever required, erecting the equipment, aligning, fastening, supporting, cleaning, checking and carrying out statutory tests as required, trial operation, pre-commissioning, commissioning and post-commissioning activities up to the time of completion of commissioning activities using their tools and tackles and testing instruments along with the supply of all consumables.

10.1.2 Scope of work covered under this specification requires quality workmanship, engineering and construction management. The contractor shall ensure timely completion of work. The contractor shall have adequate tools, measuring instruments, calibrating equipment etc. in his possession. He shall also have adequate trained, qualified and experienced engineers, supervisory staff and skilled personnel. The manpower deployment identified by contractor shall match with above scope of works.

10.1.3 If any item or equipment not covered in this tender but requires erecting / commissioning, the same shall be carried out by the contractor. Equivalent unit rate for those item or equipment shall be considered wherever possible from the BOQ / rate schedule. The rates quoted by the contractor shall be uniform as far as possible for similar items appearing in rate schedule.

10.1.4 Receipt of materials / component to be erected by the contractor, loading and transportation from the storage yard to the project site, stacking, storage and preservation are part of this scope.

10.1.5 Fabrication and installation of steel supports wherever required.

10.1.6 It is not the intent to specify herein all details of material. Any item related to this work, not covered by this scope but necessary to complete the system will be deemed to have been included in the scope of the work.

10.1.7 Deployment of skilled/ unskilled manpower, engineers/ supervisors, Tools & Plants (T & P), Material handling equipment, testing instruments, returning of un-used materials/ items to BHEL stores. The installation and commissioning of all the electrical equipments / items shall conform to the technical requirements specified elsewhere in the tender.

10.1.8 Site testing wherever required shall be carried out for all items / materials installed by the contractor to ensure proper installation and functioning in accordance with drawings, specifications and manufacturer's recommendations.

10.1.9 The contractor shall carry out testing, pre-commissioning, commissioning and trial run of the connected equipment under overall guidance of BHEL and shall locate any cause of malfunction and rectify the same for proper operation. Testing shall also include any additional tests, which the Engineer feels necessary because of site conditions and also to meet system specification.

10.1.10 The work shall be executed under the usual conditions without affecting power plant construction and in conjunction with other operations and contracting agencies at site. The contractor and his personnel shall co-operate with the personnel of other agencies, co-ordinate his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.

10.1.11 All the work shall be carried out as per instructions of BHEL engineer. BHEL engineer's decision regarding the correctness of the work and method of working shall be final and binding on the contractor.

10.1.12 Contractor shall supply and erect all items / materials etc. as per sequence prescribed by BHEL at site. BHEL engineer depending upon the availability of materials / work fronts etc will decide the sequence of erection / commissioning methodology. No claims for extra

payment from the contractor will be entertained on the grounds of deviation from the methods of erection / commissioning adopted in erection/ commissioning of similar job or for any reasons whatsoever.

10.1.13 During the course of erection, testing and commissioning of electrical work, certain rework / modification / rectification / repairs / fabrication etc. may be necessary on account of feedback from other power stations and site operation / maintenance requirements. Contractor shall carryout such rework / modification / rectification / fabrication / repairs etc, promptly and expeditiously.

10.1.14 The contractor will be responsible for the safe custody and proper accounting of all materials in connection with the work. If the contractor has drawn materials in excess of design requirements, recoveries will be effected for such excess drawals at the market rate.

10.1.15 After completing all the works, contractor shall hand over all remaining extra materials with proper identification tags in a packed condition to BHEL stores. In case of any use over actual design requirements, BHEL reserves the right to recover the cost of material used in excess or misused. Decision of BHEL engineer in this regard will be final and binding on the contractor.

10.1.16 Contractor shall, transport all materials to site and unload at site / working area, or pre-assembly yard for inspection and checking. All material handling equipment required shall be arranged by the contractor.

10.1.17 The contractor must obtain the signature and permission of the security personnel of the customer for bringing any of their materials inside the site premises. Without the Entry Gate Pass these materials will not be allowed to be taken outside.

10.1.18 Contractor shall retain all T&P / Testing instrument / Material handling equipments etc at site as per advice of BHEL engineer and same shall be taken out from site only after getting the clearances from engineer in charge.

10.1.19 The contractor at his cost shall arrange necessary security measures for adequate protection of his machinery, equipment, tools, materials etc. BHEL shall not be responsible for any loss or damage to the contractor’s construction equipment and materials. The contractor may consult the Engineer-in-Charge on the arrangements made for general site security for protection of his machinery equipment tools etc.

10.1.20 Wherever erection sequences are furnished by BHEL, the contractor shall follow the same sequence. If required by BHEL, the contractor shall change the sequence of his operation so that work on priority sectors can be completed within the projects schedule. The contractor shall afford maximum assistance to BHEL in this connection without causing delay to agreed completion date.

10.1.21 Any wrong erection shall be removed and re-erected promptly to comply with the design requirements to the satisfaction of Site Engineer.

10.1.22 Contractor has to work in close co-ordination with other erection agency at site. BHEL engineer will co-ordinate area clearance. In a project of such magnitude, it is possible that the area clearance may be less / more at a particular given time. Activities and erection program have to be planned in such a way that the milestones are achieved as per schedule/ plans. Contractor shall arrange & augment the resources accordingly.

10.1.23 Contractor shall remove all scrap materials periodically generated from his working area in and around power station and collect the same at one place earmarked for the same. Failure to collect the scrap is likely to lead to accidents and as such BHEL will make alternative arrangement and recover the cost incurred for the same along with 5% overheads. Decision of BHEL shall be final and binding on the contractor. All the package materials, including special transporting frames, etc. shall be returned to the BHEL stores / customer's stores by the contractor.

10.1.24 The contractor is strictly prohibited from using BHEL's regular components like angles, channels, beams, plates, pipe / tubes, and handrails etc. for any temporary supporting or scaffolding works. Contractor shall arrange himself all such materials. In case of such misuse of BHEL materials, a sum as determined by BHEL engineer will be recovered from the contractor's bill. The decision of BHEL engineer is final and binding on the contractor.

10.1.25 No member of the already erected structure / platform, pipes, grills, platform, other component and auxiliaries should be cut without specific approval of BHEL engineer.

10.1.26 For other agencies, such as piping, Boiler, ESP, instrumentation, insulation etc., to commence their work from / on the equipments coming under this scope, Contractor has to clear the front, expeditiously and promptly as instructed by BHEL Engineer. Some time it may be required to re-schedule the activities to enable other agencies to commence/ continue the work so as to keep the overall project schedule.

10.1.27 The terminal points decided by BHEL are final and binding on the contractor for deciding the scope of work and effecting the payment for the work done up to the terminals.

10.1.28 Crane operators deployed by the contractor shall be tested by BHEL before he is allowed to operate the cranes.

10.1.29 On Completion of work, all the temporary buildings, structures, pipe lines, cable etc. shall be dismantled and levelled and debris shall be removed as per instruction of BHEL by the contractor at his own cost. In the event of his failure to do so, the expenditure towards clearance of the same will be recovered from the contractor. The decision of BHEL Engineer in this regard is final.

10.1.30 Prior to erection of any components inspection to be done for any foreign materials and damages and they are to be attended as per directions of BHEL engineer.

10.1.31 It is the responsibility of the contractor to do the alignment, checking, etc. if necessary, repeatedly to satisfy BHEL Engineer / Customer Engineers with all the necessary tools and tackles, manpower etc. without any extra cost. The alignment will be completed only when jointly certified so, by the BHEL Engineer & Customer. Also the contractor should ensure that the alignment is not disturbed afterwards.

10.1.32 If any item or equipment not covered but requires being erected/ commissioned, same shall be carried out by the contractor. The item rates shall be determined as per GCC.

10.1.33 The contractor shall ensure that his premises are always kept clean and tidy to the extent possible. Any untidiness noted on the part of the contractor shall be brought to the attention of the contractor's site representative who shall take immediate action to clean the surroundings to the satisfaction of the Engineer-in-Charge.

10.1.34 All the necessary certificates and statutory licenses required to carry out this scope of work are to be arranged by the contractor at his own cost. Also refer clause - ELECTRICAL INSPECTORATE'S APPROVAL- given below:

10.2 ELECTRICAL INSPECTORATE'S APPROVAL:

10.2.1 The contractor shall arrange necessary statutory inspections and obtain certificates for the installation work at his cost. Contractor is responsible for getting Electrical Inspector / statutory authority's approval for all electrical installation covered in his scope.

10.2.2 All electrical installation covered in contractor's scope is to be inspected / approved by the electrical inspector / statutory authority. For getting electrical inspector approval, contractor shall arrange the following:

a. Work Completion certificate for all the equipment covered in the contract.
b. Details of Equipments (specification)
c. Copy of Test results conducted at site for all the equipment.
d. Any other documents as required by statutory authority. Any expenditure related to documentation shall be borne by contractor.
e. Contractor shall carry out the modifications / rectifications if any as suggested by the

authority at his own cost. However, it is not applicable for equipment erected by Mechanical contractor.

f. Valid Electrical Contractor's License of Haryana state.

g. Valid Supervisory Competency Cerfiticate.

10.3 SITE INSPECTION

10.3.1 The owner / employer or his authorized agents may inspect various stages of work during the currency of the contract awarded to him. The contractor shall make necessary arrangements for such inspection and carry out the rectification pointed out by the owner / employer without any extra cost to the owner / employer. No cost whatsoever for such duplication of inspection of work will be entertained.

10.3.2 BHEL / Customer will have full power and authority to inspect the works at any time, either on the site or at the contractor's premises. The contractor shall arrange every facility and assistance to carry out such inspection. On no account will the contractor be allowed to proceed with work of any type unless such work has been inspected and entries are made in the site inspection register by customer / BHEL.

10.3.3 Wherever the performance of work by the contractor is not satisfactory in respect of workmanship, deployment of sufficient labour or equipment, delay in execution of work or any other matter, BHEL shall have the right to engage labour at normal ruling rates and get the work executed through other agency and debit the cost to the contractor and the contractor shall have no right to claim compensation thereof. In such a case, BHEL shall have the right to utilize the materials and tools brought by the contractors for the same work.

10.4 MANPOWER REQUIREMENT

10.4.1 The contractor shall provide to the satisfaction of BHEL, sufficient and qualified staff for the execution of works. If and whenever any of the contractor's staff is found guilty of any misconduct or be incompetent or insufficiently qualified in the performance of his duties the contractor shall remove them from site as directed by Site Engineer.

10.4.2 Supervisor should have a minimum qualification of Diploma in Engineering or any graduate with minimum 05 years of experience in Thermal Power Station for electrical related works.

10.4.3 The Site in charge shall be provided with PCs and good communication facilities like telephone, fax, email etc. at the cost and expense of the contractor. Lack of communication facilities will not be an excuse for extension of completion date.

10.4.4 All instructions from BHEL / Customer will be directed to the contractor through the Site In-charge and he shall be responsible for all the contractor's activities at site. The contractor shall name his authorized representative prior to or immediately on commencement of operations at site

10.4.5 The Site In-charge shall be present at site during all normal working hours and his contact address after normal working hours shall be made available to BHEL so that if any emergency arises, the presence of the contractor's site Representative at site can be called for.

10.4.6 The contractor shall not change the site Representative without the consent of BHEL. Should BHEL require the replacement of the contractor's site Representative for justifiable reasons (including inadequate progress of work) the contractor shall ensure that replacement is made as soon as possible and work is not allowed suffering delay on this account.

10.4.7 The contractor shall ensure that all his supervisor's staff and workmen conduct themselves in a proper manner. They shall all be persons who are familiar with and skilled at the jobs allocated to them. Any misconduct / inefficiency noted on the part of the

contractor's personnel shall be brought to the attention of the contractor's site representative who shall immediately take such action as necessary including the removal of such misconducting / inefficient persons, if so required by the Engineer-in-Charge.

10.5 DOCUMENTATION

10.5.1 The following information shall be furnished by the bidder after testing and inspection:
Test certificates of various tests conducted at site. All inspection and test certificates shall be signed by customer's representative also, wherever called for as per field quality plan.

10.5.2 As built drawings:
After successful completion, testing and commissioning of installation work, Purchaser's drawings / documents shall be updated in line with the actual work carried out and as built drawings / documents shall be submitted by the contractor as agreed for the project.

10.5.3 These requirements are apart from the preparation of detailed engineering drawings which are part of the scope of work.

10.6 FOUNDATIONS AND GROUTING

10.6.1 Foundation for the equipments to be erected are in the scope of the contractor.

10.6.2 Cleaning of foundation surfaces, pocket holes and anchor bolt pits etc., de-watering, making them free of oil, grease, sand and other foreign materials by soda wash, water wash, compressed air or any other approved methods etc., form/shuttering work are within the scope this work.

10.6.3 The surface of foundations shall be dressed to bring the surface of the foundations to the required level and smoothness prior to placement of equipments.

10.6.4 Foundation pockets are to be cleaned thoroughly before placing the columns/ equipment. Verticality of foundation bolts to be checked along with correctness of the threads and freeness of the nuts movement. If required, cleaning of the threads to be done with proper dies.

10.6.5 The concrete foundation, surfaces shall be properly prepared by chipping, as required to bring the top of such foundation to the required level to provide the necessary roughness for bondage and to ensure enough bearing strength. All laitance and surface film shall be removed and cleaned. The required percentage contact between contact surfaces of Packer plates and foundation shall be achieved by chipping and scrapping as per BHEL Engineer's instructions.

10.6.6 For grouting of equipment; necessary cement, sand, gravels, etc. to be arranged by the contractor including the fine aggregates.

10.6.7 The BHEL supplied items are in the process of finalization. The foundation drawings and requirements mentioned are tentative which may change based on the actual foundation drawings received and finalized with the equipment manufacturer.

10.6.8 Contractor has to carry out the grouting as per the work instructions for grouting available at site.

10.7 MATERIAL HANDLING AND SITE STORAGE

10.7.1 SCOPE OF STORAGE / TRANSPORT OF CONTRCTOR SUPPLIED ITEMS

a) Contractor shall make his own arrangement for transporting the materials to site from BHEL stores/ yards which ia approx. 3-5 Km from BHEL site. Necessary material handling equipment for transporting to site/ stores and also for taking delivery from stores to work place shall be arranged at his cost.

b) Any excess materials supplied for which payment has not been made can be taken back by the contractor as per customer procedure. Incoming material gate pass shall be made for any material supplied by the contractor.

c) Contractor shall unload, transport, store, erect, test and commission the equipment as per instructions of the manufacturer's recommendation.

d) Contractor shall be responsible for examining all the shipment immediately for any damage, shortage, discrepancy etc. for the purpose of Purchaser's information only. However, the Contractor shall be solely responsible for any shortages or damages in transit, handling and/or in storage and erection of the equipment at Site.

10.7.2 COLLECTION OF BHEL SCOPE OF SUPPLY MATERIALS

a) Contractor shall take delivery of BHEL supplied materials from the / stores storage yard / sheds of BHEL / customer after getting approval of engineer / customer in the prescribed indent forms of BHEL / customer. He shall also make arrangements for safe custody, watch and ward of equipment after it has been handed over to him till they are fully erected / commissioned. The contractor shall transport materials to erection site by the prescribed route without disturbing and damaging other's works in the most professional manner and the materials shall be stored in appropriate manner as per BHEL's instructions.

b) Loading at BHEL / Customer stores and storage yard, transport to site, unloading at site / working area of equipment placement on respective foundation / location, fabrication yard, pre-assembly bay or at working area are in the scope of work of the contractor. The scope includes taking materials / Equipments from customer stores / storage yard also. Contractors Quoted / Accepted rate shall be inclusive of the same. Required cranes, tractors, trailer or trucks / slings / tools and tackles / labour including operators Fuel lubricants etc. for loading & unloading of materials will be in the scope of contractor.

c) BHEL shall issue materials covered in BHEL scope from their stores at site. The contractor shall collect such materials from BHEL stores and transport to site of work at his cost.

d) The equipment / materials from the storage yard shall be moved in sequence to the actual site of erection / location at the appropriate time as per the direction of BHEL Engineer so as to avoid damage / loss of such equipment at site.

e) The contractor shall inspect such materials as soon as received by the contractor and shall bring to the attention of the Engineer-in-Charge any shortage / damage or other defects noticed before taking over the materials. Materials once taken over will be deemed to have been received in good condition and in correct quantities except for intrinsic defects which cannot be observed by visual and dimensional inspection and weighing.

f) Upon receipt by the contractor the responsibility for any loss, damage and / or misuse of such materials shall rest with the contractor.

g) All materials issued by BHEL shall be properly stored and systematic records of receipts, issue and disposal will be maintained. Periodic inventory shall be made available to BHEL Engineer-in-Charge.

h) All materials issued by BHEL shall be utilized as directed by Engineer-in-Charge or most economically in the absence of such direction. The contractor shall be responsible for the return of all surplus material to BHEL Stores, as determined by the Engineer-in-Charge.

i) If the materials issued by BHEL are lost, damaged or unaccounted, the cost of such items shall be recovered from payments to the contractor. However, the contractor shall raise FIR and inform BHEL all details.

j) Sometimes it may become necessary for the contractor to handle certain unrequired components at Customer's / BHEL's stores in order to take out the required materials. The contractor has to take this contingency also into account. No extra payment is payable for such contingencies.

10.7.3 STORAGE

a) The contractor shall provide any fixtures, concrete blocks & wooden sleepers, which are required for temporary supporting / storage of the components and equipment at site.

b) The equipment should be preferably in its original package and should not be unpacked until it is absolutely necessary for its installation. The equipment should be best protected in its cases. It should be arranged away from walls.

c) The wooden pallet provided for packing itself can be retained for raised platform to protect equipment from ground damps, sinking into around and to circulate air under the stored equipment. This will also help in lifting the packing with fork lift truck.

d) Periodic inspection of silica gel placed inside the equipment is necessary. It has to be replaced when decolonization takes place or regenerated. BHEL shall supply the material and contractor shall replace.

e) Due care should be taken to ensure that the equipment is not exposed to fumes, gases etc. which can affect electrical contacts of relays and terminal boards.

f) The storage room and the equipment should be checked at regular interval of three months to ensure protection from termites, mould growth, condensation of water etc. which can damage the equipment.

g) Contractor shall keep BHEL informed about such problem and try to rectify the problem at his own cost.

h) All the instrument, materials and goods kept in the store room should be identified and registered in a book. Inspection report should be recorded. Any discrepancy observed should be communicated to site immediately to the Engineer in Charge.

i) The loose items supplied for the main equipment falls into various categories like tools, modules, prefabricated cables, console inserts, recorders, modules and display units, printers, sensors and transducers, PCs, monitors, cable glands, cable ducts, frames etc. are to be categorized and stored separately.

10.7.4 SUB-ASSEMBLIES

a) All sub-assemblies should be kept in a separate place where they are easily accessible.

b) Sub-assemblies should have a protective cover in case it is stored without wooden packing / case to prevent accumulation of dust. Silica gel packets should also be kept along with it.

c) Sub-assemblies should not be stacked one above the other.

d) Materials shall be stacked neatly, preserved and stored in the contractor's shed / work area in an orderly manner. In case it is necessary to shift and re-stack the materials kept at work area / site to enable other agencies to carry out their work, same shall be done by the contractor at no extra cost.

10.8 SCOPE OF ROUTE SURVEY LAYOUT AND DETAILED DRAWINGS

The drawings provided along with the tender are only schematic, typical and tentative. The contractor shall prepare final detailed drawings in consultation with site engineers after carrying out the route survey for distribution. These drawings shall be prepared in accordance with IE-Rules and have to be approved by the electrical statutory authorities. Obtaining approval from statutory authority shall be the responsibility of the contrctor and any expenditure involved in getting approval from statutory authority for the drawings and documents generated by the contractor shall be borne by the contractor. Based on the detailed drawings, contractor shall arrive at the final quantities of items which are to be procured/ fabricated, installed for construction power equipments as required and erected as per drawings. After CEA INSPECTOR VISIT, if any modification/

correction is required in line with applicable IE standards the same has to be completed by the vendor WITHIN THE QUOTED RATES. However, the material as required will be provided by BHEL with the approval of site incharge.

10.9 SCOPE OF SUPPLY

a) Scope of supply of materials shall be as detailed in the BOQ. All materials shall be procured from reputed manufacturers as per IS specification. Bidder shall ensure technical compliance for supply and erection to ensure trouble-free operation. Necessary test certificates, guarantee certificate etc. shall be submitted to BHEL along with supply.

b) The quantities furnished in the BOQ for supply items are approximate only. Contractor shall assess the quantity of supply items after conducting route survey and detailed engineering, which is part of this contract and also taking in to consideration the materials supplied by BHEL.

c) If suitable materials are available with BHEL, the quantity of supply items shall be reduced accordingly. The payment for erection of BHEL supply items shall be as per rate quoted for erection.

d) The quantity to be supplied shall be strictly as per site requirement only in consultation with Engineer-in-Charge. Before starting erection, the contractor shall get all the supply items in his scope verified by BHEL and also get necessary endorsement from BHEL Stores. BHEL's endorsement or Store Receipt Voucher (SRV) shall be submitted along with bills for payment of Supply items. After BHEL verification, material shall be kept under contractor's custody.

10.10 SCOPE OF ERECTION

a) The scope of this Construction Power Package work includes detailed engineering, supply, identification of equipment at BHEL storage yard, technical assistance for checking and making the shortage / damage reports, taking delivery at storage yard, transportation to site, handling of material at site, erecting, and carrying out statutory tests as required, commissioning and maintenance of the equipments erected till contract period using their tools and tackles and testing instruments along with the supply of all consumables.

b) The scope of specification covers the installation, testing and commissioning of the equipment / instrument along with accessories as detailed in Bill of Quantity. The detailed engineering is in the scope of the vendor which may result in minor changes to the items and quantities.

c) Site testing shall be carried out for all electrical equipment installed by the contractor to ensure proper installation and functioning in accordance with drawings specifications and manufacturer's recommendations.

d) All the work shall be carried out as per instructions of BHEL engineer. BHEL engineer's decision regarding the correctness of the work and method of working shall be final and binding on the contractor.

10.11 SCOPE OF SUB STATION YARD LEVELING AND FENCING

a) After conducting route survey and identifying substation location, the yard shall be levelled suitably. Necessary, PCC pavement, fencing, construction of foundation for VCB, PSS, LTDB, etc. plinth wall, etc. shall be carried out by the contractor. The supply of materials required for the above civil works shall be arranged by the contractor.

b) No separate unit rate shall be paid for the substation yard levelling and fencing which shall be part of respective 11/11.5kV substation or 11 kV/433V substation works.

10.12 SCOPE OF 11 kV RING MAIN SYSTEM (FEEDER POWER DISTRIBUTION SYSTEM)

a) BHEL Scope of supply as free issue:

i. HT Cables of required Qty

b) Contractor scope of work for 11 kV Ring Main Distribution System includes:

i. Conducting route survey
ii. ACSR Rabbit Conductor.
iii. Preparation of distribution drawings
iv. Vetting of drawings & documents by BHEL
v. Installation of BHEL supplied free issued materials as mentioned under above clause.
vi. Supply and installation of poles, accessories and O/H line forming ring main system.
vii. RCC poles / RS joist poles/ 11 kV GI stay set: The scope of erection work shall include excavation of earth, as per drawing, grouting with concrete of M20/M25, supply of cement, sand, metal etc. to withstand wind velocity and coping of poles etc. complete.
viii. Supply and installation of HT Termination and joining kits, Glands, lugs, etc. Separate item rates are provided for laying of HT and LT cables, supply and installation of HT termination kits, stringing of ACSR Rabbit conductor.
ix. Excavation and refilling of earth
x. Supply and installation cable route markers.

10.13 ERECTION OF 2.5 MVA – ONAN TRANSFORMER

a) 2.5 MVA 11 kV ONAN transformers E&C in this scope. The contractor shall make his own arrangements for loading the transformers from Stores and unloading the same at the specified location. T& P and other materials required for loading and unloading the transformers shall be arranged by the contractor. All grouting material shall be arranged by contractors.

b) Transformer shall be checked up thoroughly and if any items are found to be damaged and requires replacement, the same shall be carried out by the contractor at free of cost.

c) All testing instrument such as megger, multimeter, oil test kit, oil-filtering machine, H.V test kit shall be arranged by the contractor to carry out the checking of the transformer. Oil filtration shall be carried out by the contractor till achieving the Dielectric strength as stipulated, other tests like insulation resistance and earth resistance checks, and Dielectric strength test of oil before filling, Buchholz relay test and phase sequence test shall be carried out by the contractor. After completing all the works, full painting shall be carried out for all the transformers.

10.14 SCOPE OF PACKAGE SUBSTATION (PSS)

a) PSS will be supplied by BHEL and the same shall be drawn from BHEL stores and transported to the required location. The contractor shall make his own arrangements for loading the PSS from BHEL- Stores and unloading the same at the specified location. The contractor shall arrange necessary T&P and other materials required for loading and

unloading. Necessary civil foundation including supply of materials shall be arranged by the contractor before erecting the PSS.

b) If any loose items supplied along with PSS that are required to be mounted, the same shall be carried out by the contractor at free of charge.

c) The base framed shall normally be supplied along with the PSS. These shall be aligned, levelled and grouted in position, as per approved drawings. Wherever the base channels are not available, the same shall be fabricated and painted and the same shall be carried out by the contractor at free of cost. However, required materials shall be arranged by BHEL with the approval of Site In-charge/BHEL. Base channels shall be grouted on the foundation.

d) PSS shall be checked thoroughly before charging. After the satisfactory completion of these checks, the LT Board and 11 kV VCB shall be energized. The contractor shall arrange all instruments required for testing at his cost.

e) The Package substations shall be assessed and checked up thoroughly and if any items are found to be damaged/defective/ not working and requires replacement or any internal wiring to be modified, the same shall be carried out by the contractor at free of cost. However, replacement materials shall be arranged by BHEL.

f) No separate unit rate shall be paid for the erection of PSS which shall be part of shall be part 11kV/433V substation works.

10.15 SCOPE OF LAYING AND TERMINATION OF H.T AND L.T CABLE

a) BHEL shall supply the LT and HT cables as free issue.

b) All cables shall be drawn by the contractor from BHEL Stores.

c) The cables thus drawn shall be cut to size as per route length and laid.

d) The cables drawn from the BHEL stores shall be meggered before laying and any defect observed after laying also, the contractor shall replace / rectify the same free of charges.

e) Unit rate quoted for LT cables are on per meter basis and shall cover laying, termination, excavation of earth for a depth of approx. 1000mm refilling of excavated earth & compaction.

f) Unit rate quoted for HT cables are on per meter basis and shall cover laying, excavation of earth for a depth of approx. 1000mm refilling of excavated earth & compaction.

g) H.T Cable termination shall be carried out only by the HT cable jointer with utmost care.

h) Cable laying and termination shall be in accordance with IS specification as listed as a part of this document. The cables shall be suitably supported so that the cable load should not cause strain to the equipment connected.

i) If suitable cable box is not supplied along with the equipment i.e. the transformer, Suitable cable adaptor boxes shall be arranged by the contractor at free of cost and cable termination shall be carried out by using suitable cable glands etc as required.

j) Suitable pillar box shall be installed to form ring main systems at the incomer side.

k) HT Cables shall be laid in below ground at a depth of 1000 mm. Before stating excavation, route survey shall be conducted in consultation with site engineers. Cable shall be laid through GI pipes / Hume pipes as protective cover wherever road crossings are there. Excavation, laying of pipes and refilling of earth etc. are included in the respective item rates.

l) Both supplying and laying of GI pipes & Hume pipes are in the scope of contractor with separate item rates.

m) Supply of LT cable glands, lugs, etc., are part of the respective cable laying.

n) No separate payment shall be made for jointing of LT Cables as they are already included in the laying of respective LT Cable sizes.

o) The cables to be laid on the cable trays (600mm) mentioned in the BOQ and the trench of the 11/11.5kV substation shall utilize the same item rate as underground cables.

p) Transportation and storage of cable drums shall generally conform to the requirements of IS: 1255.

10.16 SCOPE OF ERECTION OF L.T. KIOSK (LT DISTRIBUTION BOARD, LIGHITING DISTRIBUTION BOARD)

a) LT Kiosk will be supplied by the contractor as per the BOQ or BHEL, which may be diverted from other sites and the same shall be drawn from BHEL stores and transported to the required location. The contractor shall make his own arrangements for loading the L.T Kiosk from BHEL- Stores and unloading the same at the specified location. The contractor shall arrange necessary T&P and other materials required for loading and unloading.

b) LT Kisok shall be totally enclosed dust and vermin proof cubicles without louvers and suitable for outdoor application and wall/ column/ structure mounting type with sloping canopy confirming to IP 55 class

c) LT Kiosk shall be constructed from CRCA sheet. The sheet steel used shall be cold rolled and two mm thick. The construction of LT Kiosk shall ensure adequate rigidity. All components of the LT Kiosk shall be fully mounted inside the panel. LT Kiosk shall have only one operational Front. Door shall be provided to give full access to all the components. Door shall have padlocking arrangement.

d) Good quality synthetic rubber/ neoprene gaskets shall be fixed around the door. The door when closed, shall compress the gasket uniformly.

e) LT Kiosk shall be designed to prevent contact with live parts when the front door is open.

f) LT Kiosk shall be fitted with MS mounting brackets and adequate size of removable undrilled gland plate of three mm thickness.

g) LT Kiosk shall be fitted with two GI earth studs located in accessible position on the outside of the panel on opposite sides.

h) All metal parts of the panel except current carrying parts shall be bonded together electrically to the earthing stud. Phase barriers of fireproof insulating material shall be fitted in such a manner that it is not readily possible for personnel to touch the phase bus-bars.

i) The incomers and outgoings of the LT Kiosk are mentioned in the respective item of the BOQ. LT Kiosk shall be provided with earth stud, earth bus bar etc. designated with labels. Applicable standards are IS: 2675, IS: 4237, IS: 13947

j) 9. The location for erection shall be decided at site, in consultation with BHEL Engineer. Any mounting arrangement like construction of foundation, fabrication and fixing of mounting supports including supply of materials like cement, sand, steel, metal etc. shall be arranged by the vendor at his cost. Fabrication materials like angle and channels will be supplied by BHEL. The scope of erection of LT Kiosk includes providing two numbers of Earth pits per LT Kiosk for which separate item rates are provided.

k) If any loose items supplied along with L.T Kiosks are required to be mounted, the same shall be carried out by the contractor at free of charge.

l) Kiosk shall be checked up thoroughly and if any items are found to be damaged/ defective/ not working and requires replacement or any internal wiring to be modified, the same shall be carried out by the contractor at free of cost. However, replacement materials shall be arranged by BHEL.

m) Erection of LT Kiosks shall cover all the works mentioned above including touch up painting. The base frames shall normally be supplied along with the kiosks. These shall be aligned, levelled and grouted in position, as per approved drawings. Wherever the base channels are not available, the same shall be fabricated and painted by the contractor

within the quoted rates. However, required steel materials shall be arranged by BHEL with the approval of Site In-charge/BHEL. Base channels shall be grouted on the foundation.

n) LT Kiosk shall be checked thoroughly and before charging. Contractor shall carry out checking of Breaker operation, Fuse unit operation, Bus bar clearances, earth resistance and protection checks etc. After the satisfactory completion of these checks, the LT Kiosk shall be energized. The contractor shall arrange all instruments required for testing at his cost.

10.17 SCOPE OF SUPPLY AND INSTALLATION OF SIGN BOARDS AND SAFETY MEASURES

a) All required signboards, caution boards and safety boards shall be arranged and installed by the contractor in all poles and substations wherever required. Feeder description and line description shall be displayed at vital locations. Foremost importance shall be given to Safety, and the contractor shall adhere to safety instructions and ensure use of safety appliances, as required. The contractor shall provide all safety equipments to his workmen to avoid accidents.

b) No separate unit rate shall be paid for the supply and erection of sign board which are to be laid with in the substation and that shall be part 11 kV/ 433 V substation works or 11kV/11.5kV substation works as per BOQ.

10.18 SCOPE OF EARTHING AND LIGHTNING PROTECTION SYSTEM

a) The scope of earthing covers earthing of all substation equipments, and providing earth pits as per IS requirement.

b) The scope of earth pits covers excavation, supply and erection of 3m long earth electrode, filling the pits with alternate layer of charcoal & salt as per IE specification, making of brick chamber with both side plastering supply and fixing of manhole cover plate with RCC slab, as per typical drawing provided by BHEL.

c) Number of earth pits for substation shall be decided considering soil resistively. However, PSS substation shall have 6 Nos pits. i.e. 2 Nos for neutral, 2 No for Body and 2 Nos for LA and 11/11.5kV substation shall have minimum 10 earth pits for earth Mat & Body earthing, 4 nos. for Neutral earthing and 04 nos. for LA earthing.

d) LIGHTNING: The scope of work of Lightning Protection system includes supply and installation of two numbers vertical air terminations and poles of 06m long with base plate. The pole shall be tubular stepped type as per applicable standard. Vertical air terminal shall be grounded with earth pits. Required civil works for lightning pole erection and grouting, grounding the air terminals and supply of grouting and grounding materials are in the scope of Contractor. The supply of above base plate is in the scope of contractors.

10.19 DETAILED SCOPE OF WORKS – YARD LIGHTING:

10.19.1 SWAGED LIGHTING POLES:

e) Lighting poles for flood lights shall be of steel tubular swaged type 09-metre-long steel poles as per applicable standard. The steel poles shall be coated with bituminous preservative paint on the inside as well as outside surface. Exposed outside surface of steel poles shall be painted with one coat of red lead oxide primer. After installation, two coats of Aluminium paint shall be applied

f) The poles shall be supplied with associated pole mounted Junction Boxes, suitable MS base with shop drilled holes or by suitable clamps for fixing of light fixtures. No cutting or drilling of galvanized structure is permitted.

g) The lighting poles shall be erected at the locations shown in the layout drawing (This drawing is in the scope of bidder). The scope of erection work shall include excavation of

earth, as per drawing, grouting with concrete M20/ M25, supply of cement, sand, metal etc. to withstand wind velocity, mounting of assembled fittings, wiring/ cabling from junction box at the bottom of pole up to the lighting fixture, installation of 50mm dia of medium thickness GI pipe for cable protection from trench to junction box for loop-in-loop-out cable. All the above required materials shall be supplied by the bidder under the respective item rates as mentioned in the BOQ.

h) Unit rate quoted for Erection of lighting pole includes Earthing of lighting pole Junction boxes and lighting fixtures, in compliance with IE rules and applicable Indian Standard. Each lighting pole JB shall be earthed by 25x3mm GI Flat bonded to 25 mm dia GI earth electrode of 3-meter length driven vertically in the ground. 14SWG GI wire shall be taken from fixture to JB including fixing of clamps.

10.19.2 LIGHTING FIXTURES

a) The luminaries shall be street light LED fittings of 90W & 150 W.

b) Street light luminaires shall be of weather proof for outdoor application.

c) Luminaires shall be of continuous trouble free operation under atmospheric conditions, without reduction in lamp life or without deterioration of materials and internal wiring. Fixtures shall be provided with outdoor type weather proof box with IP-54 or better. Applicable standards are IS: 1913, IS: 1777, IS: 4012, IS: 4013.

10.20 PROGRESS OF WORK

a) BHEL uses SDD (Site Data Digitization) for work progress and the same shall be utilized for planning and review. Necessary help and coordination shall be given by the vendor for the same.

b) The progress reports shall indicate the progress achieved against plan, indicating reasons for delays, if any. The report shall also give remedial actions which the contractor intends to make good the slippage or lost time so that further works can proceed as per the original plan and the slippages do not accumulate and affect the overall programme.

c) It is the responsibility of the contractor to provide all relevant information on a regular basis regarding erection progress, labour availability, equipment deployment, testing, etc.

d) Contractor is required to draw mutually agreed monthly erection programs in consultation with BHEL well in advance. Contractor shall ensure achievement of agreed program and shall also timely arrange additional resources considered necessary at no extra cost to BHEL.

e) Progress review meetings will be held at site during which actual progress during the week vis-a-vis scheduled program shall be discussed for actions to be taken for achieving targets. Contractor shall also present the program for subsequent week. The contractor shall constantly update / revise his work program to meet the overall requirement. All quality problems shall also be discussed during the above review meetings. Necessary preventive and corrective action shall be discussed and decided upon in such review meetings and shall be implemented by the contractor in a time bound manner so as to eliminate the cause of nonconformities.

f) The contractor shall submit daily, weekly and monthly progress reports, manpower reports, materials reports, consumables (gases / electrodes / ferrules / lugs) report, cranes availability report and other reports as per Performa considered necessary by the Engineer as per the BHEL formats.

g) The contractor shall submit weekly / fortnightly / monthly statement report regarding consumption of all consumables for cost analysis purposes.

h) The manpower reports shall clearly indicate the manpower deployed, category wise specifying also the activities in which they are engaged.

i) The monthly report shall be submitted at the end of every month as a booklet and shall contain the following details: -

i. Colour Progress photographs of executed jobs etc.

ii. Erection progress in terms of tonnage, percentage of work completion, welding joints, radiography, stress relieving, etc. completed as relevant to the respective work areas against planned.

iii. Site Organization chart of engineers & supervisors as on the last day of the month with further mobilization plan.

iv. Category-wise man hours engaged during the previous month under the categories of fitters, welders, riggers, khalasis, grinder-men, gas-cutters, electricians, crane operations, store keepers, lab technician's helpers, security etc. Data shall be split up under the work areas like Boiler (pressure parts, structures) Rotating machines, Electrostatic precipitator, Insulation, Piping, Steam turbine, Condenser, Generator etc.

v. Consumables report giving consumption of all types of gases and electrodes during the previous month.

vi. Availability report of cranes

vii. Safety implementation report in the format

viii. Pending material and any other inputs required from BHEL for activities planned during the subsequent month.

j) The contractor to reflect actual progress achieved during the month and will be submitted to BHEL, so that slippages can be observed and necessary action taken in order to ensure that the situation does not get out of control and will update the construction schedule forming part of this contract each month.

10.21 TESTING AND COMMISSIONING WORKS:

a) The contractor shall take the full responsibility of testing and commissioning of the equipment being installed by him under the overall supervision of BHEL. It shall be the responsibility of the contractor to arrange and complete all the testing, pre-commissioning and commissioning activities for the particular equipment as per relevant standard, code of practice, manufacturer's instructions and BHEL norms. All these will be witnessed by BHEL Engineers and reports signed jointly.

b) All T&P / instruments required for testing are to be arranged by the contractor. Any special equipment, tools and tackles, IMTEs etc. required for the successful completion of the Commissioning Tests shall be provided by the Contractor, free of cost.

c) All testing activities shall be carried out as per relevant standard, code of practice, manufacturer's instructions and BHEL norms. The contractor shall submit a checklist to BHEL prior to taking up testing and commissioning activities and the activities shall be carried out in accordance with the checklist approved by BHEL. All the above will be witnessed by BHEL engineer and the reports signed jointly.

d) The commissioning activities, tests, trial runs may have to be repeated till satisfactory results are obtained and also to satisfy the requirements of BHEL / customer / consultant / statutory authorities like boiler inspector, electrical inspector etc.

e) Prior to commissioning and after commissioning, protocols have to be made with BHEL / Customer. The formats will be given by BHEL and have to be printed by the contractor in adequate numbers.

f) It shall be the responsibility of the contractor to commission and attend any problem in the equipment erected by the contractor using various categories of workers in sufficient numbers along with Supervisors. Association of BHEL's / Client's staff during above period

will not absolve contractor from above responsibilities. The commissioning group shall have the knowledge of various systems referred in the tender and possess adequate experience in testing and commissioning.

g) All the tests at various stages shall be repeated till all the equipment satisfy the requirement of BHEL / Customer. Any rectifications required shall have to be done / redone by the contractor at his cost.

h) The contractor shall carryout any other test not listed in the tender but as desired by BHEL Engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning, commissioning, and operation, to demonstrate the completion of any part or whole work performed by the contractor.

i) In case, any rework is required because of contractor's faulty erection, which is noticed during pre-commissioning and commissioning, the same has to be rectified by the contractor at his cost. If any equipment / part is required to be inspected during pre-commissioning and commissioning, the contractor will dismantle / open up the equipment / part and reassemble / redo the work without any extra claim.

j) During commissioning any improvement / repair / rework / rectification / fabrication / modification due to design improvement / requirement is involved, the same shall be carried out by the contractor promptly and expeditiously.

10.22 FINAL PAINTING

k) The quoted rate / price shall be inclusive of supply and application of final painting of all the erected equipments like all steel items such as supports, racks, frames, HT/LT KIOSK, Transformers, etc as per the painting specifications of customer / BHEL.

l) In the case of steel fabricated items, raw steel after fabrication has to be cleaned and subsequent painting to be carried out.

m) All the exposed metal parts of the equipments including busducts, transformers, structures, etc., wherever applicable after installation unless otherwise specified the surface protected, are to be first painted with at least one coat of suitable primer and required number of finish coats as specified by BHEL which matches the shop primer paint used after thoroughly cleaning the dust, rust, scales, grease oil, and other foreign materials by wire brushing scrapping and chemical cleaning and the same being inspected and approved by BHEL engineers for painting. Afterwards the above parts shall be finished with as per the instructions of BHEL / Customer official.

n) Normally Paint shall be applied by brushing as per the instruction of BHEL Engineer. It shall be ensured that brush marks are minimum. If needed and insisted either by BHEL / Customer in certain cases, spray painting has to be carried out within the Quoted rates. Spray painting gun and compressed air arrangement has to be made by the contractor himself within the Quoted rates.

o) All damaged galvanized surfaces including cable trays shall be coated with cold galvanizing paint.

p) Paint used shall be stirred frequently to keep the pigment in suspension. Paint shall be of the ready mix type in original sealed containers as packed by the paint manufacturer. No thinners shall be permitted. Paint manufacturer’s instructions shall be followed in method of application, handling, drying time etc.,

q) The scope of painting includes application of colour bands, lettering the names of the systems, equipments, danger / warning signs and other data as required by BHEL within the quoted rate.

r) All surfaces shall be thoroughly cleaned, free from scales, dirt and other foreign matter. Each coat shall be applied in an even & uniform film free from lumps, streaks, runs, sags and uncoated spots.

s) The actual colour to be applied shall be approved by the customer / BHEL before starting of actual painting work.

t) Primer & finish paint shall be of reputed paint supplier approved by BHEL / Customer. Contractor has to procure paints from the BHEL / Customer approved agencies only. The quality of the finish paint shall be as per the standards of IS or equivalent as approved by BHEL / Customer. Before procurement of paint the contractor has to obtain the clearance from BHEL authorities.

u) No paint shall be applied when the surface temp is above 55 ˚C or below 10˚C, and when the humidity is greater than 90% to cause condensation on the surface or frost / foggy weather.

v) Before commencement of final painting, contractor has to obtain written clearance from BHEL / Customer for effective completion of surface preparation.

10.23 PRESERVATION / TOUCH UP PAINTING

a) Supply & application of primer & finish paints with all manpower, tools & plants and consumables is covered in the scope of this tender.

b) Contractor shall carryout cleaning and preservation / touches up painting for the materials / equipments under this tender specification right from pre- assembly stage till the equipment is cleared for final painting within the quoted rate.

c) Any equipment which has been given the shop coat of primer shall be carefully examined after its erection in the field and shall be treated with touch up coat of red oxide primer wherever the shop coat has been abraded, removed or damaged during transit / erection, or defaced during welding.

d) Mostly the equipment / items / components will be supplied with one coat of primer paint and one coat of finish paint. However, during storage and handling, the same may get peeled off / deteriorate. All such surfaces are to be thoroughly cleaned and to be touch up painted with suitable approved primer and finish paint matching with shop paint / approved final colour.

10.24 SCOPE OF OPERATION AND MAINTENANCE

a) The scope of O & M work includes identification of items at stores / yards, checking, reporting the damages if any, taking delivery at storage yard / stores, loading, transportation to working yard, pre-assembly, calibration, checking, replacing, testing and commissioning, & post-commissioning activities using vendor's own tools and tackles and testing instruments along with the supply of all consumables like insulation tapes, HT tapes, electrodes, gas, paints, cable dressing materials, tag plates, PVC sleeves etc.

b) Operation & maintenance of High Masts, Electrical works in BHEL Offices, BHEL Stores, BHEL yards, etc. inside the Main Plant boundary erected and commissioned by other agencies will be part of this package. The Electrical works of storage areas outside the main plant boundary (if any) erected and commissioning by other agencies shall also be covered under this O&M package.

c) The contractor shall operate and maintain all the electrical installation by deploying electricians, helpers, supervisor etc. on a three shift basis as per the instruction of Engineer in charge.

d) Contractor shall attend the break down and replace the defective components promptly.

e) During the maintenance period, if the contractor fails to deploy adequate manpower continuously for two weeks, BHEL will make alternative arrangement and recover the cost incurred for the same along with 5% overheads. Decision of BHEL shall be final and binding on the contractor.

f) All the tools and plants required for preventive maintenance and breakdown maintenance shall be arranged by the contractor.

g) During the maintenance period, Contractor shall also replace any defective items from spares at free of cost for all electrical installation. However, replacement materials / spares shall be supplied by BHEL as free issue.

h) The man power should be available throughout the year inclusive of all holidays and Sundays.

i) The supply of faulty parts and spares are excluded from the contractor's scope and will be provided by BHEL free of cost.

10.25 TECHNICAL REQUIREMENT FOR ITEMS SUPPLIED BY THE CONTRACTOR.

10.25.1 GENERAL

a) Equipment and material supplied shall comply with description, rating, type and size as detailed in this specification, drawings and annexures.

b) Equipment and materials furnished shall be complete and operative in add details.

c) All the accessories, fittings, supports, anchor bolts etc., which form part of the equipment or which are necessary for safe and satisfactory installation and operation of the equipment shall be furnished.

d) All parts shall be made accurately to standard gauges so as to facilitate replacement and repair. All corresponding parts of similar equipment shall be interchangeable.

e) Samples of all items shall be made available for purchaser's approval prior to supply of item to site.

10.25.2 FERRULES

a) Ferrules shall be required for individual core of cable hence they shall be suitable for the insulated conductor diameter.

b) Ferrules shall be of plastic material.

c) Numbering on the ferrules shall be engraved type with contrast colour to the base. Engrave colouring shall be of durable quality to match the entire life of the plant. Engraving shall be legible from a distance of 600 mm.

d) Ferrules shall be interlocking type in such a way that the interlocked ferrules take the shape of tube with complete ferrule number appearing in a straight line.

10.25.3 TAGS

a) Cables tags shall be provided with cable number for identification.

b) Cable tags shall be of durable fibre, aluminium or stainless steel sheets.

c) Cable number shall be engraved type in case of aluminium or stainless steel tags, and printed type in case of fibre sheet.

d) Tags shall be durable quality of size 60mm x 12mm with holes at both ends.

e) Samples of tags shall be approved by BHEL Engineer before delivery.

f) Tags shall be provided with non-corrosive wire of sufficient strength for taggings.

10.25.4 FIRE STOP CABLE SEALING SYSTEM (AS APPLICABLE)

Fire stop cable sealing system shall have two (2) hours fire protection rating suitable for sealing both vertical & horizontal cable penetrations. The sealing compound in conjunction with mineral wool shall form effective fire seals. The sealing compound shall have special property to allow for short circuit conditions. GPG fire stop sealing compo or equivalent sealing compound shall be used.

10.26 GUIDELINES FOR ERECTION OF GI PIPES, SUPPORTS & ACCESSORIES

a) For installation of cables in GI conduits the conduits shall be installed first without cables but having suitable pull wires laid in conduits.

b) For equipment and devices having GI conduit entry arrangement other than standard GI conduit adopter, adopters shall be provided as required to enable the GI conduit to be properly terminated, between conduit end and motor T.B.

c) GI conduits shall run without moisture or water traps and shall be made drawing arrangement towards the end.

d) The entire GI conduit system shall be firmly fastened in position. All boxes and fittings shall generally be secured independently from the GI pipes entering them.

e) Bends of GI pipes/conduits shall be made without causing damage to the pipes/conduits.

f) Occupancy of conduits shall not be greater than 40%.

g) The adopter for coupling rigid GI pipe/conduits and flexible conduit shall be of aluminium or galvanised steel.

10.27 INSTALLATION, TESTING & COMMISSIONING IN GENERAL:

a) The stages of completion of various works shall be as follows:

b) Completion: Equipment shall be considered to be completely erected when the following activities have been completed.

- Moving of all equipment to the respective foundations.
- Fixing of anchor bolts or tack welding as required.
- Leveling and alignment of equipment.
- Assembling of all accessories such as relays, CTs, PTs, meters, instruments etc. as described in the job specification.
- Cable laying, termination with continuity check.
- Applying of finishing coat of paint.

c) All the equipment shall be tested at site to know their condition and to prove suitability for required performance. The site tests and acceptance tests to be performed by contractor are detailed below.

d) The contractor shall be responsible for satisfactorily working of complete integrated system and guaranteed performance.

10.28 SITE TESTS AND CHECKS

10.28.1 **General**

a) All the equipment shall be tested at site to know their condition and to prove suitability for required performance.

b) The test indicated in following pages shall be conducted after installation. All tools, accessories and required instruments shall have to be arranged by contractor. Any other test which is considered necessary by the manufacturer of the equipment, contractor or mentioned in commissioning manual has to be conducted at site.

c) In addition to tests on individual equipment some tests / checks are to be conducted / observed from overall system point of view. Such checks are highlighted under miscellaneous tests but these shall not be limited to as indicated and shall be finalized with consultation of client before charging of the system.

d) The contractor shall be responsible for satisfactory working of complete integrated system and guaranteed performance.

e) All checks and tests shall be conducted in the presence of client's representative and test results shall be submitted in six copies to client and one copy to Electrical Inspector. Test results shall be filled in proper proforma.

f) After clearance from Electrical Inspector system/equipment shall be charged in step by step method.

g) Based on the test results clear cut observation shall be indicated by testing engineer with regard to suitability for charging of the equipment or reasons for not charging and this information is to be brought to the notice of the BHEL Engineer by the contractor.

10.28.2 **Trial Run Test**

After the successful test of each equipment as per standard test procedure, the entire control system shall be put on trial run test on actual site conditions and operation of the system.

10.28.3 **Acceptance Test**

The acceptance test on the system shall be carried out by the supplier as per mutually agreed test procedures to establish satisfactorily functioning of the system as a whole and each equipment as part of the system.

10.29.1 **TESTS on CT (Location of CT maybe in HT Switchgear)**

i. Ratio
ii. Polarity
iii. Magnetising current
iv. IR Value

10.29.2 **TESTS on PT (Location of PT maybe in HT Switchgear)**

v. IR test of primary winding by HV megger between windings
vi. IR test of secondary winding by LV megger between winding and winding to earth
vii. Checking of voltage ratio
viii. Verification of terminal markings and polarity
ix. Checking of oil level if applicable
x. Checking of continuity and IR values for cables from PT to M
xi. Checking tightness of earthing connection.
xii. Checking of insulator for cracks.
xiii. Checking output on charging of the system with connected meter

Note:

1) While operating the mechanism on Electrical Control, check limit switches, step by step contractor, over running device etc. once again for their actual operation and prove that they are functioning properly.
2) For More Details, please refer Respective Manuals from the OEM.

10.29 GUIDELINES FOR ERECTION OF HT SWITCHGEAR PANELS

10.30.1 **Erection**

a) The base frames will be supplied normally along with the boards. These will have to be aligned, levelled and grouted in position as per approved drawings. Wherever the base channels are not available, the same will have to be fabricated and painted at site. Base frames shall be grouted on the openings which shall be made on the floor during the time of casting. All necessary concrete chipping and finishing works are to be completed.

b) All the panels/board shall be placed on its foundation or supporting structures and shall be assembled as required. All panels should be installed with parallel, horizontal and vertical alignment by skilled craftsmen.

c) All the boards will be delivered in sections. Necessary interconnection of busbar, bolting of panels, left out panel / interpanel wiring, etc. will have to be done after assembling the panel.

10.30.2 **The Following Points shall be Checked up During Erection**

i. Layout of foundation channels.

ii. Floor level covered by the panel with respect to main floor level.
iii. Location and serial no. of panels.
iv. Positioning of panels.
v. Verticality of switchgear panels within the limit specified.
vi. Freeness of Breaker Truck and modules in housing and its manual operation.
vii. Earthing of panels and breaker truck to station earth.
viii. Lugs for termination of HT and LT cables.
ix. Mounting and fixing arrangements of Bus bars.
x. Tightening of Busbar jointing bolts as specified.
xi. Clearance between:
- Phase to Phase
- Phase to earth

xii. Minimum clearance for:
- Breaker, Truck and modules withdrawal
- Distance required for maintenance work

xiii. Check the operation of:
- Remote control
- Various required - closing / tripping / alarm / indications / interlocks

xiv. Installation position of instruments and relays
xv. Operation of relays and meters by secondary injection.
xvi. 15. AC/DC supplies for panel
xvii. 16. Final relay settings as per customer requirements.
xviii. 17. Tightness of terminal connections for HT & LT connections.
xix. 18. Opening operation of breaker, manually and electrically.
xx. 19. Working of ammeters and voltmeters for their entire range and other panel mounted instruments like recorder, indicator etc.

10.30.3 **HT SWITCHGEAR TESTS**

i. IR test
ii. HV one minute P.F. test checking of oil level
iii. Measurement of contact resistance for HT breakers
iv. Test to prove inter changeability of similar parts (including breaker module)
v. Testing of relays as per supplier's commissioning manual
vi. Testing and calibration of all meters.
vii. Operation of all relays by secondary injection method
viii. Testing of CT polarities and CT ratio by primary injection test.
ix. Measurement of knee point voltage and secondary resistance for CTs used for differential protection.
x. IR and voltage ratio test for PTs
xi. Functional test of all circuit components for each panel / feeder.
xii. Test to prove closing/tripping operation at minimum and maximum specified voltage in test and service position.
xiii. Check for drawout test and service position of breakers for all feeders.
xiv. Check for covering of all openings in the panel - check for continuity and operation of aux. contacts of breaker.
xv. HV test on vacuum interrupters (for VCBs)
xvi. Check for pressure of SF6 gas and air (for SF6).

10.30 LT SWITCHGEAR PANELS

10.31.2 **Erection**

a) The base frames will be supplied normally along with the boards or shall be fabricated at site with steel supplied in the BOQ. These will have to be aligned, levelled and grouted in

position as per approved drawings. Wherever the base channels are not available, the same will have to be fabricated and painted at site. Base frames shall be grouted on the openings which shall be made on the floor during the time of casting. All necessary concrete chipping and finishing works are to be completed and within this contract.

b) All the panels/board shall be placed on its foundation or supporting structures and shall be assembled as required. All panels should be installed with parallel, horizontal and vertical alignment by skilled craftsmen

c) All the boards will be delivered in sections. Necessary interconnection of busbar, bolting of panels, left out panel / inters panel wiring, etc. will have to be done after assembling the panel.

d) Earthing Pit for the body and neutral 2 Nos each is to be made as per the drg. The same shall be quoted in the E&C rate.

10.31.3 Checks during erection

i. Layout of foundation channels.
ii. Floor level covered by the panel with respect to main floor level.
iii. Location and serial no. of panels.
iv. Positioning of panels.
v. Verticality of switchgear panels within the limit specified.
vi. Freeness of Breaker Truck and modules in housing and its manual operation.
vii. Earthing of panels and breaker truck to station earth.
viii. Lugs for termination of LT cables.
ix. Mounting and fixing arrangements of Bus bars.
x. Tightening of Busbar jointing bolts as specified.
xi. Clearance between :
- Phase to Phase
- Phase to earth

xii. Minimum clearance for:
- Breaker, Truck and modules withdrawal
- Distance required for maintenance work

xiii. Check the operation of:
- Remote control
- Various required - closing / tripping / alarm / indications / interlocks

xiv. Installation position of instruments and relays
xv. Operation of relays and meters by secondary injection.
xvi. AC/DC supplies for panel
xvii. Final relay settings as per customer requirements.
xviii. Tightness of terminal connections for HT & LT connections.
xix. Opening operation of breaker, manually and electrically.
xx. Working of ammeters and voltmeters for their entire range and other panel mounted instruments like recorder, indicator etc.

10.31.4 LT Switchgear tests

i. IR test
ii. Measurement of contact resistance for LT breakers
iii. Test to prove inter changeability of similar parts (including breaker module
iv. Testing of relays as per supplier’s commissioning manual.
v. Testing and calibration of all meters.
vi. Operation of all relays by secondary injection method.
vii. Testing of CT polarities and CT ratio by primary injection test.
viii. Measurement of kneepoint voltage and secondary resistance for CTs used for differential protection
ix. IR and voltage ratio test for PTs

x. Functional test of all circuit components for each panel / feeder
xi. Test to prove closing / tripping operation at minimum and maximum specified voltage in test and service position
xii. Check for drawout test and service position of breakers for all feeders
xiii. Check for covering of all openings in the panel - check for continuity and operation of aux. contacts of breaker.

10.31 TESTING OF CABLES:

a) The contractor shall submit to the Engineer a checklist for testing and commissioning and the activities shall be carried out in accordance with the checklist.
b) Testing and electrical measurement of cable installations shall conform to IS: 1255
c) Prior to installation, cables shall be tested for:
i. Continuity of conductors
ii. Insulation resistance between conductors & earth
iii. Insulation resistance between conductors.
d) After installation cables shall be tested for:
i. Insulation resistance between conductors & iron
ii. Insulation resistance between conductors & earth
iii. Conductor resistance
iv. Capacitance between conductors & earth (if required)
v. DC high voltage test (for LT power cables of higher sizes interconnecting PCCs& MCC)
vi. Absence of cross phasing
vii. Firmness of terminations.

10.32 NOTE:

The tests specified above for all the electrical equipment are not exhaustive. Any other pre-commissioning and field tests not included in the above list but necessary as per relevant standards, Electricity rules, code of practice and as instructed by the manufacturer of the equipment shall also have to be carried out if deemed as per requirement either within the quoted rates / price or at additional cost. Decision of Engineer in charge will be the final regarding additional cost for testing. The contractor shall take the full responsibility of testing, commissioning, trial run and successful operation of the equipment.

Test certificates of the vendor scope items, where ever necessary same should be produced by the bidder long with the dispatch documents/ Invoice of the supplied items.

For Hight mast: As per Annexure-1

For VCB: As per Annexure-2

For Rabbit Conductor: As per Annexure-3

Annexure-4

UNPRICED RATE SCHEDULE

ITEM NO.	DESCRIPTION OF WORK	TOTAL VALUE IN INR (IN FIGURES AND WORDS)
1.0	**TOTAL PRICE FOR** **"SUPPLY, ERECTION & COMMISSIONING OF CONSTRUCTION POWER SUPPLY SYSTEM (PACKAGE-A & PACKAGE-B) AT 1x800MW YAMUNANAGAR PROJECT"**	**A**
Notes:		
a.	**The rates of individual item for the entire scope of work shall be arrived as per Calculation defined in Rate Schedule.**	
b.	**The derived item rate will remain firm throughout the contract period.**	

Instructions to the bidders

1. Bidders shall quote Total Price for the entire scope of work (PKG-A & PKG-B) in Rupees.
2. Bidder's quoted price above shall be complete in all respect for the full scope defined in specification and in accordance with all terms & conditions of tender.
3. Contractor shall fully understand description and specifications of items mentioned in BOQ.
4. Conditional price bids with any deviation / clarification etc. are liable to be rejected. No cutting / erasing / over writing shall be done.
5. Quantities mentioned in BOQ Cum Rate Schedule are approximate only and liable for variation on either side depending upon site / design requirement. The tentative contract value (CV) of entire scope of work shall be calculated as per finally quoted / accepted rates & the Quantities indicated in BOQ cum Rate Schedule.
6. Contractor's total quoted price as per BOQ Cum Rate Schedule will be taken as tentative only. The contractor undertakes to execute actual quantities as per advice of BHEL Engineer and accordingly the final contract price shall be worked out on the

basis of quantities actually executed at site and payments will also be regulated for the same.

7. In case of any mis-match in rate and amount on price discrepancy, the same will be dealt as per clause no. 1.4 of GCC.
8. Taxes (GST) shall be payable extra as per relevant clauses in Technical Conditions of Contract.