

**Illumination
Works of
U#1&2**

TECHNICAL CONDITIONS OF CONTRACT (TCC) VOL-IA

**ERECTION, TESTING & COMMISSIONING OF
ILLUMINATION PACKAGE OF U#1 & U#2 at
2X660 MW NTPC TALCHER THERMAL POWER
PROJECT, STAGE-III, ANGUL, ODISHA**


BHARAT HEAVY ELECTRICALS LIMITED



TECHNICAL CONDITIONS OF CONTRACT (TCC)
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CHAPTER - I : PROJECT INFORMATION

1.	PROJECT INFORMATION	
	Project Name	2x660 MW NTPC Talcher TPS
	Talcher Thermal Power Project is situated near Talcher town in Angul district of Odisha. Talcher TPS was taken over by NTPC on 03.06.1995. The present proposal is for expansion of TTPS by adding 2 units of 660 MW.	
1.1.	 <p style="text-align: center;">LOCATION MAP:2X660MW Talcher Thermal Power Project</p>	
1.2.	Plant Site Location	The proposed site is at a distance of about 4 km from Talcher town and about 25 km from district headquarters Angul in Odisha state, India.
1.3.	Nearest Town/ City	The proposed site is at a distance of about 4 km from Talcher town and about 25 km from district headquarters Angul in Odisha state, India.
1.4.	Nearest Railway Station	Talcher is on Talcher-Cuttack section of North Eastern Railway (renamed East Coast Railway) at about 2 Km. However, a small railway station named 'Talcher Thermal' is located near project boundary.
1.5.	Nearest Airport	Bhubaneswar
1.6.	Nearest Seaport	Kolkata-424km
1.7.	Daily Ambient Temperature	Mean of daily minimum temperature = 15.1°C Mean of daily maximum temperature = 39.8°C

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CHAPTER -I : PROJECT INFORMATION

1.8.	Wind Speed	Design wind speed is 50 m/sec as per IS: 875 Part III
1.9.	Seismic Zone	The project site lies in zone III as defined in IS: 1893.
Note: The Bidder shall acquaint himself by a visit to the site, with the conditions prevailing at site before submission of the bid. The information given here in under is for general guidance and shall not be contractually binding on the Owner. All relevant site data / information as may be necessary shall have to be obtained / collected by the Bidder.		

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CHAPTER-II: SCOPE OF WORK

2.	SCOPE OF WORK
2.1.	<p>Erection, testing, pre-commissioning and handing over of Illumination (Station Lighting) System, all lighting equipment's as per Technical conditions of contract (TCC) and all other materials including handling at storage yard/ stores, transportation to work site, calibration, pre-assembly as required for completion of Unit#1 & 2 of 2x660 MW NTPC Talcher Project.</p> <p>Supply & Erection of consumables like adapter glands, conduit fittings viz. couplers, elbows, bends, tees, circular boxes etc., conduit accessories viz. clips, all saddles, spacer, circular junction box, circular box, spacing plates, entry bushes, lock nuts, plugs, heavy duty lugs, ferrules, expansion fasteners, ball & sockets, earth clips, fan boxes, clamps, screws, pull out boxes etc., conduit boxes, clamps, flexible conduit, fixing hardware, anchors, wedges, nuts & bolts, concrete inserts, M/H Hook with rawl plug, materials required for mounting the fixtures, consumable and other incidental materials required to complete the installation, testing & commissioning of complete lighting system for successful operation, & to the satisfaction of purchaser/ customer. Supply scope of these items shall form part of the installation rates quoted for the item (As per Tentative List of Consumables given in Annexure-1 of Chapter XI).</p> <p>The broad scope of E&C work includes:</p> <ol style="list-style-type: none">1. LDB/ WDB (Distribution Boards).2. Lighting Panels.3. Lighting Luminaires (complete with accessories).4. Switch Boxes.5. Junction Boxes.6. Receptacles.7. Ceiling fans with electronic regulators.8. Poles installation including all accessories. (swaged, steel tubular, galvanized).9. Wires10. Conduits including Hot dip galvanized rigid steel conduits (heavy duty).11. Supply Module/ Lamp unit.12. Exit sign/ Emergency lighting units' installation.13. 24V supply module & lamp unit complete with all accessories.14. Fabrication of steel structure15. Laying & Termination of Power Cables16. Above Ground Earthing & Lightning Protection Materials17. Hume Pipe18. Laying & Termination of Underground Cables19. Ladder <p>Minor civil works Plumbing/ Grouting/ Foundation required to complete the lighting installation are covered under the scope of this contract and form part of the item installation cost and are not payable separately.</p> <p>E&C of scope shall be completed as per approved drawings & instructions received from BHEL Engineers.</p>

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2.2.	STATION LIGHTING
2.2.1.	Station lighting covers complete power plant and its auxiliary (BOP) areas, handling transportation from BHEL stores/ yard to work place. Erection & Commissioning of lighting material like LDB (Including Lighting transformer for AC/ DC) Type, LP, lighting luminaires (with Complete accessories), Switch Boxes, Junction Boxes, Receptacles, Fans, Emergency lighting, Poles, Conduits, Rigid/ Flexible PVC coated conduit, Wires, Structural Steel as per the drawings, etc.
2.2.2.	All measuring and testing instruments required during erection, testing, commissioning and performance testing shall be arranged by the bidder.
2.2.3.	Supply of necessary hardware (As per Tentative List of Consumables given in Annexure-1 of Chapter-XI) such as double compression cable glands, conduit fittings viz. couplers, elbows, bends, tees, circular boxes etc., conduit accessories viz. clips, saddles, spacing plates, entry bushes, lock nuts, plugs, heavy duty lugs, ferrules, expansion fasteners, ball & sockets, earth clips, fan boxes, clamps, screws, pull out boxes etc. are in the scope of bidder. No separate rate shall be payable for the above.
2.2.4.	The contractor shall provide holes or openings in walls and floors that are required for routing the conduits wherever required within the quoted rate. Closure of the openings, holes by suitable packing materials shall be in the scope of bidder. No separate payment will be made for Supply of packing materials, packing, closure & finishing of holes. All shall be included within the quoted rate.
2.2.5.	The contractor shall be responsible if any parts of lighting fixtures, LDBs, LPs are lost or damaged and lamps are broken during installation. All damage and thefts shall be made good by the contractor till the installation is handed over to the customer.
2.2.6.	All items shall be checked for its good condition and tested for its operation before erection as per FQP. If any item is found defective before erection due to manufacturing, then it shall be supplied by BHEL and the same shall be erected by the contractor within the quoted rates. A suitable test set up is required for testing.
2.2.7.	The contractor shall note that for any change in the location of lighting panels, lighting fixtures, switch boxes/ receptacles, no extra charges will be paid so long as the modifications are indicated to the contractor before commencement of the work on that particular equipment or circuit.
2.2.8.	Any modification work required by BHEL shall be attended by the contractor. Modifications which had raised due to execution deficiencies are at the cost of contractor whereas modifications which are due to design change shall be treated as extra work.
2.2.9.	The contractor shall have a separate cleaning gang to clean all equipment under erection as well as the work area and the project site at regular intervals to the satisfaction of Engineer-in-charge. In case this is not done, the purchaser will have the right to carry out the cleaning operation and any expenditure incurred in this regard will be to the contractor account.
2.2.10.	Except as specifically approved by the Engineer-in-Charge, installation of exposed conduits, mounting of lighting fixtures, etc. shall be taken up only after other services such as piping, air ducting, cable tray/ bus duct hangers, structural bracing's etc. in a particular area have been installed
2.2.11.	After installation of lighting fixtures/ receptacles, panel number and circuit number shall be painted on them at a suitable place.
2.2.12.	Work to be in-line with drawing/ design philosophy as per approved fixture mounting arrangement drawings as per Annexure-2 of Chapter-XI and in line with BHEL Engineer instruction.

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2.2.13.	Any modification work required by BHEL shall be attended by the contractor. Modifications which had raised due to execution deficiencies are at the cost of contractor whereas modifications which are due to design change shall be treated as extra work.
2.3.	LIGHTING FIXTURES AND ACCESSORIES
2.3.1.	Fixtures shall be mounted to maintain sufficient clearance from the overhead travelling crane trolley (wherever applicable).
2.3.2.	In FGD Scrubber galleries, mounting height of fixtures shall be about 2500 mm from platforms except shown otherwise. Bracket for fixture mounting shall be fabricated at site by using suitable conduits with a reducing socket to suit the fixtures and clamped on to the handrails. The fixing shall be strong enough to withstand vibration and high wind velocity. If a roof over platform is available, the fixture can be pendant mounted.
2.3.3.	Cost of E&C for lighting fixture shall be inclusive of cost of lamp installation.
2.3.4.	Wooden plugs in walls and ceilings for fixing of lighting fixtures and accessories are not acceptable. A suitable fool-proof method (preferably using nylon rawl plug) of fixing these shall be offered and this will be subject to the purchaser's approval.
2.3.5.	Lighting fixtures of appropriate type as per the lighting layout drawings and datasheet attached as per Annexure-3 of Chapter XI, shall be installed by the contractor. The type of mounting arrangement of fixtures shall be selected from the typical arrangements. The type of mounting will generally be indicated on the layout drawings. The exact mounting will, however, be decided at site depending upon the actual space/ other facilities available at site.
2.3.6.	The bracket for mounting the lighting fixtures on boiler platforms shall be fabricated at site using 40 mm GI conduit with a reducing socket to suit the fixture and clamped to the hand rails. However, the clamping of these conduits at points of large vibrations should be avoided. The fixing shall be strong enough to withstand vibrations and wind velocity. If a roof (or other platform over the platform is available, the fixture will be pendant mounted (supported to the structural members of the platform above).
2.3.7.	Flood lights shall be mounted on steel base facing the tentative direction shown on drawings. Fixing holes shall be provided with slot to turn the fixture about 5 Deg on both sides. Bolts shall be tightened with spring washers. Terminals connection to the flood lights shall be through flexible conduits. BHEL will supply the steel base and contractor has to install the same for fixing the flood light on the flood light structures. Alternatively, the flood light fixtures shall be mounted on galvanized M.S. base making use of shop drilled holes or by suitable clamps. No cutting or drilling of galvanized structure is permitted.
2.3.8.	In the rooms where false ceilings are provided, the lighting fixtures shall be supported separately by false ceiling grid of roof over false ceiling if it is of steel structural or form ceiling and not by the false ceiling board. The arrangement shall be to the approval of purchaser. The erection rate of lighting fixtures shall include the supply of steel brackets, supporting, anchoring material, hardware and also steel brackets/ hangers for bridging the gap above false ceilings, etc., required for installation of lighting fixtures as shown in the approved fixture mounting arrangement drawings as per Annexure-2 of Chapter XI.
2.3.9.	A four (4) way terminal junction box type F shall be provided near each lighting fixture, for loop-in, loop-out and off connection of lighting wires or as required.
2.3.10.	To distinguish emergency AC fixtures from normal AC fixtures, red painted circular mark of 1 cm dia. shall be provided on emergency fixtures.

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2.3.11.	The self-contained emergency lighting fixtures shall be installed in required areas. Mounting brackets are to be provided by the contractor.										
2.4.	LIGHTING DISTRIBUTION BOARD AND LIGHTING PANELS										
2.4.1.	Lighting DBs consisting of lighting transformer etc., shall be mounted on floor and LPs shall be mounted on the walls/ columns/ steel structures at the locations indicated in the drawings.										
2.4.2.	Suitable Space provision for LDB mounting on floor would be made by the purchaser. The contractor will supply necessary foundation bolts and do the grouting to fix up the LDBs.										
2.4.3.	LPs shall be installed by fastening to studs of not less than 12 mm dia. which will be suitably grout-ed/welded to the wall/column by the contractor. All the required accessories including studs for the erection of the panel shall be supplied by the contractor. If Mounting channels are required for, LPs the same will be provided by contractor.										
2.5.	LIGHTING CONTROL SWITCH BOXES & RECEPTACLE BOXES										
2.5.1.	All switch/ receptacle boxes in offices and control room shall be flush mounted in the wall. In other areas they shall be mounted on wall or column.										
2.5.2.	The locations of switch/receptacle boxes will be approximately as shown in the drawings. The exact location shall be finalized by the contractor in consultation with BHEL engineer.										
2.5.3.	All switch/receptacle boxes in offices and control room shall be flush mounted in the wall. In other areas they shall be mounted on wall or column. Unless Otherwise noted on the drawings the mounting height of switch/receptacle boxes shall be as follows. a. Lighting Control switch boxes - 1500 mm. b. Receptacle boxes 500 mm for indoor and 900 mm for outdoor locations.										
2.6.	CONDUITS AND ACCESSORIES										
2.6.1.	Conduit shall run along wall, floor, ceiling, on steel structures, embedded in wall, floor, for ceiling, in accordance with relevant layout drawings. The contractor shall closely co-ordinate his work with the civil contractor. Exposed conduits shall be run in straight lines parallel to building columns, beams and walls. Unnecessary bends and crossings shall be avoided to present a neat appearance. In the office area as, specified conduits shall be embedded along the entire run. It is the responsibility of the lighting contractor to co-ordinate with the civil contractor of these buildings. Conduits supports shall be provided at an interval of 750mm for horizontal runs and 1000mm vertical runs.										
2.6.2.	After installation, the conduits shall be thoroughly cleaned by compressed air before pulling in the wire.										
2.6.3.	The Contractor shall ensure for properly embedding conduit pipe sleeves wherever necessary for cabling work. All openings in the floor/ roof/ wall/ cable tunnel/ cable trenches made for conduit installation shall be sealed and made water proof by the Contractor.										
2.6.4.	GI pull wire of adequate size shall be laid in all conduits before installation. Metallic conduit runs at termination shall have two lock nuts wherever required for junction boxes etc.										
2.6.5.	Conduit runs/ sleeves shall be provided with PVC bushings having round edge at each end. All conduits/ pipes shall have their ends closed by caps until cables are pulled. After cables are pulled, the ends of conduits/ pipes shall be sealed with Glass wool/ Cement Mortar/ Putty to prevent entrance of moisture and foreign material.										
2.6.6.	All lighting wires shall be run inside the conduit. Size of conduit shall be selected as per the table given below:										
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">S. No.</th> <th rowspan="2">Size of Wire</th> <th colspan="2">Max. number of wires in</th> </tr> <tr> <th>20mm Conduit</th> <th>25mm Conduit</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">1.5 sqmm</td> <td style="text-align: center;">4</td> <td></td> </tr> </tbody> </table>	S. No.	Size of Wire	Max. number of wires in		20mm Conduit	25mm Conduit	1	1.5 sqmm	4	
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	2	2.5 sqmm	4	6
2.6.7.	Exposed conduit/ pipe shall be adequately supported by racks, clamps, straps or by other approved means. Conduits/ pipe support shall be installed square and true to line and grade with an average spacing between the supports as given below, unless specified otherwise.			
	Conduit/ pipe size (dia).		Spacing	
	up to 40 mm		1 M	
	50 mm		2.0 M	
	65-85 mm		2.5 M	
	100 mm and above		3.0 M	
2.6.8.	For bending of conduits, bending machine shall be arranged at site by the contractor to facilitate cold bending. The bends formed shall be smooth.			
2.6.9.	Conduit shall be clamped on to approved type spacer plates or brackets by saddles or U-bolts. The spacer plates or brackets in turn, shall be securely fixed to the building steel by welding and to concrete or brick work by grouting or by nylon rawl plugs.			
2.6.10.	Embedded conduits shall be securely fixed in position to preclude any movement. In fixing embedded conduit, if welding or brazing is used, extreme care should be taken to avoid any injury to the inner surface of the conduit.			
2.6.11.	Spacing of embedded conduits shall be such as to permit flow of concrete between them and in no case shall be less than 40mm.			
2.6.12.	For direct embedding in soil, the conduits shall be coated with an asphalt base compound. Concrete pier or anchor shall be provided where necessary to support the conduit rigidly and to hold it in place.			
2.6.13.	Conduits shall be installed in such a way as to ensure against trouble from trapped condensation.			
2.6.14.	The contractor shall be made available at site, dies for threading various conduits. Running threads shall be avoided as far as practicable. Where it is unavoidable, check nut shall be used. All field thread ends shall be reamed after threading and anti-corrosive paint applied.			
2.6.15.	Conduits shall be kept, wherever possible, at least 300 mm away from hot pipes, heating devices etc.			
2.6.16.	Slip joints shall be provided when conduits cross structural expansion joints or where long run of exposed conduits are installed, so that temperature change will cause no distortion due to expansion or contraction of conduit run			
2.6.17.	For long conduit runs junction/pull boxes shall be provided at suitable intervals (not exceeding 10 m) to facilitate wiring.			
2.6.18.	Conduits shall be securely terminated at LPs/junction boxes or lighting fixtures by proper fastening with a lock put on inside and outside. The number of conduits terminating at LP's shall not exceed the permissible number considering the glanding area of lighting panel. Conduit terminations shall be made water & vermin proof.			
2.6.19.	Conduits lengths shall be joined by screwed couplers. Conduit shall be cleanly cut. The cut ends shall be within three (3) degrees of square with the conduit axis. Cut ends shall be reamed and all burrs and sharp edges removed.			
2.6.20.	Conduits lengths shall be jointed connection and shall be made thoroughly water-tight and rust-proof by application of a thread compound which will not insulate the joints. White lead will be uses for embedded conduit and red lead for exposed conduit.			
2.6.21.	Water treatment plant chlorination plant lighting installations shall be made with epoxy coated steel conduits and accessories.			

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2.6.22.	Field bends shall have a minimum radius of four (4) times the conduit diameter. All bends shall be free of kinks, indentations or flattened surfaces. Heat shall not be applied in making any conduct bend. Separate bends may be sued for this purpose.
2.6.23.	The entire metallic conduit system, whether embeded or exposed, shall be electrically continuous and thoroughly grounded where slip joints used, suitable bending shall be provided around the joint to ensure a continuous ground circuit.
2.6.24.	Conduits and fittings shall be properly protected during construction period against mechanical injury. Conduit ends shall be plugged or capped to prevent entry of foreign material.
2.6.25.	Lighting fixtures shall not be suspended directly from the junction box in the main conduit run.
2.6.26.	Conduits in control room, service building, laboratory building and other air-conditioned areas will be surface mounted on the roof above false ceiling, however vertical drops of conduits will be concealed along walls and finally plastered by bidder (including minor chipping works) for better aesthetics.
2.6.27.	Chipping of walls for vertical drops and final plastering is in the scope of this package.
2.6.28.	Filling of wires in conduit shall not exceed 40% of the conduit area.
2.6.29.	Lighting and receptacles will be fed from separate circuits. No two different phase circuits will be run in the same conduit. However, different circuits of same phase may be laid in the same conduit.
2.6.30.	Maximum 03 numbers of 1-phase receptacles will be loop in & loop out in a circuit.
2.7.	LIGHTING WIRES
2.7.1.	Lighting wires from lighting panels to junction boxes and junction boxes to lighting fixtures, switch boxes and receptacle boxes shall run in conduits (Rigid/ flexible).
2.7.2.	All wires in a conduit shall be drawn simultaneously. No subsequent drawing is permissible.
2.7.3.	Wires shall not be pulled through more than two equivalent 90 deg. bends in a single conduit run. Wherever required, suitable conduit junction boxes/pull boxes shall be provided. All types of wiring, concealed or unconcealed shall be capable of easy inspection.
2.7.4.	Receptacles and lighting circuits shall be fed from different circuits. The switch controlling these circuits shall be on the live side (phase wire) of the circuits.
2.7.5.	A.C. normal, A.C. emergency and D.C. emergency system wiring shall run throughout in separate conduits.
2.7.6.	Wiring shall be spliced only at junction boxes. Maximum two wires shall be connected at each terminal.
2.7.7.	In vertical run of wires in conduit the wires shall be suitably supported by means of wooden/hard rubber plugs at each pull/junction box.
2.7.8.	All lighting wires shall be crimped using suitable type of solderless, crimping, tinned fork type copper lugs. Cost of the lugs shall be included in the erection price of wire.
2.8.	JUNCTION BOXES/ PUSH BUTTONS
2.8.1.	Different types of junction boxes are to be erected by the contractor as per attached BOQ. The junction boxes are to be located at the locations jointly decided at site during erection. The junction boxes are to be erected on the frames fabricated at site. The installation of Junction Boxes/ Push Buttons (JB/ PB) should be checked for correctness and their functions.
2.8.2.	Junction boxes having volume upto 1600 cubic centimeter may be installed without any support other than that resulting from connecting conduits where two or more rigid metallic conduits enter and accurately position the box. Boxes shall be installed so that they are levelled, properly aligned and present a pleasing appearance. Boxes with volumes greater

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	than 1600 cubic cm. or for other reasons not rigidly held, shall be adequately supported. The contractor shall perform all drilling, cutting, welding, shimming and bolting required for attachment to supports.
2.8.3.	Necessary holes for conduit/ cable entry shall be done during installation depending on the requirement. The holes shall be drilled/ punched neatly and shall be dust/ vermin proof after installation of the conduit.
2.8.4.	All welds, bolts holes, conduit entry holes etc., made during installation as mentioned above shall be wire brushed and touched up with metal primer (lead oxide and zinc chromate in synthetic medium).
2.8.5.	The junction boxes/ push buttons need to be checked of correct installation.
2.8.6.	There shall be functional checking/ adjustment of JB / PB for their system.
2.8.7.	Junction boxes shall be mounted at a height as specified in the drawings and shall be adequately supported/ mounted on masonry wall by means of anchor fasteners/ expandable bolts or shall be mounted on an angle, plate or other structural supports fixed to floor, wall, ceiling or equipment foundations.
2.9.	STREET LIGHTING/FLOOD LIGHTING POLES INSTALLATION
2.9.1.	The lighting poles and lighting Tower shall be erected by the contractor at locations shown in the street lighting layout. Installation of necessary wiring/ cabling including underground cabling as required, junction/ switch box and mounting of assembled fittings. All the above erection work shall be done by contractor for lighting masts including making of foundations. For loop-in-loop out, the cables from trench to junction box, shall run through the conduits.
2.9.2.	The lighting poles shall be painted with two coats of aluminium paint after completion of installation or as specified by BHEL.
2.9.3.	Flood lights shall be mounted on steel base facing the tentative direction shown on drawings. Fixing holes shall be provided with slot to turn the fixture about 5 Deg on both sides. Bolts shall be tightened with spring washers. Terminals connection to the flood lights shall be through flexible conduits. BHEL will supply the steel base and contractor has to install the same for fixing the flood light on the flood light structures. Alternatively, the flood light fixtures shall be mounted on galvanized M.S. base making use of shop drilled holes or by suitable clamps. No cutting or drilling of galvanized structure is permitted.
2.9.4.	Each lighting poles and lighting/lightning mast junction box shall be earthed by 25X3 mm GS flat bonded to one (1) 20 mm dia MS earth electrode of 3 meter length driven vertically in the ground. 16 SWG GI wire shall be taken from fixture to JB.
2.10.	CEILING FANS AND REGULATORS
2.10.1.	The contractor shall install the ceiling fans and regulators at the locations shown in the relevant drawings. The exact location will however, be decided at site in consultation with engineer-in-charge.
2.10.2.	The fan regulators shall be flush mounted on the lighting control switch boxes provided in that area.
2.10.3.	Hook along with rubber bush shall be supplied and grouted by contractor in ceiling for mounting the fan. All necessary material and hard wares for installation shall be supplied by contractor.
2.11.	ABOVE GROUND EARTHING
2.11.1.	All equipment shall be earthed by two separate and distinct connections. Earthing terminals will be available in all equipment supplied by BHEL. Above ground earthing shall be carried out as the approved drawing & Philosophy furnished by BHEL Engineer.

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2.11.2.	All junction boxes, receptacles, switch boxes, lighting fixtures, conduit etc. shall be earthed in compliance with the provision of Indian Electricity rules and applicable Indian Standard amended up to date or as specified in the approved drawing by BHEL-PEM.
2.11.3.	A continuous earth conductor of SWG GI wire shall be run all along each conduit run and bonded at every 600mm by not less than two turns of the same size of wires. This conductor shall be connected to the earth bus of lighting panel from which the conduits originate. All junction boxes, receptacles, lighting fixtures etc. shall be connected to this GI earth conductor. All lighting panels and LDBs shall be earthed by GI flats to the purchasers earthing bus.
2.11.4.	Equipment Earthing in station lighting shall be done as per the earthing philosophy given by BHEL-PEM in drawings.
2.11.5.	The contractor shall carry out above ground earthing for all Electrical equipment which are part of the scope of work. Different type of earthing materials shall be supplied and the contractor shall lay and connect the earthing materials as per site requirement and as detailed in drawings. Unit rate for earthing material shall be paid on running meter basis.
2.11.6.	Parts of all electrical equipment and machinery not intended to be live shall have two separate and distinct earth connections each to conform to the stipulation of the Indian Electricity Rules and apparatus rated 240V and below may have single earth connections.
2.11.7.	The earthing conductors shall be of mild steel/ GI strip/ wires. All connections from equipment to main earthing conductors shall be made as illustrated in earthing drawing/ as per instruction of BHEL Engineer. Suitable "CU" Lugs are to be supplied for earthing with GI wire by the agency wherever is required.
2.11.8.	A continuous earthing conductor shall be installed in all cables trays and securely clamped to each tray section by suitable connectors to form a continuous earthing system. When two or more trays supporting power, cables run on parallel a continuous earthing conductor shall be provided on one tray only with tap-offs to the control cable trays. All valve and damper motor and rapping motors will be earthed to this conductor.
2.11.9.	All joints in the earthing system shall be welded type. Earthing connections to all equipment including motors shall be bolted type.
2.11.10.	Earthing connections shall be free from tinning scale paint, enamel, grease, rust or dirt at the time of making joint.
2.11.11.	Metallic sheaths, screens/ shields and armour of all multicore cables shall be bonded and earthed.
2.11.12.	Earthing conductors along their run-on columns, beams, walls etc. shall be supported by suitable cleats at intervals of 750/ 1000 mm.
2.11.13.	Welded joints on GI earthing conductors shall be painted (Refer clause no. 2.29 for details.)
2.11.14.	For different floors in a building, localized internal earthing ring shall be formed and connected to the ground earthing through vertical risers. The earthing mat shall be common to both power and lighting installations.
2.11.15.	The runway conductors at different building elevation shall be inter connected between the main risers along the column/ wall and shall also be connected to the nearest riser/ structure columns and the distance between earthing point shall not exceed 30 meters.
2.11.16.	Generally, risers are provided near the structure/ equipment foundation, in case risers are not visible and buried below the foundation level, contractor shall carry out necessary earth excavation for connecting the above ground earthing strips. Wherever welding is involved necessary protective coating shall be applied on weld joints.
2.11.17.	If the equipment is not available at the time of earthing conductor laying tap connections from the main earthing conductor shall be brought out up to slab equipment foundation

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	level with at least 200mm spare length left for further connections to equipment earthing terminals.
2.11.18.	Entire system shall be earthed in accordance with the provisions of the relevant IEC recommendations/ IS code of practice IS 3043-1947 and Indian Electricity Rules, so that the values of the step and contact potentials in case of faults are kept within safe permissible limits.
2.11.19.	If any outer shops and buildings as well as the electrical sub-stations and electrical rooms are also in contractor's scope, a ring main earthing system will be provided. Ring main earthing systems shall again be interconnected as a network to power plant main earthing mat. Internal earthing ring in the electrical equipment room shall be provided by the contractor irrespective of whether equipment of the area is in their scope or not.
2.11.20.	A minimum of two spare earth rings will be provided in each floor of the building for earthing future building. All tray tiers of each section shall be connected to the runway conductor at an interval of about 10 meters.
2.11.21.	Each RCC steel column of the building will be interconnected to the floor-earthing grid in basement/ground floor. For protective earthing separate conductor shall be used for flow of earth fault current.
2.11.22.	For protective earthing separate conductor shall be used for flow of earth fault current.
2.11.23.	Contractor shall carry out minor civil i.e., chipping of floor (where earth strip is to be laid on floor), removal of topsoil for laying earth strip in switchyard area etc.
2.11.24.	Refer notes mentioned in Drawing.
2.12.	STRUCTURAL STEEL FABRICATION AND INSTALLATION (Structural steel is Free issue items from BHEL)
2.12.1.	The steel structures supplied and fabricated by the contractor shall be made from standard quality steel sections/ flats/ plates. The steel fabricated structures shall be free from defects, cleaned of rust, grease, oil etc., and sharp edges shall be removed.
2.12.2.	The welds shall be wire brushed or cleaned otherwise. The holes shall be touched up with metal primer.
2.12.3.	All steel fabrications shall be painted with two coats of metal primer (lead oxide and zinc chromate in synthetic medium) followed by two coats of aluminium paint. The welds to galvanized steel shall be touched up with galvanized weld rod applied in accordance with manufacturer's instruction.
2.12.4.	Fabrication & painting charges of structural steel shall be part of erection charges of that equipment for which the same is being used.
2.12.5.	Structural steel material like MS angles, channels, beams, flats, plates etc. shall be supplied in running meter and the same shall be used for misc. fabrication if required. and the same shall be used for fabrication of panel base frame, cable tray supports, canopies for instruments/ panels/ drives/ JBs/ Push Buttons etc., Instrument/ Junction box frames, Impulse Pipe/ Instrument Air Pipe supports and instruments etc.
2.12.6.	This shall include cutting into size, conduiting of end connections, if required, welding, grinding of excess weld deposits, drilling of holes for mounting of device/ instrument, installation at location, leveling, alignment, providing bracings, painting etc. No gas cut holes will be permitted. Contractor to follow the BHEL supplied welding schedule and welding procedures.
2.12.7.	All the fabricated supports/ frames for instruments, trays, pipes, electrical equipment, etc., shall be painted after sand blasting and surface preparation as per painting specifications. Paints and other associated items are in the scope of the contractor.

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2.12.8.	In case, structural cable trays, bends, tees, reducers etc., are required to be fabricated from structural steel and installed, unit rate applicable for fabrication and installation of structural steel shall be applicable in such instances.
2.12.9.	Frame installation at site may involve mounting either on concrete floor by grouting/ using anchor fasteners or on steel structure by welding etc. All consumables including anchor fasteners shall be arranged by the contractor. Where required, as part of work, concrete floors may have to be chipped out to reinforcement depth for anchoring the frames. Wherever grouting is required, contractor shall arrange all the required material including cement/ grout mix, shuttering etc., necessary labour and meet all other requirements as part of work. All consumables including anchor fasteners shall be arranged by the contractor.
2.12.10.	In certain packages, galvanized members of junction box frames and instrument racks shall be supplied in cut to sizes and frame assemblies are required to be done as per drawing by bolting/ welding. The installation rate as quoted shall include the assembling of the frames.
2.12.11.	Gas cutting of tray/ impulse pipe support and holes in frame is not permitted. Only hacksaw cutting/ drilled hole shall be permitted.
2.13.	CABLE LAYING (AS PER APPLICABILITY)
2.13.1.	Cable installation shall be carried out as per IS:1255 and other applicable and in line with Approved Cable Erection Philosophy as per Annexure-4 of Chapter XI.
2.13.2.	For Cable unloading, pulling etc. following guidelines shall be followed in general:
2.13.3.	Cable roll shall be unloaded, handled and stored in an approved manner on hard and well drained surface so that they may not sink.
2.13.4.	Where cables cross roads/ rail tracks, the cables shall be laid in hume pipe/ HDPE pipe.
2.13.5.	No joints shall be allowed in trip circuits, protection circuits and CT/ PT circuits. Also joints in critical equipment in main plant area shall not be permitted. Vendor shall identify and accordingly procure the cable drum length.
2.13.6.	In each cable run some extra length shall be kept at suitable point to enable one LT/ two HT straight through joints to be made, should the cable develop fault at a later stage. Control cable termination inside equipment enclosure shall have sufficient lengths so that shifting of termination in terminal blocks can be done without requiring any splicing.
2.13.7.	While crossing the floors, un-armoured cables shall be protected in conduits up to a height of 500 mm from floor level if not laid in tray.
2.14.	FOUNDATIONS, GROUTING AND CIVIL WORKS
2.14.1.	For Poles and Masts: Foundation for Poles and Masts are not part of this tender. The dimension of the foundation and anchor bolt pits shall be checked by the contractor for their correctness as per drawings. Further, top elevation of foundations shall be checked with respect to bench mark etc. All materials required for the above shall be part of contractor's scope within the quoted rate. No extra payment will be made for materials to be arranged by contractor.
2.14.2.	For Road Crossing: Cables wherever required shall pass through the hume pipes. Laying of hume pipes is excluded from the scope of the bidder. However, laying of cables through hume pipes of required length and closing the ends of hume pipes by suitable cover is in the scope of bidder. Any incidental materials required then and there shall be part of contractor's scope within the quoted rate. No extra payment will be made for materials to be arranged by contractor.
2.14.3.	For Underground Cabling: Contractor has to make arrangement for cables which are to be laid underground as per drawing. Civil Works related to laying of Underground Cables

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	are excluded from the scope of bidder. All materials required for Underground Cabling except cables shall be part of contractor's scope within the quoted rate. No extra payment will be made for materials to be arranged by contractor.
2.14.4.	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.
2.14.5.	The contractor at their cost shall arrange for grouting of foundation bolt holes of equipment as specified in the drawings / specification or as advised by the Engineer of BHEL after preparing the foundation top surface for grouting, All the materials for grouting (sand, gravel & cement including special Cement) shall be arranged by the contractor. The grouting has to be done up to basement level. The required consumables like Portland cement, gravel, sand etc., have to be provided by the contractor at their cost. If required, special cement like conbextra, GP1, GP2, PAGAL, shrinkomp etc., or its equivalent as approved by BHEL, shall be arranged by the contractor at their cost. It shall be the responsibility of the contractor to obtain prior approval of BHEL, regarding suppliers, type of grouting cements before procurement of grouting cements.
2.14.6.	It shall be contractor's responsibility to check the various equipment foundations for their correctness with respect to level, orientation, dimensions etc., and ascertained dimensions shall be measured and submitted to BHEL for approval before erection. Also minor chipping, dressing of foundations up to 30 mm for obtaining proper face for packer plates/shims, and may be required for the erection of the equipment/plants will have to be carried out by the contractor without extra cost.
2.14.7.	The surface of foundations shall be dressed to bring the surface of the foundations to the required level and smoothness prior to placement of equipment.
2.14.8.	Foundation pockets are to be cleaned thoroughly before placing the 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.
2.14.9.	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 and the packers placed with suitable mortar prior to erection of the equipment. Packer plates should not only be blue matched with foundation but also inter-packer contact surfaces between the packers and foundation frame etc., shall also be blue matched by Prussian Blue match checks and required percentage contact shall be achieved by chipping and scrapping as per BHEL Engineers instructions.
2.14.10.	The certificates of the grout are to be submitted to BHEL. If necessary, test cubes are to be made and tested at site to ensure the quality of the grout as per relevant IS standards. In case grouting with Portland cement is approved, necessary cement, sand etc to be arranged by the contractor including the fine aggregates.
2.14.11.	Certain packer plates and shims over and above the quantity received as part of supplies from manufacturing units of BHEL will have to be cut out from steel plates/sheets at site by the contractor to meet site requirement. However, machining of the packers, wherever necessary, will be arranged by BHEL at free of cost.
2.14.12.	Shims and packer plates required for temporary use are to be arranged by the contractor within the quoted rate.
2.14.13.	The contractor at their cost shall arrange for grouting of anchor points of T & Ps issued to them. Necessary grout materials are to be arranged by the contractor at their cost.

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2.14.14.	Works such as minor rectification of foundation bolts, reaming of holes, drilling of dowels, matching of bolts and nuts, making new dowel pin etc. are covered in the scope of work.
2.14.15.	Minor civil works like drilling, chipping and punching holes on slabs and brick-walls and grouting related to installation of Lighting Panels/LDBs/control panels, Junction boxes etc., shall be included in the erection cost of such items. No separate payment is applicable. The scope also includes supply of grouting material. More details regarding scope of civil are given in the respective equipment erection.
2.14.16.	PROCEDURE FOR GROUTING: Contractor has to carry out the grouting as per the work instructions for grouting available at site.
2.15.	GENERAL GUIDELINES FOR ERECTION AND COMMISSIONING
2.15.1.	Contractor shall abide by the safety/ security rules and regulations as per the requirement of NTPC and BHEL. Contractor shall obtain information about all safety and security norms of NTPC well in advance. BHEL will not admit any claims whatsoever on account of Contractor's non-familiarization of site safety and security regulations.
2.15.2.	The contractor shall work in co-ordination with civil, air-conditioning, ventilation & switchgear vendors. Where holes or openings in walls and floors are required for routing the conduits, the contractor shall provide the same. Cut-outs in false ceiling shall be provided by false ceiling contractor.
2.15.3.	The intent of specification is to procure services according to the most modern and proven techniques and codes. The omission of specific reference to any method, equipment or material necessary for proper and efficient execution of this work shall not relieve the contractor of the responsibility of providing such facilities to complete the work without any extra compensation.
2.15.4.	The work covered under this specification is of highly sophisticated nature, requiring the best quality workmanship, supervision, engineering and construction management. The contractor should ensure proper planning, successful & timely completion of the work to meet the overall project schedule. The contractor must deploy adequate quantity of tools & plants, measuring instruments, calibrating equipment, modern/ latest construction aids etc. He must also deploy adequately trained, qualified and experienced engineers, supervisory staff and skilled personnel. The manpower deployment identified by contractor should match requirement of sophistication involved with the items mentioned in the BOQ.
2.15.5.	The work under this scope being quite sophisticated and also quite extensive, for proper planning, monitoring, reporting, etc. of ongoing works, the contractor shall establish his own computer (1no.) and printer (1no.) at his site office, along with suitable operator(s), consumables, etc. Non-establishment of above equipment will attract penalty @Rs 10,000/ - (Rs Ten thousand only) per month.
2.15.6.	BHEL is operating web based computerized Suvidha/ SSD/IPMS/SCMS/E-store etc system that includes, inter-alia, issue of materials, daily progress reporting, Contractor's running monthly billing and material reconciliation through a computerized data management system. Contractor shall install necessary hardware to hook-up with the BHEL's system and use the same for his scope of work. The contractor shall also provide adequate and suitable manpower for co-ordinating, data gathering in suitable format, computer operations for implementation of Suvidha/SDD/ IPMS/ SOMS at site.
2.15.7.	The work to be carried out under the scope of this specification covers the complete work of loading, handling, transporting, unloading, preassembly, erection, calibration, testing, air flushing, pre commissioning tests, commissioning of systems, trial run of various auxiliaries, achieving various activities till handing over of the unit to BHEL's customer,

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	providing maintenance team to cater to guarantee responsibilities and maintenance thereafter.
2.15.8.	The work shall be executed under the usual conditions affecting major power plant construction and in conjunction with numerous other operations at site. The contractor and his personnel shall cooperate with personnel of BHEL, BHEL's customer, customer's consultants and other contractors, coordinating his work with others and proceed in a manner that shall not delay or hinder the progress of work or the project as a whole.
2.15.9.	Contractor shall erect, align and commission all the equipment and auxiliaries as per the sequence & methodology prescribed by BHEL depending upon the technical requirements. Availability of materials and fronts will decide this. BHEL Engineer's decision regarding correctness of the work and method of working shall be final and binding on the contractor. No claims for extra payment from the contractor will be entertained on the ground of deviation from the methods/ sequences adopted in erection of similar sets elsewhere.
2.15.10.	The services, tests and support to be provided by the agency for the work mentioned in the various sections of this tender are indicative and not exhaustive, but not limited to these for the completion of the work in all respects.
2.15.11.	Plant materials should not be used for any temporary supports/ scaffolding/ preparing pre-assembly bed etc.
2.15.12.	The contractor shall have total responsibility for all equipment and materials in his custody at contractor's stores, or any loose, semi-assembled, assembled or erected by him at site. He shall effectively protect the finished works from action of weather and from damages or defacement and shall also cover the finished parts immediately on completion of work as per BHEL Engineer's instructions. The machined surfaces/ finished surfaces should be greased and covered.
2.15.13.	At all stages of work, equipment/ materials in the custody of contractor, including those erected, will have to be preserved as per the instructions of BHEL's Engineer.
2.15.14.	The contractor shall make all fixtures, temporary supports, steel structures required for jigs & fixtures, anchors for load and guide pulleys required for the work (including those specifically included in BHEL scope). However, necessary steel will be provided from the scrap/ surplus materials available at site.
2.15.15.	The work shall conform to dimensions and tolerances specified in various drawings that will be provided during the erection. If any portion of the work is found to be defective in workmanship or not conforming to drawings or other specifications due to contractor's fault, the contractor shall dismantle and re-do the work duly replacing the defective materials at his own cost, failing which the work will be done by BHEL departmentally or by engaging other agencies and recoveries will be effected from contractor's bills towards expenditure incurred including 30% departmental charges.
2.15.16.	The terminal points decided by BHEL shall be final and binding on the contractor for deciding the scope of work and effecting payment for the work done.
2.15.17.	During the course of erection, testing and commissioning of Electrical work, certain rework/ modification/ rectification/ repairs/ fabrication etc., will be necessary on account of feedback from various thermal power stations or units already commissioned and/ or units under erection and commissioning and also on account of design discrepancies and manufacturing defects and site operation/ maintenance requirements. This will also include modifications/ re-works suggested by BHEL/ customer/ other inspection group. Contractor shall carryout such rework/ modification/ rectification/ fabrication repairs etc. promptly and expeditiously. Daily log sheets signed by BHEL engineer and indicating the details of work

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	carried out, man-hours etc. shall be maintained by the contractor for such works. Claims of contractor, if any, for such works will be dealt as per clauses 2.15 of GCC.
2.15.18.	In case any rework/ repair/ rectification/ modification/ fabrication etc. is required because of contractor's faulty workmanship which are noticed during the commissioning of, at any stages, the same shall be rectified by the contractor at his cost. If during the commissioning any improvement/ repair/ rework/ rectification/ fabrication/ modification due to design improvement is required, the same shall be carried out by the contractor promptly and expeditiously. Claim if any, for such work from the contractor shall be governed by clause no. 2.15 of GCC.
2.15.19.	Daily log sheets indicating the details of work carried out, man-hours, consumables used etc., shall be maintained by the contractor and counter-signed by BHEL Engineer every day.
2.15.20.	Contractor shall prepare Marked-Up drawings incorporating modifications and deviations from original drawings or prepare fresh sketch for actual installation/ connection details if need be, that can be converted to "As-built" drawings.
2.15.21.	All transport equipment, handling equipment, tools, tackles, fixtures, equipment, materials, manpower, supervisors/ engineers, consumables, electrodes including oxygen, acetylene argon etc. gases, primers, paints etc.; except otherwise specified as BHEL scope of free issue; required for this scope of work shall be provided by the contractor. All expenditure including taxes and incidentals in this connection will have to be borne by him unless otherwise specified in the relevant clause. The contractor's quoted rates should be inclusive of all such contingencies.
2.15.22.	Equipment/ instruments required to be erected for this work, though not limited to but are generally as per rate schedule. For any items or class of work not specified herein but required for total completion of work, the same shall be carried out as per BHEL requirement. However, the payment of these items/ class of work shall be regulated as per the General Condition of the contract.
2.15.23.	Overhauling, cleaning, revisioning, servicing of equipment during erection and commissioning stages will be arranged by the contractor. All equipment shall be preserved and protected before and after erection as per the advice of BHEL's Engineer.
2.15.24.	The glands & lugs shall be supplied either loose or fitted with the equipment. Contractor shall take care of this aspect at the time of receipt of the equipment from BHEL stores. Contractor shall account for the quantities received with the equipment and shall hand over the same to cabling agency under intimation to BHEL Engineer. Contractor shall extend all necessary help & co-ordinate with the cabling agency during the course of work.
2.15.25.	The contractor shall collect all scrap materials periodically from various levels of powerhouse, working area of the power station, auxiliary and piping around power station and collect the same at one place earmarked for the same. Loads of scraps are to be shifted to a place earmarked by BHEL. Failure to collect the scrap is likely to lead to accidents and as such, BHEL reserves the right to collect and remove the scrap at contractor's risk, if there is any failure on the part of contractor in this respect. 1% value of each RA bill will be earmarked against compliance of the above, to be released only on satisfactory collection and deposit of scrap as stated above. In case of failure of contractor to comply with this requirement, BHEL will make suitable arrangement. In such case, any expenditure over and above the withheld 1% amount will also be recovered suitably from the RA bills of vendor.
2.15.26.	All works such as cleaning, leveling, aligning, trial assembly, dismantling of certain equipment/ components for checking and cleaning, surface preparation, fabrication of

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	<p>sheets, tubes and pipes as per general engineering practice and as per BHEL Engineer's instructions at site, cutting, gouging, weld depositing, grinding, straightening, chamfering, filing of cut outs/ openings for mounting of console inserts, modules, indicators, recorders, chipping, drilling of holes, reaming, scrapping, cable laying, dressing, lapping, fitting up etc. as may be applicable in such erection works are treated as incidentals to erection work and are necessary to complete the work satisfactorily shall be carried out by the contractor as part of the work within the quoted rates.</p>
2.15.27.	<p>All equipment shall be handled very carefully to prevent any damage or loss. No bare wire ropes, slings etc. shall be used for unloading and/ or handling of the equipment without the specific written permission of the BHEL Engineer. The equipment from the storage yard shall be moved 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.</p>
2.15.28.	<p>The contractor should take all reasonable care to protect equipment and materials under his custody either in his stores or at site. Copper tubing, brass fittings, brass valves etc. forming an integral part of equipment or system are liable to greater damages/ pilferages/ theft/ losses. It will be responsibility of contractor to arrange for adequate security round the clock for protection from such damages/ pilferages/ theft/ losses.</p>
2.15.29.	<p>Housekeeping in the erection and preassembly area is as important as well-planned and orderly work. The access to site for inspection approaches by BHEL and customer engineers and leading of the material shall be made available by the contractor at all times. The shifting and re-shifting of erection materials, tools and plants and clearance of restrictions, filling of ditches, undulation near preassembly, boiler area and switch yard area is the responsibility of the contractor. Contractor should visit the site and acquaint himself with all restrictions and difficulties that he may encounter during erection/ commissioning stages.</p>
2.15.30.	<p>The contractor shall ensure that all the packing materials and protection devices used for the various equipment during transit and storage are removed before the equipment are erected in position.</p>
2.15.31.	<p>All pipes and tubes, equipment, instruments issued to contractor and kept at site for erection shall be covered with plastic caps/ steel caps or shall be closed with suitable plugs by the contractor.</p>
2.15.32.	<p>Contractor shall calibrate, erect, commission all the equipment, cabinets/ panels and cabling etc. as per sequence prescribed by BHEL at site. The sequence of erection/ commissioning methodology will be decided by the BHEL Engineers depending upon the availability of materials/ work fronts etc. 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 jobs or for any reasons whatsoever.</p>
2.15.33.	<p>Descriptions of certain packages appearing in the rate schedule are available in this section and also in (Chapter-XI), to give general idea to bidder about the type of equipment to be erected, calibrated, tested and commissioned.</p>
2.15.34.	<p>BHEL reserves right to recover from the contractor any loss, which arises out of undue delay/ discrepancy/ shortage/ damage, or any other causes due to contractor's lapse during any stage of work. Any loss to BHEL due to contractor's lapse shall have to be made good by the contractor.</p>
2.15.35.	<p>Substantial portion of cable laying & termination shall be done by other agencies for that equipment covered under this tender specification. Contractor shall take care of this aspect at the time of receipt of the equipment from BHEL stores. Contractor shall account for the quantities received with equipment's and shall hand over the same to cabling agency under</p>

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	intimation to BHEL Engineer. Contractor shall extend all necessary help & co-ordinate with the cabling agency during the course of work.
2.15.36.	The weight & dimension as mentioned against the individual items in Price Bid Part –II Rate Schedules or elsewhere in the tender specification are indicative and approximate and there may be variation in dimension & weight in actual supply of equipment. No rate variation shall be considered on this account. The scope of work & description of system/ equipment as given in the various clause of this tender specification and rate schedule are only for understanding the system requirements; contractor shall note this point and assess the volume of work prior to submit the offer.
2.15.37.	For any class of work for which no specifications have been laid down in these specifications, work shall be executed as per the instructions of BHEL' Engineer.
2.15.38.	It is the responsibility of contractor to provide skilled manpower for periodic maintenance after the initial commissioning till handing over the system.
2.16.	STATUTORY LICENCES AND OTHER RELATED REQUIREMENTS The contractor will have the following valid certificates:
2.16.1.	Contractor should have obtained valid Electrical Contractor-ship License to carry out the Erection, Testing & Commissioning work on applicable Voltage electrical equipment from the appropriate statutory authority of concerned state or Central Electricity Authority, as the case may be. All fees and expenses in this regard shall be to the contractor's account.
2.16.2.	Supervisory Competency Certificate of Applicable Voltage for equipment erection, testing & commissioning classes as defined in this tender specification, issued by applicable appropriate State or Central Statutory Authority. During the execution of work minimum two persons should be posted at site who have valid Supervisory Competency Certificate.
2.16.3.	The installation of all electrical equipment shall be carried out only by persons holding valid certificates of Competency for the voltage classes as defined in this tender specification, issued by appropriate state or central Statutory Authority. Contractor shall submit the particulars of Licenses held by him.
2.16.4.	Contractor shall arrange inspection of concerned Statutory Authority for the installation, testing & commissioning of High/ Low voltage equipment covered under this tender specification and obtain their approval in appropriate format prior to charging of the equipment as per applicability.
2.16.5.	Contractor shall be responsible for all necessary liaisoning work with Statutory Authority towards the certification of installation/ works. BHEL/ BHEL's Customer shall provide technical assistance, drawings & documents for submission to Statutory Authority. Contractor shall provide all logistical services in this regard.
2.16.6.	All necessary certificates and licenses, permits & clearances required to carry out this work from the respective statutory authorities are to be arranged by the contractor expeditiously at his cost in time to ensure smooth progress of work.
2.16.7.	If the contractor does not have these licenses and statutory requirements, then the contractor has to arrange them to work in the concerned state (Odisha) where the project is being executed within 6 weeks of mobilization at site for carrying out the works covered under this contract.
2.17.	COLLECTION OF MATERIALS
2.17.1.	The contractor shall take delivery of equipment, materials from the storage yard/ stores/ sheds of BHEL/ customer. He shall also make arrangements for verification of equipment, transportation up to site of work, safe custody, watch and ward of equipment after it has been handed over to him till these are fully erected, tested and commissioned and taken over by the customer. The contractor should note that the transport of equipment to erection

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	<p>site, assembly yards etc. should be done by the prescribed route in the most professional manner without disturbing ongoing works of various other contractors. Special equipment such as laboratory equipment, measuring and control equipment, electronic items, SF6 Breakers, gauges, panels, console inserts, switches, transmitters, controllers, cables, conduits etc. shall be stored when taken over by the contractor in appropriate manner as per BHEL's instructions. The contractor should also note that while taking delivery of materials from BHEL stores (open/ closed), it may be necessary to handle other items which could be blocking the exit route of the materials. This aspect shall be taken care of in the quoted rates and no extra payment shall be done in this regard. It shall be the contractor's responsibility to arrange necessary cranes/ tractors, trailer, trucks, slings, labor, etc., for transport of equipment.</p>
2.17.2.	<p>Note: - Damaged cable drums or any damaged items also to be shifted within the quoted rates. No extra compensation for difficulty in shifting due to damaged drums shall be made in this regard.</p>
2.17.3.	<p>The distance between storage area and erection site is approx. 3-4km. However, this location may change at the discretion of the BHEL's customer. Contractor shall plan and transport equipment, components from storage to erection site and erect them in such a manner and sequence that material accumulation at site does not lead to congestion at site of work. Materials shall be stacked neatly, preserved and stored in the Contractor's shed and at work areas in an orderly manner. In case it is necessary to shift and re-stack the materials kept at work areas/ site to enable other agencies to carry out their work or for any other reason, same shall be done by Contractor most expeditiously as incidental to work. No claim for extra payment for such work will be entertained.</p>
2.17.4.	<p>The panels shall be transported from stores to the place of installation in vertical position. Care shall be taken such that the switches, lamps, instruments etc. mounted on the panel do not get damaged during transit.</p>
2.17.5.	<p>Contractor shall plan and transport equipment/ components from storage yard/ sheds to erection site and erect them in such a manner and in a sequence that material accumulation at site should not lead to congestion. Materials shall be stacked neatly, preserved and stored in the contractor's shed and work areas in an orderly manner. It may be specifically noted that the space available may be limited and accumulation of material may lead to the necessity of shifting and restacking the materials to enable other agencies to carry on with their work or to comply with customer's requirements. If required, the contractor shall arrange shifting of surplus material expeditiously (no claim for extra payment for such work will be entertained) failing which the same will be arranged by BHEL and all charges together with departmental charges will be recovered from his bills.</p>
2.17.6.	<p>The contractor shall take delivery of the components, equipment, chemicals, lubricants etc. from the storage area/ sheds of BHEL/ customer after getting the approval of BHEL/ customer on standard indent forms to be specified by BHEL/ customer. Complete and detailed account of the materials and equipment after usage shall be submitted to the BHEL and reconciled periodically.</p>
2.17.7.	<p>The contractor shall handover all the damaged, unused materials, package materials, containers, special transporting frames, gunny bags, parts/ materials remaining extra over the normal requirement with proper identification tags in a packed condition to BHEL stores. In case of any misuse or use over actual design requirements, BHEL reserves the right to recover the cost of parts/ materials used in excess or misused. Decision of BHEL Engineer in this regard will be final and binding on the contractor.</p>

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2.17.8.	Equipment/ instruments etc., under the scope of erection and commissioning are generally dispatched from BHEL's Manufacturing Units/ vendor's works to erection site well before the start of erection. Sometimes, such dispatched materials may get stuck up with transporters/ railways. The contractor shall provide support/ manpower for necessary chase up for removal of such bottlenecks in transportation. Also, for smaller items, it could be necessary to depute his person to personally carry certain items from works to site. Requirement of such activities; which will be decided by BHEL Engineer; and chase up activities, if required, shall be performed under authorization by BHEL. The above services shall be provided within the quoted rates.
2.17.9.	The contractor shall make suitable security arrangements including employment of security personnel and ensure protection of all materials/ equipment in their custody and installed equipment's from theft/ fire/ pilferage and any other damages and losses.
2.18.	GUIDELINES FOR HANDLING AND STORAGE
2.18.1.	After unloading at site, the package of the equipment shall be inspected for external damage. In case the package is damaged, package number and details of damage should be noted. The details of damage should be reported to concerned site Engineer.
2.18.2.	Cases should be opened/ unpacked using correct nail pullers. While opening the planks, care should be taken to see that equipment inside is not damaged. Cases should not be unpacked in areas where they are exposed to rain, water/ liquid splashing, dust or other harmful materials like chlorine gas, sulphur dioxide etc.
2.18.3.	After opening the case, all supports provided for transport are to be removed with due care.
2.18.4.	Immediately after unloading at site, the electronic equipment should be kept in a covered area. Handling and lifting of package should be done without jerks or impacts. Packing case should not be dropped or slid along the floor under any circumstances. Suitable forklift should be used to move the case to its final position. All above points are to be strictly followed as electronic equipment may get damaged due to vibration and shock.
2.18.5.	Hinged frames should not be opened when equipment is not secured to floor as this is likely to cause it to topple over. The hinged frame can be opened only if the equipment is still fixed on to bottom wooden pallet.
2.18.6.	The equipment should preferably be stored in its original package and should not be unpacked until it is absolutely necessary for its installation or advised by BHEL Engineer. The equipment should be best protected in its cases. It should be arranged away from walls.
2.18.7.	The wooden pallet provided for packing itself can be retained on raised platform to protect equipment from ground damp, sinking into and to circulate air under the stored equipment. This will also help in lifting the package with fork-lifter.
2.18.8.	Periodic inspection of silica gel placed inside the equipment is necessary. It has to be replaced or regenerated when de-colorization takes place.
2.18.9.	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.
2.18.10.	The storage room and the equipment should be checked at regular interval to ensure protection from termites, mould growth, condensation of water etc., which can damage the equipment.
2.18.11.	All the equipment, 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 Engineer.
2.18.12.	The packing material shall be retained if the cubicle is to be repacked after inspection.
2.18.13.	All subassemblies should be kept in a separate place where they are easily accessible.

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2.18.14.	Subassemblies should have a protective cover in case they are stored without wooden packing/ case to prevent accumulation of dust. Silica gel packets should also be kept along with it.
2.18.15.	Subassemblies should not be stacked one above the other.
2.18.16.	The loose items supplied for the main equipment falls into various categories like tools, cables, prefabricated cables, console inserts, recorders, VDU/ CRT, other display units, printers, sensors and transducers, cable glands, cable ducts, frames, racks, etc. These are to be categorized and stored separately.
2.18.17.	All the electronic modules shall be handled by qualified personnel only.
2.18.18.	Electronic modules should only be touched when it is absolutely essential to do so.
2.18.19.	Before touching any electronic module, the operator should discharge the static electricity by earthing himself or better still, ensure constant discharge by wearing an earthed wrist strap.
2.18.20.	The operator should not wear clothing made entirely from synthetic fibres, but a mixture containing at least 65% cotton.
2.18.21.	The PCB should always be held by front panel or by module frame and electronic components/ connectors should never be touched.
2.18.22.	The electronic modules should not be placed close to television sets or CRT units.
2.18.23.	Soldering irons and any other tools used must be grounded.
2.18.24.	All modules using CMOS components are packed in antistatic bags when transported loose to avoid ESD failures. The antistatic bags must always be used to transport modules at site from one place to the other.
2.19.	MEASUREMENTS, WASTAGE & CUTTING ALLOWANCE
2.19.1.	The contractor shall not waste any materials issued to him. In case it is observed at any stage that the wastage/ excess utilization of materials is not within the permissible limits, recovery for the excess quantity used or wasted will be effected with departmental charges from the contractor. Decision of BHEL on this will be final and binding on the contractor.
2.19.2.	For all payment purposes, measurement shall be made on the basis of the execution of drawings/ physical measurements. Physical measurements shall be made by the contractor in the presence of the BHEL Engineer.
2.19.3.	The measurement for cable, impulse pipes/ tubes, GI pipe, conduits, flexible conduits, trays etc., shall be made on the basis of length actually laid.
2.19.4.	All the surplus, scrap and serviceable materials, out of the quantity issued to the contractor shall be returned to BHEL in good condition and as directed by the BHEL Engineer.
2.19.5.	All materials returned to stores should carry aluminium tag indicating the size and type. Power cables more than 15 meters' length and C&I cables more than 5 meters' length is termed as serviceable material and shall be returned size wise and category wise to the owner's stores/ yard. Cable of serviceable length being returned to the stores in drums shall have their free ends sealed and the balance lengths on the drum(s) shall be noted and certified by the Engineer-in-charge. This shall be applicable only for the purpose of accounting the cables issued for installation.
2.19.6.	While carrying out material reconciliation with contractor, all the above points will be considered. All serviceable material returned by the contractor shall be deducted from the quantities issued for the respective sizes and categories and the balance quantity will be taken as the net quantity issued to the contractor. Material reconciliation shall be done and allowable scrap quantity calculated as per wastage allowance percentage specified above. Any scrap/ wastage generated by the contractor in excess of the allowable percentage

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-II: SCOPE OF WORK

	shall be charged at the rates decided by the Engineer whose decision shall be final and binding on the contractor.															
2.19.7.	The entire surplus, damaged, unused materials, packaging materials/ containers, special transporting frames, gunny bags, etc., shall be returned to BHEL stores by the contractor.															
2.19.8.	The contractor shall handover all parts/ materials remaining extra over the normal requirement with proper identification tags in a packed condition to BHEL stores. In case of any misuse or use over actual design requirements, BHEL reserves the right to recover the cost of parts/ materials used in excess or misused. Decision of BHEL's engineer in this regard will be final and binding on the contractor.															
2.19.9.	For all site-fabricated steel items such as supports, racks, frame, canopy etc. physical measurement shall be made and then converted to tonnage. For steel material supplied to the contractor, all scrap shall be returned to BHEL stores with due accounting.															
2.19.10.	Every month the contractor shall submit an account for all the materials issued to him by BHEL in the standard Performa prescribed for this purpose by the site-in-charge.															
2.19.11.	The erection contractor shall make every effort to minimize wastage during erection work. Cutting and wastage allowance shall be computed on length, weight of material actually used, measured and accepted. In any case, the wastage shall not exceed the following limits: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>S. No.</th> <th>Item</th> <th>%age Wastage of Erected Qty</th> </tr> </thead> <tbody> <tr> <td>a)</td> <td>Each iron/ steel fabricated section</td> <td>2</td> </tr> <tr> <td>b)</td> <td>Each size of power cables</td> <td>1</td> </tr> <tr> <td>c)</td> <td>Each size of control cables</td> <td>2</td> </tr> <tr> <td>d)</td> <td>GI pipes</td> <td>1</td> </tr> </tbody> </table>	S. No.	Item	%age Wastage of Erected Qty	a)	Each iron/ steel fabricated section	2	b)	Each size of power cables	1	c)	Each size of control cables	2	d)	GI pipes	1
S. No.	Item	%age Wastage of Erected Qty														
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b)	Each size of power cables	1														
c)	Each size of control cables	2														
d)	GI pipes	1														
2.19.12.	If the actual wastage is more than the specified figure, then equivalent price of the excess portion will be deducted from the contractor's bill.															
2.19.13.	The cable take-off from drums shall be planned strategically such that jointing in the run of cables and wastage are avoided. For this purpose, the exact route length between various equipment/ panels as per the cable schedule shall be measured and the route length recorded before laying of the cables. Depending upon the route length and the type of cable required for various destinations, the cable drums shall be suitably selected for cable laying. Any jointing shall have to be approved by BHEL Engineer. All the cut pieces/ bits of cables, which are not used, shall be returned to the purchaser for accounting towards wastage. The cables damaged by the contractor shall have to be replaced by the contractor at his own cost.															
2.19.14.	NOTE: <ol style="list-style-type: none"> a) Salvageable scrap shall mean lengths of pipes, multi-cables, other cables etc., that can be used one time or other at a later date and normally they are recovered from the cut-pieces of pipes, multicore cables, cables etc. b) Non - Salvageable scrap means the lengths of tubes, pipes, multicore cables, cables etc., and they are from cut-pieces of tubes, pipes, multicore cables, cables etc., that cannot be used at all one time or other. c) As per the contract material like cable tray and accessories, cables, tray supports shall be supplied by BHEL and customer. Reconciliation shall be done and duly submitted every month with joint signature to BHEL and Customer. d) For any items or classes of work not specified herein but required for total completion of work, the same shall be carried out as per BHEL requirement. However, payment for these items/ class of work shall be regulated on the basis of rate arrived as per GCC. 															

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	e) Contractor shall provide necessary resources for completion of such work within the stipulated time schedule. Value of such work shall be included while computing the total value of work finally executed for all contractual purposes, particularly for contract variation purpose.
2.20.	FINAL PAINTING
2.20.1.	2.9.1 The contractor shall provide the Primer (ROZC as per IS:2074) for the scope of painting work indicated in Section-4 as well as for protection of site weld joints and gas cut locations. Contractor shall also arrange to provide the required thinner and other consumables, T&P etc. required for application of ROZC Primer. All paints and thinners shall be sourced only from BHEL approved manufacturers. Some of them are as listed under: <ul style="list-style-type: none"> • M/s Asian Paints • M/s Berger paints • M/s Jenson & Nicholson • M/s Shalimar Paints • M/s Akzo Nobel • M/s Kansai Nerolac Paints
2.20.2.	In order to have consistency in painting system, it is preferable that all the supplies are sourced from one single manufacturer.
2.20.3.	The contractor shall provide all the primer, paint, and other consumables like brush, cleaning agents etc. All T&Ps, manpower, supervision is in contractor's scope. Painting shall be carried out as per colour scheme approved by BHEL/ BHEL's customer.
2.20.4.	Touch up paintings on damaged areas: Surface preparation by manual tools, wire brush/ emery paper etc. Minimum 6" peripheral area, adjoining to damaged area to be covered. If metal surface is exposed; it is to be painted with Zinc rich epoxy (70 micron) or suitable primer with existing paint scheme. If primer is intact, intermediate & top coat to be done with specified DFT in scheme.
2.20.5.	All the fabricated frames, instrument racks, Junction box frames, Push button frames, trays/ impulse pipes, supports, panel base frame, etc., wherever applicable shall be first painted with two coats of primer paint (red chromate zinc primer) and then two coats of epoxy-based paint of approved shade (decided by BHEL Engineer) after thoroughly cleaning the surface of dust, rust, scale, grease, oil, etc., by wire brushing, scrapping or any other suitable method like sand blasting/ shot blasting. The quoted rates should be inclusive of all these including supply of paints and consumables.
2.20.6.	All metal parts of the equipment including supports, structures, etc., as applicable shall be painted after thoroughly cleaning the surface from dust, rust, greases, oils, scales, etc., by wire brush, scrapping, sand blasting/ shot blasting (as applicable) as specified in relevant erection documents. The above parts shall then be painted with specified two coats of specified paint over the shop primer/ paint. Also, where the shop primer/ paint has peeled off, the affected area shall be cleaned thoroughly by the specified method and then primer coat applied. Similarly, certain components may be supplied without any primer/ paint coat from shop. The surface of such items shall be cleaned as per specifications, coated with suitable primer and then coated with final paint coats. The dry film thickness after final coat should be as per specification. The color, shade etc. shall be as per specification. Painting schedule will be furnished at site.
2.20.7.	Other equipment like JB's, Panels, transmitter racks, Local gauge boards etc., shall be painted with two coats of synthetic enamel paint/ any other approved by BHEL/NTPC. The quoted rates should be inclusive of application of two final coats of synthetic enamel paint.

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	All the consumables such as wire brush, other cleaning materials, painting implements, etc., is to be arranged by the contractor at his own cost. All equipment painting will be done by spray painting. The quoted rates should be inclusive of all these including
2.20.8.	All the weld joints of GI cable trays and GI structural members shall be applied with red oxide and aluminium paint/ any other approved by BHEL/NTPC and then coated with bitumen.
2.20.9.	All damaged surfaces of galvanized or un-galvanized faces of steel structures etc. shall be brushed up and painted with red primer paint followed by two coats of aluminium paint/ enamel paint to the satisfaction of Engineer. The contractor has to arrange all the materials for painting at his cost.
2.20.10.	Welded joints on GI earthing conductors shall be coated with one coat of bituminous paint/ any other approved by BHEL/NTPC. in case of buried earth grid or earth flats to be laid in cable trench. For site welded GI strips/ wires which are exposed these are required to be painted with one coat of cold galvanizing zinc paint. Contractor to arrange the required paints and other items at his cost.
2.20.11.	In case of GI Structure, the cold galvanizing paint to be applied as touch up where ever needed. This is to be done as per instruction of BHEL Engineer.
2.20.12.	The primer shall be compatible with the final coat paint schedule.
2.20.13.	Full (spray) painting of Dry-type & Oil-filled transformers, bus ducts with two coats of paint (any other approved by BHEL/NTPC) as per specification.
2.20.14.	For Transformers and Oil Tanker, External surface of transformer and accessories- Chemical resistant epoxy zinc phosphate primer, MIO (Micaceous iron oxide) as intermediate paint followed by polyurethane finish paint.
2.20.15.	Colour Banding, Legend and Identification Marking, Equipment nomenclature, Direction marking etc. shall be in scope of the contractor.
2.20.16.	Touch-up painting of LDB and Lighting Transformer, Lighting Panels or any other equipment/ devices wherever necessary. Treatment as per IS: 6005. Two coats of lead oxide primer followed by powder painting with final paint shade of RAL 9002/any other approved by BHEL/NTPC.
2.20.17.	The primer shall be compatible with the final coat paint schedule.
2.20.18.	Supply of paint, primers, other consumables etc. for above and any other scope in these specifications shall be in Contractor's scope.
2.20.19.	Irrespective to scopes of painting & supply of paint mentioned elsewhere it is to be noted that supply of paint, primers, other consumables etc. for all primer/ painting works to be done by the contractor, shall be in Contractor's scope. No dispute shall be entertained on the above matter.
2.21.	WELDING, NON-DESTRUCTIVE TESTING ETC.
2.21.1.	Installation of equipment involves good quality welding, NDE checks etc.
2.21.2.	Welder deployed for aluminium welding shall have experienced and approved by BHEL and BHEL's Customer after due qualification process/ testing.
2.21.3.	Welding of all structural steel & aluminium shall be done only by the qualified and approved welders.
2.21.4.	All the welders shall be tested and approved by BHEL Engineer/ BHEL's Customer before they are actually engaged on work even though they may possess IBR/ other certificates. BHEL reserves the right to reject any welder without assigning any reason.
2.21.5.	The welded surface shall be cleaned of slag and painted with primer paint to prevent corrosion. For this paint will be supplied by the contractor.

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2.21.6.	Welding electrodes have to be stored in enclosures having temperature and humidity control arrangement. This enclosure shall meet BHEL specifications.
2.21.7.	Certain types of coated welding electrodes, prior to their use, call for baking for specified period and will have to be held at specified temperature for specified period. Also, during execution, the coated welding electrodes have to be carried in portable ovens.
2.22.	INTEGRATED ELECTRICAL TESTING/ COMMISSIONING
2.22.1.	The brief scope of work under is defined as below, but not limited to the following. Drawing & documents shall be provided by BHEL at the time of testing. BHEL decision in this regard shall be final and binding on the contractor.
2.22.2.	The contractor shall prepare all erection/ commissioning log sheets and protocols/ test certificates as per field quality plan, and is signed by the concerned BHEL/ BHEL's Customer engineer and submit the same to BHEL engineer as per his instruction.
2.22.3.	Contractor shall maintain the charged and commissioned equipment till the same is taken over by customer.
2.22.4.	Contractor's quoted rates for all concerned items shall include Integrated Testing as defined hereinafter.
2.23.	TESTING, PRE-COMMISSIONING, AND POST COMMISSIONING
2.23.1.	The work is also inclusive of various commissioning activities of BHEL scope. The various activities, tests, trial runs may have to be repeated till satisfactory results are obtained and also to satisfy the requirements of customer/ consultant/ statutory authorities like boiler inspector, electrical inspector etc.
2.23.2.	The contractor shall perform various activities during pre-commissioning, integrated testing, post-commissioning stages of equipment covered under this tender specification. It is responsibility of contractor to arranged tools & plants, test equipment, experienced engineers and technicians. Contractor shall earmark separate manpower for respective commissioning areas and they shall not be disturbed/ diverted for other work. The contractor's commissioning group shall work as per the instruction of BHEL Engineer and they shall coordinate day-to-day activity with other agency and BHEL/ Customer. The testing activity may have to be repeated till satisfactory results are obtained and also to satisfy the requirement of Customer/ statutory Authority.
2.23.3.	The contractor shall simultaneously start testing & commissioning activities for equipment to match the mile stone activities of the project.
2.23.4.	In case any malfunctioning and/ or defects are found during tests, trial runs such as loose components, undue noise or vibration, strain on connected equipment etc., the contractor shall immediately attend to these defects/ malfunctions and take necessary corrective measures. If any readjustment and realignment is necessary, the same shall be done as per BHEL Engineer's instructions.
2.23.5.	The pre-commissioning activities will start prior to light up of boiler and various trials, commissioning operations shall continue till the unit is handed over to customer. Simultaneous commissioning activities will be in progress in various areas, checking of equipment erected, making ready for trial runs, alkali flushing, chemical cleaning, mass flushing etc. All these works need specialized gangs including electrician/ instrument mechanics in each area. Contractor shall earmark separate manpower for various commissioning activities. This manpower shall not be disturbed or diverted. The mobilization of these commissioning gangs shall be such that planned activities are taken up in time and also completed as per schedule and the work undertaken round the clock if required. It is the responsibility of contractor to discuss on day to day/ weekly/ monthly basis the requirement of manpower, consumables, tools and tackles with BHEL Engineer

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-II: SCOPE OF WORK

	and arrange for the same. If at any time the requisite manpower, consumables, T&P are not arranged then BHEL shall make alternate arrangements and necessary recoveries with overhead cost will be made from the bills of the contractor.
2.23.6.	During pre-commissioning, commissioning, post commissioning and trial operation stages of various systems, certain category of manpower with T&P and consumables will have to be provided to BHEL Commissioning Engineers exclusively at their disposal. It shall be the responsibility of the contractor to provide engineers, electricians, technicians, helpers, fitters etc. along with necessary consumables, hand tools, calibration equipment etc., for the various commissioning activities in progress. During peak months there could be requirements of separate commissioning gangs simultaneously in even up to 12 to 15 areas. Contractor has to augment the manpower as and when required as per work demand and necessity at site. The quoted rates shall include this.
2.23.7.	The mobilization of these commissioning groups shall be such that planned activities are taken up in time and also completed as per schedule and work undertaken round the clock if required. It is responsibility of contractor to discuss on day to day/ weekly/ monthly basis the requirement of manpower, consumables, tools & tackles/ testing equipment with BHEL Engineers and arrange for the same. If at any time the requisite manpower, consumables, testing equipment etc. are not arranged then BHEL shall make alternative arrangements and necessary recoveries with overhead cost will be made from the running bills.
2.23.8.	Contractor shall cut open works if needed as per BHEL Engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over without any extra payment.
2.23.9.	It shall be specifically noted that contractor manpower may have to be engaged round the clock simultaneously at different areas and hence considerable number of personnel and their overtime payment may be involved. This aspect must be considered by the contractor while quoting their rate. No additional compensation by for the same shall be payable, irrespective of number of persons engaged or number of working hours per day.
2.23.10.	It is the responsibility of contractor to provide for necessary labor, tools and tackles and consumables till the completion of work under these specifications even in case erection, testing and commissioning of this work is delayed due to reasons not attributable to the contractor.
2.23.11.	It shall be specifically noted that the contractor may have to work round the clock and in shifts during the pre-commissioning and commissioning period along with or without BHEL Engineers and hence considerable overtime payment is involved. The contractor's quoted rates shall be inclusive of all these factors.
2.23.12.	During the commissioning activities and carrying out various tests, if any of temporarily work such mounting of test equipment/ cabling etc. are required; the contractor shall carry out such work without any extra cost. The same shall be removed after completion of the activity.
2.23.13.	During this period, though BHEL/ client's staff will also be associated in the work, the contractor's responsibility will be to arrange for complete requirement of men and required T&Ps, consumables, scaffolding and approaches etc., till such time the commissioned unit is taken over for trial operations.
2.23.14.	The contractor shall carry out any other tests as desired by BHEL Engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning and commissioning, to demonstrate the completion of any part or whole of work performed by the contractor.
2.23.15.	Contractor shall prepare calibration/ testing report/ protocols.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
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2.23.16.	Observing and checking the performance of the various devices on load/ process variation. Any deficiencies/ defect noticed during the variable load conditions, the same should be attended properly.
2.23.17.	Providing necessary assistance for Trial Operation of the unit is in scope of this specification. Smooth operation and availability of all instrument/ controls of the systems installed under the scope herein, shall be ensured by the contractor. Contractor shall provide adequate number of skilled manpower and T&P for this purpose. Interruption in Trial Operation for reasons attributable to the Contractor shall result in re-start of the Trial Operation all over again; consequential extension in Time Schedule/ Contract Period shall be to the contractor's account.
2.23.18.	If any small wiring correction or minor modification in control panel wiring is noticed during the commissioning, it shall be carried out as a part of commissioning activity.
2.23.19.	The trial run of the complete facility as an integral unit shall be conducted for 720 continuous hours. During the period of trial run of 720 hours, the unit shall operate continuously at full rated load for a period of not less than 72 hours.
2.24.	TROUBLESHOOTING DURING PLANT OPERATION
2.24.1.	During pre-commissioning/ commissioning stages when the plant will be under various stages of operation, it will be necessary to have continuous (day and night) presence of suitable manpower along with required tools to attend to any defects etc. that may arise during such operation. The contractor will be required to put such personnel in shifts in the designated areas. The bidder must also take this aspect into consideration.
2.25.	POST-COMMISSIONING
2.25.1.	Contractor shall rectify the defect observed/ informed by customer during the trial run.
2.25.2.	Contractor shall submit the as- built drawing as per guidelines and instruction of BHEL Engineer.
2.25.3.	After trial run/ handing over of the equipment, if due to unforeseen reasons, certain works crop up; the contractor shall provide all the assistance.
2.26.	CODES AND STANDARDS
2.26.1.	The design, Manufacture and performance of equipment shall comply with all currently applicable regulations and safety codes in the locality where the equipment will be installed. Nothing in this specification shall be constructed to relieve the bidder of these responsibilities.
2.26.2.	Unless otherwise specified, equipment offered shall conform to latest applicable Indian and IEC standards. Equipment complying with any other authoritative standards such as British, U.S.A, VDE etc. may also be considered provided these standards ensure performance equivalent to or superior to Indian Standards. In such cases the Bidder shall clearly indicate the standard adopted and furnish a copy of the latest English version of the standard along with the tender. Should there be any dispute of design standard, the most stringent one shall be followed. The relevant Indian Standards are:

LIGHTING WIRES

IS:10810	Methods of tests for cables.
IS:694	PVC insulated cables for working voltages up to and including 1100V.
IS:3961	Recommended current ratings for PVC insulation light output cables.
IS:5331	PVC insulation and sheath of electric cables.
IS:8130	Conductors for insulated electric cables and flexible cards.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-II: SCOPE OF WORK

CONDUITS & ACCESSORIES AND JUNCTION BOXES

IS:1653	Rigid steel conduits for electrical wiring.
IS:3480	Flexible steel conduit for electrical wiring.
IS:2667	Fittings for rigid steel conduits for electrical wiring.
IS:3837	Accessories for rigid steel conduits for electrical wiring.
IS:4649	Adaptors for flexible steel conduits.
IS:5077	Decorative Lighting outfits.
IS:5133	Steel and Cast Iron Boxes. (Part-I)
IS:5133	Boxes made of Insulating materials (part-II)
IS:2629	Hot dip galvanizing of iron & Steel.
IS:9537	Specification for conduits for Electricals installation. (part-I & II)

ELECTRICAL INSTALLATION PRACTICES & MISCELLANEOUS

IS:5	Colour for ready mixed paints 2 enamels.
IS:1293	3 Pin, Plug & Socket Outlets.
IS:226	Structural steel (standard quality).
IS:2509	Rigid nonmetallic conduits for electric wire.
IS:371	Ceiling fans
IS:3854	Switches for domestic and similar purposes.
IS :5216	Guide for safety procedures and practices in electrical work.
IS:1913	General and safety requirements for electric lighting fittings.
IS:3419	Fittings for rigid nonmetallic conduit.
IS:732	Code of practice for Electrical Wiring installation (System Voltage not exceeding 650V).
IS:3646	Code of practice for interior illumination part I, II & III.
IS:1944	Code of practice for lighting of public thorough forces.
IS:3106	Code of practice for selection of installation and maintenance of fuses. (Voltage not exceeding 650V).
IS:4615	Switch socket out let (Non-locking).
IS:5571	Guide for selection of electrical equipment for hazardous areas.
IS:5572	Classification of hazardous areas electrical installation.
IS:800	Code of practice for use of structural steel in general building construction.
IS:2633	Method of testing uniformity of coating in zinc plated articles.
IS:6005	Code of practice for phosphating of form & steel.
IS:3043	Code of practice for earthing.

INDIAN ELECTRICITY ACT AND RULES

IS:6665	Code of practice for industrial lighting.
IS:458	Specification for concrete pipes.

FIRE INSURANCE REGULATIONS

- Rule no. 35, 48, 49, 50, 61 & 64 of Indian Electricity Rule with amendment-3 rules 1986
- Regulations laid down by the chief Electrical Inspector of the State/ CEA.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-III: FACILITIES IN THE SCOPE OF CONTRACTOR/ BHEL
(SCOPE MATRIX)

3. FACILITIES IN THE SCOPE OF CONTRACTOR/ BHEL (SCOPE MATRIX)				
S. No.	Description	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 owner
b)	Open space for storage (as per availability)	Yes		Location will be finalized after joint survey with owner
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 PURPOSES OF THE BIDDER			
a)	Open space for labour colony (as per availability)		Yes	Agency has to make his own arrangement at his own cost.
b)	Labour Colony with internal roads, sanitation, complying with statutory requirements		Yes	
3.2.	ELECTRICITY			
3.2.1.	Electricity for construction purposes only of Voltage 415/ 440V, 3phase, 50Hz	Yes		Free of cost at one point near the site at a distance of approx. 500 meter. Further distribution and Metering are in scope of bidder.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-III: FACILITIES IN THE SCOPE OF CONTRACTOR/ BHEL
(SCOPE MATRIX)

a)	Single point source	Yes		At a distance of 500 m from site (Distance is only tentative, it may vary up-to an extent depending on site condition)
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			
a)	Single point source	Yes		Chargeable basis. Single point as above for construction purpose, no separate point shall be given. Metering is in scope of 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	Agency has to make his own arrangement at his own cost.
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:			
a)	Making the water available from single point	Yes		Free of cost at one point near the plant boundary. Further distribution and metering are in scope of bidder.
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.			

TECHNICAL CONDITIONS OF CONTRACT (TCC)
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a)	Making the water available at single point	Yes		Free. Contractor has to make his own arrangements for distribution. Single point as above for construction purpose, no separate point shall be given.
b)	Further distribution as per the requirement of work including supply of materials and execution		Yes	Contractor has to make his own arrangements for distribution.
3.3.3.	Water supply for Living Purpose			
a)	Making the water available at single point		Yes	No separate point shall be given.
b)	Further distribution as per the requirement of work including supply of materials and execution		Yes	Contractor has to make his own arrangements for distribution.
3.4.	LIGHTING			
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	
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			
a)	Telephone, fax, internet, intranet, e-mail etc.		Yes	
3.6.	COMPRESSED AIR (wherever required for the work)		Yes	

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b)	Supply of Compressor and all other equipment required for compressor & compressed air system including pipes, valves, Storage System etc.		Yes	
c)	Installation of above system and operation & maintenance of the same		Yes	
d)	Supply of the all the consumables for the above system during the contract period		Yes	
3.7.	Demobilization of all the above facilities		Yes	
3.8.	TRANSPORTATION			
a)	For site personnel of the bidder		Yes	
b)	For bidder's equipment and consumables (T&P, Consumables etc.)		Yes	
3.9.	ENGINEERING WORKS FOR CONSTRUCTION:	Yes		NOT APPLICABLE
a)	Providing the erection/ constructions drawings for all the equipment covered under this scope	Yes		
b)	Drawings for construction methods	Yes	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	Yes		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	Yes	In consultation with BHEL
g)	Weekly erection schedules based on S. No. d		Yes	In consultation with BHEL
h)	Daily erection/ work plan based on S. No. e		Yes	In consultation with BHEL

TECHNICAL CONDITIONS OF CONTRACT (TCC)
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i)	Periodic visit of the senior official of the bidder to site to review the progress so that work is completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two months.		Yes	
j)	Preparation of preassembly bay		Yes	NOT APPLICABLE
k)	Laying of racks for gantry crane if provided by BHEL or brought by the contractor/ bidder himself		Yes	NOT APPLICABLE
l)	Arranging the materials required for preassembly		Yes	NOT APPLICABLE
m)	COVID-19 Preventive Measure		Yes	
3.10.	LAND			
a)	Land will be provided free of cost by BHEL to the extent available/ considered necessary by BHEL to successful bidder for their temporary office & store. Contractor has to make his own arrangements for Land for Labour colony. Availability of land is very limited and successful bidder have to plan & use existing land considering use of land by other civil/ mechanical/ electrical successful bidders and storage of plant machineries & materials. The existing land shall be shared by all agencies deployed by BHEL at site.			
b)	BHEL shall hand over such allotted land to the successful bidder on as is where is condition. Successful bidder shall arrange at his own cost cleaning and grading of area allotted, construction of their temporary office, stores, go-down, fabrication yards etc and also the watch & ward, etc as may be required.			
c)	All temporary roads for crane movement shall be constructed and maintained by BHEL.			
d)	Land, as available, shall be arranged by the successful bidder for labour colony outside plant boundary. BHEL shall reimburse lease rent of such land used for Labour Colony. Necessary vehicles from plant to labour colony to and fro, for transportation of laborer shall be arranged by the successful bidder. Successful bidder should visit the site to assess site condition regarding feasibility of use of land for the purpose. The successful bidder to construct temporary labour colony/ hutment, toilets as per attached technical specifications and drawings after obtaining approval of formalities from statutory body/NTPC Guidelines.			
e)	Successful bidder shall provide adequate no of toilets in their labour colony and maintain minimum requirement hygiene as per safety regulations.			
f)	On completion of work, all the temporary buildings, structures, pipelines, cables, etc, shall be dismantled & leveled and debris shall be removed as per instruction of BHEL by successful bidder at their cost. In the event of failure to do so, same will be removed and expenditure thereof will be recovered from successful bidder. Decision of BHEL in this regard shall be final & binding. However, the scope of dismantling & leveling the area is limited only to successful bidder's site office, yard and other spaces occupied by successful bidder.			
3.11.	WATER			

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a)	BHEL will provide construction as well as potable water at one strategic point within plant premises, free of cost, to the successful bidder for their site office & store.
b)	Further network for construction & potable water system for construction work shall be arranged by successful bidder at their own cost.
c)	BHEL shall not be responsible for any inconvenience or delay caused due to any interruption of water supply and successful bidder shall claim no compensation for delay in work for such interruption. Successful bidder may make standby arrangement for water for which no separate payment shall be made by BHEL.
d)	Successful bidder will have to arrange for storage of water to meet day-to-day requirement.
e)	Availability of water (construction as well as potable) in project site is limited. Successful bidder shall ensure that no water is wasted and shall take all necessary measures for any wastage & preservation of water. In this context, for proper utilisation & to avoid scarcity, successful bidder shall mandatorily construct storage facility of construction & potable water at site (Near work places). Any deviation from this shall lead to forthwith withdrawal of the facility.
f)	Construction water, as available, may be provided for labour colony within the project premises free of cost. Successful bidder should visit site before quoting to assess site condition regarding feasibility of use of water source for the purpose. Further network for drinking water system for construction work shall be arranged by successful bidder at their own cost. Successful bidder shall take care of all precautions to avoid any sort of misuse, wastage of water. Any deviation from this shall lead to forthwith withdrawal of this facility.
g)	Successful bidder shall make their own arrangement of potable water facility for labour colony, at their own cost.
h)	Bidder to note that use of construction/potable water from bore-well may be permitted if found suitable. Any statutory clearance required shall be obtained by the contractor.
3.12.	ELECTRICITY
a)	BHEL will provide construction power free of charges at 415 V level at one/ two strategic point(s) within plant premises. Successful bidder shall make their own distribution arrangement to draw electricity. However, provision of suitable temporary lights at different floors/ working areas for execution of the work & safety of workmen shall be provided by successful bidder, within accepted rate. Illumination should be such that minimum illumination requirement as specified by local statutory body / international standard for general illumination is maintained.
b)	Contractor shall be responsible for fulfilment of all requirements including statutory requirements in this regard. Contractor shall deploy and install required energy meter, cables, fuses, distribution boards, switchboards, bus bars, earthing arrangements, protection devices and any other installation as specified by statutory authority/act. Contractor shall also obtain approvals of appropriate authority and pay necessary fees, levies etc towards the clearance of such installations, prior to use. Sufficient power factor compensation equipment like capacitor shall be provided by contractor for reactive loads like welding machines etc. In case of any fine/penalty on account of low power factor, same shall be shared by contractor proportionately according to power consumption.
c)	Contractor shall make necessary arrangements for onward distribution of construction power taking due care of surrounding construction activities like movement of cranes & vehicles, civil work, fabrication/construction/assembly/ erection etc and safety of personnel. It may become necessary to relocate some of the installations to facilitate work of other agencies or himself.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-III: FACILITIES IN THE SCOPE OF CONTRACTOR/ BHEL
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d)	Contractor to note that till construction power is made available by BHEL, contractor shall make his own arrangement like DG set etc. The contractor shall also take the approval/ permission of statutory authorities for his DG set installation. The Contractor has to make his own arrangement for the same as required to carry out the job under the scope of work within the quoted rate. Nothing extra shall be paid on this account of DG set up and running for construction and office maintenance etc.
e)	Contractor is advised to maintain the calibrated energy measuring instruments and use their system as efficiently as possible to maintain the HT side input energy meter reading and LT side outgoing energy meter reading to sub-contractors as equal. Successful bidder shall arrange energy meter for their office.
f)	If any other voltage level (other than normally available) is required, the same shall be arranged by successful bidder from power supply as above. Successful bidder will have to provide at their own cost necessary calibrated energy meters (tamper proof, suitably housed in a weather proof box with lock & key arrangement) at point of power supply along with calibration certificate from authorized/ accredited agency for working out the power consumption. In case of recalibration required for any reason, necessary charges including replacement by calibrated meters is to be borne by successful bidder. Supply of electricity shall be governed by applicable Rules & Regulation. In case of any major deviation from normally accepted norms is observed, BHEL will reserve the right to impose penalty as deemed fit for such cases.
g)	Successful bidder shall have to provide earth leakage circuit breaker at each point wherever human operated electrical drives/ T&Ps are deployed.
h)	The power supply will be from the available grid. BHEL shall not be responsible for any inconvenience or delay caused due to any interruption of power supply/ variation in voltage level and no compensation for delay in work can be claimed by the successful bidder due to such non-supply on the grounds of idle labour, machinery or any other grounds.
i)	Successful bidder shall arrange sufficient illumination at their own work areas and energy meter for office.
j)	Successful bidder should ensure that the work in critical areas is not held up in the event of power breakdown. In the event of breakdown in the electric supply, if the progress of work is hampered, it will be the responsibility of the successful bidder to step up the progress of work after restoration of electric supply so that overall progress of work is not affected.
k)	Successful bidder has to make arrangement at their own cost for illumination for their working area for execution of the work & safety of workmen. This system will include temporary pole lighting, portable lighting towers with DG back-up, within the quoted price. The illumination should be such that minimum illumination requirement as specified by Indian standards for general illumination is maintained.
3.13.	CONSTRUCTION MANAGEMENT
a)	Based on the approved program, successful bidder shall submit a program of construction/ erection/ commissioning for the implementation. These programs would be amplified showing start of erection and subsequent activities and shall form the basis for site execution and detail monitoring. The three-monthly rolling program with the first month's program being tentative based on the site condition would be prepared based on these programs. Successful bidder shall also be involved along with BHEL/ customer to tie up detailed resources mobilization plan over the period of the contract matching with the performance targets.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-III: FACILITIES IN THE SCOPE OF CONTRACTOR/ BHEL
(SCOPE MATRIX)

b)	The program would be jointly finalized by Site Incharge of successful bidder with BHEL/ customer as well as the site-planning representative. The erection program will also identify sequential events matching financial turnover.
c)	Successful bidder is liable to furnish all documentary evidences towards payment of Works Contract Tax as and when required by BHEL.
d)	The contractor shall maintain a site organization of adequate strength in respect of manpower, construction machinery and other implements at all times for smooth execution of the contract. This organization shall be reinforced from time to time, as required to make up for slippage from the schedule without any commercial implication to BHEL. The site organization shall be headed by a competent construction manager having sufficient authority to take decisions at site.
e)	The contractor should also submit to BHEL for approval a list of construction equipment, erection tools, tackle etc. prior to commencement of site activities. These tools & tackles shall not be removed from site without written permission of BHEL.
3.14.	OTHER FACILITIES
a)	Adequate water less urinals shall be arranged by the contractor within quoted rates, at site of construction at different level and different areas like boiler structure, with proper disposal arrangement.
b)	Vendors have to comply requirements of HSE & Statutory requirement in line with BHEL HSE plan, NTPC Safety requirement, Odisha/ Central statutory requirement.
c)	Vendors have to arrange labour rest sheds, drinking water facility, toilets, canteen facility as per local labour act/ BOCW act. Maintaining hygiene and disposal of debris, scraps, canteen items and area cleaning is included in vendor's scope.
d)	Agency has to arrange trained scaffolding experts with accreditation from statutory agencies with proper experience and they will issue fitness certificates for safe use. Such kind of qualified scaffolding experts will vary as per job requirement. At the same time, training has to be given by these experts at regular intervals for their own workers for increasing no. of experts.
e)	Agencies HSE officers should have sufficient experience as per rule 209 of BOCW act central rule 1998. Agencies HSE officers will be part of BHEL HSE Team and they will be responsible for giving training on HSE issues in addition to normal field works and other normal site requirements.
f)	Preparation of method statement, HIRA, Job Safety analysis, permit to work, lifting plans, and all supporting documents as required for starting & continuation of work/ job is in vendor's scope.
g)	Hydras are not allowed for materials transport, only pick and carry cranes shall be deployed by the agency.
h)	First aid centre will be maintained by BHEL and cost will be proportionately recovered from vendors.
i)	Vendor has to arrange land within his quoted rate for making labour colony. Vendors labour colony has to be maintained with proper hygiene, drinking water, bathroom water, lighting arrangement, sewerage system. These facilities are to be regularly maintained including drains, surrounding, upkeep of labour colony. BHEL/ NTPC & local statutory authorities will visit labour colony from time to time and all healthy conditions are to be maintained by vendor.
j)	Scaffolding pipes, clamps, safety nets, floor grills for working platforms are to be made of good quality with proper certifications as per IS Codes.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-IV: T&P AND MMES TO BE DEPLOYED BY CONTRACTOR

4.	T&PS AND MMES TO BE DEPLOYED BY CONTRACTOR										
4.1.	<p>T&PS and MMES TO BE DEPLOYED BY CONTRACTOR:</p> <p>The following minimum major Tools & Plants (T&P) shall be arranged by the Contractor within the quoted rate for each package for execution of the scope of works covered under this contract.</p> <table border="1"> <thead> <tr> <th>SI.No.</th> <th>Description</th> <th>Qty</th> </tr> </thead> <tbody> <tr> <td>01</td> <td>For loading and transportation, all necessary T&P such as trailers, Hydra, Winches, welding generators, slings, jacks, sleepers, rails etc. are to be arranged by the contractor.</td> <td>As required.</td> </tr> <tr> <td>02</td> <td>DG Set of appropriate capacity</td> <td>As required.</td> </tr> </tbody> </table>		SI.No.	Description	Qty	01	For loading and transportation, all necessary T&P such as trailers, Hydra, Winches, welding generators, slings, jacks, sleepers, rails etc. are to be arranged by the contractor.	As required.	02	DG Set of appropriate capacity	As required.
SI.No.	Description	Qty									
01	For loading and transportation, all necessary T&P such as trailers, Hydra, Winches, welding generators, slings, jacks, sleepers, rails etc. are to be arranged by the contractor.	As required.									
02	DG Set of appropriate capacity	As required.									
4.2.	All the tools & plants required for this scope of work, are to be arranged by the contractor within the quoted rates as and when required.										
4.3.	T&Ps mentioned above is tentative requirement considering parallel working in all areas mentioned in scope of work. However, mobilization schedule, quantity / numbers and capacity as mutually agreed at site for major T&Ps, have to be adhered to. List of T&Ps required for the completion of entire scope of works shall be listed by the contractor and approval shall be obtained from BHEL Site In charge. Numbers/quantity, Capacity & time of requirement of T&Ps will be reviewed time to time by BHEL site and contractor will provide required T&Ps / equipment to ensure completion of entire work within schedule / target date of completion without any additional financial implication to BHEL. Vendor shall give advance intimation and certification regarding capacity etc. prior to dispatch of any heavy T&P. Also, on completion of the respective activity, demobilization of T&P in total or in part can be done with the due approval of engineer in charge. Retaining of the T&P's during the contract period will be mutually agreed in line with construction requirement.										
4.4.	The contractor shall furnish a list of Tools and plants including cranes, tractors/trailers/trucks etc. which are proposed for this work by the contractor to deploy, before start of works and approval to be obtained from BHEL Site In charge.										
4.5.	The contractor shall arrange sufficient no. of Man-Lifters & Ladders (Fixed and movable) with all safety features to execute the lighting job safely in all areas of the Power Plant.										
4.6.	Computerized ferrules printing machine (min – 01 No.) shall be provided for making printed ferrules for all the cables.										
4.7.	<p>EQUIPMENT REQUIRED FOR TESTING, COMMISSIONING & OPERATION:</p> <p>The tentative list of testing equipment shall be arranged by contractor in sufficient number to carry out the job simultaneously in more than one area within the quoted rate.</p> <ol style="list-style-type: none"> i. Test Lamp ii. Buzzer iii. Lux Meter iv. Insulation tester: <ol style="list-style-type: none"> a) Hand operated Megger - 0.5 KV/1.0 KV/2.5 KV, 0- 1000 M Ohms v. Earth resistance tester 0 to 1, 10, 100 ohms vi. Voltmeter AC 0 - 125 - 250 - 625 V AC vii. Ammeter AC 0 - 2A - 10A AC viii. Multimeter - analogue: AC V 2.5V - 2500V, AC A - 100 mA - 10 A DC V 25.V - 2500V, dc A - 50mA - 10A 										

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-IV: T&P AND MMEs TO BE DEPLOYED BY CONTRACTOR

	<ul style="list-style-type: none"> ix. Digital Multi meters (make: Fluke) AC 0V-600V, DC 0V-300V x. Digital: voltages AC & DC - 100mv - 1000 V xi. Current 10-mA - 10A Resistance - 0-20 M ohms xii. Wheat stone bridge - 0.05 m ohm - 100 ohm. xiii. 220V DC power pack for control supply required for testing of panels xiv. Test setup for testing the lighting equipments such as 24V DC, 220 V DC and 240 V 1 Ph AC. xv. Tong tester - 0 - 5A - 10A, 30A, 60A, 150A - 600A, 500A-1000A. xvi. Lockout Tagout (LOTO) system for implementing during testing, commissioning & initial operation of Electrical equipment xvii. Insulating Rubber mats & Hand gloves (as required) <p><i>Note: The list mentioned above is tentative requirement considering parallel working in all areas mentioned in scope of work. However, mobilization schedule and quantity /numbers as mutually agreed at site for major T&Ps, have to be adhered to.</i></p>																																		
4.8.	<p>ACCURACY REQUIREMENT OF TESTING INSTRUMENTS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">S.No.</th> <th style="width: 30%;">INSTRUMENT / TOOL</th> <th style="width: 30%;">RANGE</th> <th style="width: 30%;">ACCURACY</th> </tr> </thead> <tbody> <tr> <td rowspan="9" style="text-align: center; vertical-align: middle;">1</td> <td rowspan="9" style="text-align: center; vertical-align: middle;">Digital Multimeter</td> <td>Voltage 200mV to 1000 V DC</td> <td style="text-align: center;">+ 1% + 1 digit</td> </tr> <tr> <td>Philips Voltage 200mV to 1000 V AC</td> <td style="text-align: center;">+ 1% + 1 digit</td> </tr> <tr> <td>Hcl Current 200mA to 20 A AC</td> <td style="text-align: center;">+ 0.8% + 1 digit</td> </tr> <tr> <td>Philips Current 20 mA to 20 A AC</td> <td style="text-align: center;">+ 0.8% + 1 digit</td> </tr> <tr> <td>Resistance (Hcl) 2120 200* to 200M*</td> <td style="text-align: center;">+ 0.5% + 1 digit</td> </tr> <tr> <td>Resistance (Hcl) 2105 200* to 200M*</td> <td style="text-align: center;">+ 0.25% + 1 digit</td> </tr> <tr> <td>Hcl Voltage 200mA to 750 V</td> <td style="text-align: center;">+ 0.8% + 1 digit</td> </tr> <tr> <td>Philips Current 20 mA to 20 A DC</td> <td style="text-align: center;">+ 0.5% + 1 digit</td> </tr> <tr> <td>Hcl Current 200 mA to 010 A AC</td> <td style="text-align: center;">+ 1% + 1 digit</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">Motor operated Megger</td> <td style="text-align: center;">up to 200 Ohms</td> <td style="text-align: center;">+ 5% at Centre scale</td> </tr> <tr> <td rowspan="2" style="text-align: center;">3</td> <td rowspan="2" style="text-align: center;">Tongue tester</td> <td style="text-align: center;">0/300/600A AC</td> <td style="text-align: center;">+ 5%</td> </tr> <tr> <td style="text-align: center;">0 to 300A DC</td> <td style="text-align: center;">+ 5%</td> </tr> </tbody> </table>	S.No.	INSTRUMENT / TOOL	RANGE	ACCURACY	1	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 010 A AC	+ 1% + 1 digit	2	Motor operated Megger	up to 200 Ohms	+ 5% at Centre scale	3	Tongue tester	0/300/600A AC	+ 5%	0 to 300A DC	+ 5%
S.No.	INSTRUMENT / TOOL	RANGE	ACCURACY																																
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TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-IV: T&P AND MMEs TO BE DEPLOYED BY CONTRACTOR

4	Hand operated Megger 500V / 1000V/2.5 KV	Up to 1000 M Ohms	+ 5% at Centre Scale + 10% at end of Scale
5	Motorized Megger 2.5 KV	Up to 1000 M Ohms	+ 5% at Centre Scale + 10% at end of Scale
6	Earth Resistance tester (Tester)	0 to 1, 10 Ohms	+ 5% at Centre Scale range
7	AC tongue Tester	0 to 1000A AC	+ 3%
8	DC Tongue Tester	0 to 300A DC	+ 5%
9	DC Ammeter	0 to 300 A	
10	DC Voltmeter	0 to 500 V	
11	DC Tong Tester (mA)	0-500 mA	

Note:

1. For loading and transportation, all necessary T & P such as Trailers, Cranes, Winches, welding generators, slings, jacks, sleepers, rails etc., are to be arranged by the contractor.

2. Note for Contractor's Instruments:

- a. The contractor shall arrange all the T&Ps, and instruments as indicated except testing instruments which are proprietary in nature.
- b. The contractor at their cost shall arrange all cranes and truck / tractor, trailers required for material handling purpose and also cranes required for erection.
- c. Any other tools and plants instruments and equipment required in addition to the above for the successful completion of this job will have to be arranged by the contractor at their cost.
- d. Necessary accessories for the above shall also be provided by the contractor.
- e. The above instruments / equipment shall be sent for testing and calibration whenever from time to time and maintained by contractor as required by BHEL.
- f. All testing instruments shall have calibration certificate issued by recognized / accredited agencies
- g. List of such agencies and periodicity of calibration required for different instruments will be furnished by BHEL at site.
- h. Contractor shall maintain calibration records as per the BHEL format and produce them whenever called for by BHEL Engineers.
- i. Contractors shall arrange experienced/qualified persons for using these calibration instruments at laboratory and also at work spot.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-IV: T&P AND MMEs TO BE DEPLOYED BY CONTRACTOR

	Wherever frequent calibration is required; contractor shall arrange adequate number of instruments such that the work does not suffer for want of test instruments
4.9.	<p>In the event of contractor failing to arrange the required tools, plants, machinery, equipment, material or non-availability of the same owing to the breakdown, BHEL will make alternative arrangement at the risk and cost of the contractor:</p> <p>Case 1: BHEL provides its own Capital T&P: In case the BHEL provides any T&P which is owned by BHEL, hire charges (as per BHEL norms) will be recovered from the contractor as per the prevailing BHEL Corporate hire charges given in Annexure-6 of Chapter XI.</p> <ul style="list-style-type: none"> • In case, the T&P is specifically listed in "T&Ps to be deployed by Contractor", "hire charges applicable to outside agencies other than contractors working for BHEL" will apply. • If not listed, "hire charges applicable to contractors working for BHEL" will apply. The hire charges of Capital Tools & Plants are exclusive of operating expenses e.g., Operator, fuel & Consumables and the same shall be arranged by the contractor at his cost. <p>Case 2: In all cases other than that specified in Case 1 above, actual expenses incurred by BHEL along with applicable overheads will be back-charged to the contractor. The present rates of BHEL's Corporate Crane hire charge are enclosed as part of this tender. This may get revised further as per the BHEL corporate guidelines. The prevailing rates as on date of execution shall be applicable.</p>
4.10.	All the T & P arranged by contractor including electrical connections wherein required shall be reliable / proven / tested with necessary test certificate.
4.11.	All instruments, measuring tools etc. are to be calibrated periodically as per the requirement of BHEL and necessary calibration certificates are to be submitted to BHEL before use.
4.12.	Crane operators deployed by the contractor shall be tested by BHEL before he is allowed to operate the cranes.
4.13.	All the distribution boards, connecting cables, hoses etc., and temporary connection work including electrical connections for the BHEL issued T & Ps shall have to be arranged by the contractor at his cost
4.14.	Other Relevant clauses shall be referred in Special Conditions of Contract (SCC) published in Volume IB of Book II.
4.15.	PROTECTION / HANDLING OF TOOLS AND PLANT ARRANGED BY THE CONTRACTOR
4.15.1.	Equipment, vehicles, tools and plants and materials brought to site by the contractor from their resources shall have distinctive identification marks and the contractor shall intimate the description and quantity to BHEL in writing.
4.15.2.	All construction materials brought by the contractor shall have prior approval regarding quality and quantity by BHEL. The contractor shall also provide without extra cost necessary enclosures containers and protective materials for proper storage of materials inside, whenever so instructed by the purchaser without any extra cost.
4.15.3.	No material or equipment or tools etc., shall be taken out of the work-site without the written consent of BHEL.
4.15.4.	BHEL shall not be responsible for the safety and protection of the materials of the contractor and the contractor shall make their arrangements for proper watch and ward for their materials.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-IV: T&P AND MMEs TO BE DEPLOYED BY CONTRACTOR

4.15.5.	Until such time the work is taken over by BHEL, the contractor shall be responsible for proper protection including proper fencing, guarding, lighting, flagging, and watching. The contractor shall during the progress of work properly cover up and protect any part of the work liable to damage by exposure to the weather and shall take every reasonable precaution against accident or damage to the work from any cause.																								
4.15.6.	<p>CALIBRATION RECORD OF SUB-CONTRACTOR'S INSTRUMENTS Format No. CP: PEX: FOX Name of Site: Name of Sub-Contractor:</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 10%;">SI.No.</th> <th style="width: 20%;">Name of the Instrument</th> <th style="width: 15%;">Instrument REGN.No.</th> <th style="width: 10%;">Date of Entry / Exit</th> <th style="width: 15%;">Periodicity of Calibration</th> <th style="width: 30%;">Calibration Details</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td>Date of Cal: Cal. Agency: Next Due Date:</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td>Date of Cal: Cal. Agency: Next Due Date:</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td>Date of Cal: Cal. Agency: Next Due Date:</td> </tr> </tbody> </table>	SI.No.	Name of the Instrument	Instrument REGN.No.	Date of Entry / Exit	Periodicity of Calibration	Calibration Details						Date of Cal: Cal. Agency: Next Due Date:						Date of Cal: Cal. Agency: Next Due Date:						Date of Cal: Cal. Agency: Next Due Date:
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TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-V: T&Ps AND MMEs TO BE DEPLOYED BY BHEL ON SHARING BASIS

5.	T&Ps AND MMEs TO BE DEPLOYED BY BHEL ON SHARING BASIS
5.1.	The EOT crane at TG Hall without operating personnel shall be made available at free of charge for erection purposes based on the requirement. As the above crane is deployed for Boiler/T.G. & Aux. erection and also to various other contractors, the decision of BHEL engineers will be final with regard to allotment of crane. The contractor has to arrange experienced operator for EOT Crane. The decision of BHEL Engineers will be final with regard to allotment of crane.
5.1.1.	If the EOT Crane is not available for any reason, bidder should make necessary arrangements for carrying out the works within the quoted rates.
5.1.2.	Providing manpower assistance required for free movement of Trailing cable of EOT Crane is included in the scope of this contract.
5.1.3.	The availability of crane is likely to be hampered from time to time due to routine preventive maintenance or breakdown maintenance. Contractor has to make alternative arrangement or plan / modify / alter his activities to suit the above conditions and the contractor will not be liable for any compensation or extension of time due to this non-availability, for maintaining the erection schedule.
5.1.4.	In the event of the crane not available for longer duration due to major breakdown or any other reasons, BHEL will reschedule the work in consultation with bidder and direct the bidder to concentrate on other areas till such time the cranes are made available.
5.1.5.	Crane operators deployed by the contractor shall be tested by BHEL before he is allowed to operate the cranes.
5.1.6.	Depending upon the nature of work and availability of facilities locally, contractor may have to arrange for a temporary workshop for facilitating uninterrupted progress of work.
5.1.7.	All the distribution boards, connecting cables, hoses etc., and temporary connection work including electrical connections for the BHEL issued T & Ps shall have to be arranged by the contractor at his cost.
5.1.8.	Cranes provided by BHEL are only for erection purpose and shall not be available for material handling or transportation purpose. Contractor shall make their own arrangements for material transportation to erection site.
5.2.	The contractor at his cost shall arrange for grouting of anchor points of T & Ps issued to him. Necessary grout materials are to be arranged by the contractor at their cost.
5.3.	Contractor shall make good any loss or damage to the Equipment supplied to him and day to day maintenance and operations of equipment shall be borne by the contractor including all consumables like petrol, oil and air filters etc.,
5.4.	Any additional crane and other T & P which may be required for successful and timely execution of the work covered within the scope of this tender shall be arranged and provided at site by the contractor at his cost. In case if the contractor fails to provide such equipment, BHEL will arrange for the same and the cost will be recovered from the contractor's bill with BHEL overheads, as applicable from time to time which may vary even during contract period.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-VI: TIME SCHEDULE

6.	TIME SCHEDULE																								
6.1.	<p>Initial Mobilization</p> <p>After issue of LOA (through Fax/courier/email) the contractor shall report to the Construction Manager/Site In-Charge of BHEL at site within Two weeks (14 days) from date of LOA for Kick-off meeting regarding mobilization of manpower, T&Ps and date of start of work and detailed completion program etc.</p> <p>The contractor has to subsequently augment his resources in such a manner that the project milestones are completed on specified schedules and entire work completed within the entire contract period, as specified in the following clause from the date of start of work, in a manner required by BHEL to match with the project schedule.</p>																								
6.2.	<p>Commencement of Contract Period:</p> <p>BHEL Engineer will certify the actual date of start of work after adequate mobilization of manpower, major equipment and required T&P by the contractor. In case of discrepancy, the decision of BHEL shall be considered to be final and binding to contractor. Based on the availability of civil foundations, drawings and material from BHEL, contractor may have to advance the erection activity after getting clearance from Construction Manager, or the erection activity may get delayed due to site conditions.</p> <p>The contractor shall complete all the works in the scope of this contract within the contract period. Pending points identified by the customer/BHEL during the execution of the contract are to be liquidated during the contract period itself.</p>																								
6.3.	<p>Schedule of Completion:</p> <p>The contract period for completion of entire work under scope shall be as mentioned hereunder, from the "START OF CONTRACT PERIOD" as specified earlier for completion of the entire work in respective Packages.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 70%;">Package</th> <th style="width: 30%;">Contractual Schedule (Month)</th> </tr> </thead> <tbody> <tr> <td>Package C: ERECTION, TESTING & COMMISSIONING OF ILLUMINATION PACKAGE OF U#1 & U#2.</td> <td style="text-align: center;">20 Months</td> </tr> </tbody> </table>			Package	Contractual Schedule (Month)	Package C: ERECTION, TESTING & COMMISSIONING OF ILLUMINATION PACKAGE OF U#1 & U#2.	20 Months																		
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6.4.	<p>The contractor has to subsequently augment his resources in such a manner that following major milestones of erection & commission are achieved on specified schedules:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">S. No.</th> <th rowspan="2">MAJOR MILESTONE</th> <th colspan="2">Tentative Schedule</th> </tr> <tr> <th>Unit-1</th> <th>Unit-2</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td>ND HYDRO TEST</td> <td style="text-align: center;">8th Month</td> <td style="text-align: center;">10th Month</td> </tr> <tr> <td style="text-align: center;">2</td> <td>BOILER LIGHT UP</td> <td style="text-align: center;">10th Month</td> <td style="text-align: center;">12th Month</td> </tr> <tr> <td style="text-align: center;">3</td> <td>SYNCHRONIZATION</td> <td style="text-align: center;">14th Month</td> <td style="text-align: center;">16th Month</td> </tr> <tr> <td style="text-align: center;">4</td> <td>COMPLETION OF FACILITIES</td> <td style="text-align: center;">18th Month</td> <td style="text-align: center;">20th Month</td> </tr> </tbody> </table>			S. No.	MAJOR MILESTONE	Tentative Schedule		Unit-1	Unit-2	1	ND HYDRO TEST	8 th Month	10 th Month	2	BOILER LIGHT UP	10 th Month	12 th Month	3	SYNCHRONIZATION	14 th Month	16 th Month	4	COMPLETION OF FACILITIES	18 th Month	20 th Month
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**TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-VI: TIME SCHEDULE**

	<p>Agency for Illumination Package has to expedite their work in order to meet the milestones as indicated above.</p> <p>NOTE: Above time schedule is only tentative and in order to meet above schedule in general, and any other intermediate targets set, to meet customer/ project schedule, contractor shall arrange & augment all necessary resources from time to time as per the instructions of BHEL Engineer w.r.t. monthly plan and review format (F-14).</p> <p>The above schedule shall be advanced, if there are requirements to advance the project to meet the project requirement. No extra payment whatsoever shall be paid on this account.</p>									
<p>6.5.</p>	<p>Intermediate milestones: Two Major Intermediate Milestones are identified as M1 and M2.</p> <table border="1" data-bbox="339 750 1372 976"> <thead> <tr> <th></th> <th>Milestone Names</th> <th>Tentative Schedule from start of work of Package</th> </tr> </thead> <tbody> <tr> <td>M1</td> <td>Illumination readiness for BOILER LIGHT UP Unit#1</td> <td>10th Month</td> </tr> <tr> <td>M2</td> <td>Illumination readiness for BOILER LIGHT UP Unit#2</td> <td>12th Month</td> </tr> </tbody> </table> <p>Successful bidder shall plan their work in such a manner so as to meet the above construction schedule & project schedule, in consultation with BHEL/ customer. M1 & M2 are the intermediate LD milestone. Successful bidder shall submit detailed L1/L2 schedule separately for the package after getting LOI from BHEL and prior to issuance of detailed work order.</p>		Milestone Names	Tentative Schedule from start of work of Package	M1	Illumination readiness for BOILER LIGHT UP Unit#1	10 th Month	M2	Illumination readiness for BOILER LIGHT UP Unit#2	12 th Month
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M2	Illumination readiness for BOILER LIGHT UP Unit#2	12 th Month								
<p>6.6.</p>	<p>Provision of Penalty in case of slippage of Intermediate Milestones:</p> <ol style="list-style-type: none"> a. In case of slippage of Two Major Intermediate Milestones, mentioned as M1 & M2 above, delay Analysis shall be carried out on achievement of each of these two Intermediate Milestones in reference to F-14. b. 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. c. 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. d. 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. e. Amount required to be withheld on account of slippage of identified intermediate milestone(s) shall be withheld out of respective milestone payment (if any) and balance amount (if any) shall be withheld @10% of RA Bill amount from subsequent RA bills. f. Final deduction towards LD (if applicable), 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. 									

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-VI: TIME SCHEDULE

	<p>g. 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 milestones shall not be released and be converted into recovery.</p> <p>h. Contractor shall make all possible efforts to expedite the activities, in case of delay of any intermediate milestone, to maintain overall project completion schedule.</p> <p>*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.</p>
6.7.	Completion of Work and Commencement of Guarantee Period
6.7.1.	The works shall be completed to the entire satisfaction of the Engineer and in accordance with the completion schedule as specified in the Contract, and all unused stores and materials, tools, plant, equipment, temporary buildings, site office, labour hutments and other things shall be removed and the site and work cleared of rubbish and all waste materials and delivered up clean and tidy to the satisfaction of the Engineer at the Contractor's expenses.
6.7.2.	BHEL shall have power to take over from the Contractor from time to time such sections of the work as have been completed to the satisfaction of the Engineer. Such work however shall not be treated as have been completed until the remaining / pending works are executed to the satisfaction of Engineer.
6.7.3.	Commencement of performance guarantee shall be as per clause no. 2.24 (Performance Guarantee for Workmanship) of General Conditions of Contract. The commencement of guarantee period for the quality of the workmanship shall start from the date of Trial operational acceptance of facilities OR Handing Over to the customer, whichever is earlier.
6.7.4.	The contractor shall submit and a detailed area/structure wise L3 schedule within 25 days from date of LOA, in consultation with BHEL, based on the tentative schedule provided as above. The detailed L3 schedule shall be approved by BHEL and same shall be implemented. Bidder shall submit L3 schedule in MS Projects and excel to meet the agreed project schedule covering various mile stone activities and their split-up details such as mobilization, procurement of materials & erection activities. This schedule shall also clearly indicate the interface facilities / inputs applicable in each package. Bidders shall submit Resource deployment plan Area wise with detail program in line with above schedule in the form of Bar Chart/ MS project planner along with their offer.
6.8.	The under mentioned Records/ Log-books/ Registers applicable to be maintained. <ul style="list-style-type: none"> i) Hindrance Register. ii) Site Order Book. iii) Test Check of measurements. iv) Records of Test reports of Field tests. v) Records of manufacture's test certificates. vi) Records of disposal of scraps generated during and after the work completion
6.9.	CONTROL AND MONITORING OF PROGRESS OF WORK
6.9.1.	Refer forms F -14 to F-15 of volume I D (Forms & Procedure). Plan and review will be done as per the formats.
6.9.2.	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 the slippages do not accumulate and affect the overall programme.
6.9.3.	It is the responsibility of the contractor to provide all relevant information on a regular basis regarding progress of work, labour availability, equipment deployment, testing, etc.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
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6.9.4.	Contractor is required to draw mutually agreed monthly work 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.
6.9.5.	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 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 time bound manner so as to eliminate the cause of nonconformities.
6.9.6.	The contractor shall submit quarterly progress reports, manpower reports, materials reports, consumables (gases / electrodes) report, cranes availability report and other reports as per Performa considered necessary by the Engineer. The periodicity of the reports will be decided by BHEL Engineer at site.
6.9.7.	The contractor shall submit quarterly statement report regarding consumption of all consumables for cost analysis purposes.
6.9.8.	The contractor shall submit a report of any damage, shortage, discrepancy etc., every week detailing in this regard. Non-submission of report would be considered as no shortage of materials.
6.9.9.	The manpower reports shall clearly indicate the manpower deployed, category wise specifying also the activities in which they are engaged.
6.10.	<p>The monthly report as a booklet shall be submitted at the end of every month and shall contain the following details: -</p> <p>2.1 Progress photographs in colour.</p> <p>2.2 Erection progress in terms of the respective work areas against planned</p> <p>2.3 Site Organization chart of engineers & supervisors as on the last day of the month with further mobilization plan.</p> <p>2.4 Safety implementation report in the format.</p> <p>Pending material and any other inputs required from BHEL for activities planned during the subsequent month.</p>
6.11.	<p>Site Data Digitalisation: Daily Activity Log, M-Book and Subcontracting Billing Module: -</p> <ol style="list-style-type: none"> 1. Refer Vendor Portal System with links: for ref. https://pshq.bhel.in/sddvp/ 2. Login ID and Password shall be provided by respective package manager. 3. Contractor by clicking 'Daily Work Photos', shall upload area wise photos on daily basis. 4. Contractor by clicking 'Daily Activity Log', shall update site activities on daily basis. 5. Contractor by clicking 'Measurement Book', shall enter Measurement Book in Format and BOQ. 6. Contractor shall raise their RA Bills along with supporting documents (such as Quality and HR Document – Vetted by Customer Etc.) and checklist through SDD portal only. 7. Contractor shall comply the system requirement. 8. Refer Vendor Manual for further details. <p>Note: The contractor shall be required to provide all facilities including manpower for the aforementioned activities, without any cost implications to the BHEL.</p>

TECHNICAL CONDITIONS OF CONTRACT (TCC)
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6.12.	Agency shall extend all support towards inputs for Project Management to PMC team, IPMS system or any other system/tool for project monitoring and control.
6.13.	General Terms:
6.13.1.	Successful bidder shall submit daily work program based on above construction schedule. Deferment of schedule is not acceptable, unless specifically called for by BHEL. Successful bidder will adhere to schedule and resource planning to be augmented to ensure completion as per schedule. Slippage from adherence to this schedule will attract penalty/ LD as per tender provision.
6.13.2.	Periodic progress reviews on the entire activities of execution in respect of supply & works in scope of successful bidder will be held once in a month at Nagpur/ site. These meetings will be attended by reasonably higher officials of successful bidder and will be used as a forum for discussing all areas where progress needs to be speeded up. Successful bidder shall be further responsible for ensuring that suitable steps are taken to meet various targets decided upon such meetings. Review shall be done in applicable BHEL format (F-14 etc) and shall have to be signed jointly by BHEL engineer and site in-charge of vendor. This signed document shall form the basis for future delay analysis of the project.
6.13.3.	The contractor shall complete all the work in the scope of this contract within the contract period. Subject to availability of materials and other inputs, it is the responsibility of the contractor to carry out work to achieve the monthly progress and keep up the schedules.
6.13.4.	Contractor shall draw the monthly erection program along with BHEL Engineer indicating the work to be achieved and event to be completed. Once the program is drawn, he shall adhere to the same. Contractor shall plan and erect the materials as it is received at site. The monthly planned percentage shall take into consideration the material available at site before the start of the month and also any material received during the month. Contractor shall mobilize his resources required to achieve the monthly programs.
6.13.5.	Contractor shall specifically note that there is likely to be some delay in supplies of materials/ release of work fronts/ other reasons. Contractor shall have to work round the clock on such critical activities as a part of catch up program to meet the project requirement to the extent possible and shall also provide required resources as part of scope of work.
6.13.6.	In order to meet above schedule in general, and any other intermediate targets set, to meet customer/ project schedule, contractor shall arrange & augment all necessary resources from time to time as per the instructions of BHEL.
6.13.7.	In case the activities in the schedule are to be advanced, the related structural activities in the scope of the contractor are to be advanced to meet the project requirement. No extra payment whatsoever shall be paid on this account.
6.13.8.	The contractor shall submit area-wise L3 schedule within 7 days in consultation with BHEL. The detailed L3 schedule shall be approved by BHEL and same shall be implemented. Bidder shall submit L3 schedule in MS Projects to meet the agreed project schedule covering various mile stone activities and their split-up details such as mobilization, procurement of materials, fabrication & erection activities. This schedule shall also clearly indicate the interface facilities/ inputs applicable in each package.
6.14.	DEFINITION OF WORK COMPLETION
	The contractor's scope of work under these specifications will be deemed to have been completed in all respect, only when all the activities are completed satisfactorily and so certified by BHEL site in charge. The decision of BHEL in this regard shall be final and binding on the contractor.
6.15.	MATERIAL RE-CONCILIATION & SHORT CLOSURE OF CONTRACT

TECHNICAL CONDITIONS OF CONTRACT (TCC)
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	The BOQ is for the Package (Unit#1 & Unit#2). The contractor shall do unit-wise material re-conciliation periodically. In extreme case if need arises, BHEL may short close the contract unit-wise.
6.16.	PERFORMANCE GUARANTEE FOR WORKMANSHIP (Clause no 2.24 of GCC)
	Guarantee Period for entire contract shall commence from the "Work Completion Date" certified by BHEL Engineer.
6.17.	SCHEDULE COMPRESSION
	BHEL, owing to its commitment to their customer, may ask contractor to compress the total completion schedule by up to 15%. This will result in advancement of various milestones. For achieving the same, contractor shall plan his activities and mobilize additional resources accordingly to the satisfaction of BHEL engineer within the quoted rates.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-VII: TERMS OF PAYMENT

7. TERMS OF PAYMENT		
Progressive Payment against monthly running bills will be made up to 90% of the value of the completed erection on Pro rata basis as per Clause no 7.1.1 to 7.1.9 of the following table.		
SI No.	Activity / Work Description	% of Unit Rate
7.1.	PRO RATA PAYMENTS (90%)	
7.1.1.	Light Poles, fittings & Accessories	
A)	Erection of Light Poles, fittings & Accessories	75%
B)	Final painting	15%
	Total=	90%
7.1.2.	Masts, fittings & Accessories	
A)	Erection of Masts, fittings & Accessories	90%
	Total=	90%
7.1.3.	GI/Flexible Conduits, fittings & wires	
A)	Fixing of GI/Flexible conduits with fittings	65%
B)	Pulling & termination of wires and Earth wires	25%
	Total=	90%
7.1.4.	Lighting Luminaires, Fans, Emergency Lighting Units, Exit Signs	
A)	Fixing of Lighting Luminaires, Fans, Emergency Lighting Units, Exit Signs	80%
B)	Charging of Lighting Luminaires, Fans, Emergency Lighting Units, Exit Signs	10%
	Total=	90%
7.1.5.	Lighting Distribution Boards (LDB)/ Lighting Transformers/ Lighting Panels (LP)/ Switch Boxes (SB)/ Junction Boxes (JB)/ 24 V Lighting Modules/ Receptacles & Miscellaneous equipment	
A)	Erection of LDBs / LPs / SBs / JBs / 24 V Lighting Modules/Receptacles & Miscellaneous equipment	80%
B)	Charging of LDBs / LPs / SBs / JBs / 24 V Lighting Modules/Receptacles & Miscellaneous equipment	10%
	Total=	90%
7.1.6.	LT Power Cable/Control Cable	
A)	Laying of cables / Wires	65%
B)	Glanding and Cable termination	15%
C)	Testing and charging	5%
D)	Dressing/ and clamping	5%
	Total =	90%

**TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-VII: TERMS OF PAYMENT**

7.1.7.	Earthing Flats/Earth Rods	
A)	Fabrication, erection, alignment, welding /bolting of earthing / lightning protection strips; earth pits Completion	65%
B)	Testing / commissioning	25%
	Total =	90%
7.1.8.	Miscellaneous Items	
A)	Installation of Misc items (24V Supply Module, Sensors, Dimmers, Underground Cable, Ladder etc.)	90%
	Total =	90%
7.1.9.	Misc. Structural steel including JB Supports, Panel Supports, J-Poles, Hume Pipes etc.	
A)	Fabrication / Pre assembly	50%
B)	Erection, Alignment, welding/bolting and if applicable chipping/grouting/painting	40%
	Total =	90%
7.2.	STAGE / MILESTONE PAYMENTS (10%)	
A)	Boiler Light Up	2%
B)	Rolling and Synchronisation (STG)	1%
C)	Full Load	1%
D)	COD	1%
E)	Trial Operation	1%
F)	Punch List points/ pending points liquidation	1%
G)	Area cleaning, temporary structures cutting/ removal and return of scrap	1%
H)	Submission of 'As Built Drawings'	1%
I)	Material Reconciliation	1%
	Total for Stage/ Milestone Payments (10%)	10%
7.3.	Progressive Payment/ Final Payment: The payments for works under the scope of this contract for both the packages shall be as per clause no 2.6; 2.22; 2.23 of General Conditions of Contract and Volume-IB, Chapter-X of SCC.	
7.3.1.	Documents required for RA Bill:	
	GST Complied Invoice of the work done as per approved BBU.	
	WAM -6 for RA Bill.	
	Jointly signed Measurement sheet/ Protocols	
	Power of Attorney before submission of Bill.	
	Validity of Bank Guarantees as applicable under the contract.	
	Monthly HSE Compliance Certificate certified by BHEL- Safety	
	Material reconciliation statement along with RA Bill (Monthly basis).	
	HR/IR compliance documents:	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-VII: TERMS OF PAYMENT

	<p>i. Wages payment sheet as per applicable minimum wages.</p> <p>ii. Proof of PF contribution submission.</p> <p>iii. Proof of ESI/ WC contribution submission</p> <p>iv. Proof of Bonus payment as per Bonus Act if applicable.</p> <p>v. Proof of EL payment if applicable.</p> <p>vi. Any other statutory document if applicable.</p>
7.3.2.	<p>Documents required for Final Bill:</p> <p>The final bill is drawn as soon as the entire work is completed. From the final amount due, all amounts already claimed up to the previous running account bill will be deducted. It should be ensured that in the final bill the following additional particulars have been provided:</p> <ul style="list-style-type: none"> • Final Bill in WAM-7 Format. • 'No claim' certificate from the contractor. • Clearance certificates where ever applicable viz. Clearance Certificates from Customer, various Statutory Authorities like Labour department, PF Authorities, Commercial Tax Department etc. • Final Material re-conciliation statement duly approved by BHEL. • Indemnity Bond as per prescribed format. • Deviation statement showing the difference between the actuals and as per the contract. • Final Delay Analysis.
7.3.3.	<p>The payment for running bills will be released after submission of running bill complete in all respects with all documents. It is the responsibility of the contractor to make his own arrangements for making timely payments towards labour wages, statutory payments, outstanding dues etc. and other dues in the meanwhile. No interest shall be payable for the delayed payment (if any).</p> <p>Few points of consideration are as below:</p> <p>a) The measurements sheets of work done in a month shall be submitted in triplicate duly agreed/signed by BHEL Engineer. The contractor shall extend all necessary assistance for verification of measurements of works without any extra cost.</p> <p>b) Material reconciliation shall be complied on monthly basis.</p> <p>c) The RA bill payments are interim payments and bills shall be submitted in prescribed formats.</p> <p>d) Recoveries on account of electricity, water, statutory deductions etc. shall be made as per terms of contract.</p> <p>e) BHEL will release payment through Electronic Fund Transfer (EFT)/RTGS.</p>

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-VII: TERMS OF PAYMENT

	<p>f) Final bill shall be submitted after completion of works and upon material reconciliation along with all prescribed formats.</p> <p>Quoted Rates are inclusive of all labour, contractor's equipment, temporary works, consumables and all matters and things of whatsoever nature, charges for Safety Aspects/Compliance to Safety Rules including operations and maintenance services (if applicable) etc., and other services, as identified in the tender Documents, as necessary for the proper execution of the subject work.</p> <p>NO CLAIM WHAT SO EVER MAY BE, WILL BE ENTERTAINED UNDER THIS CONTRACT, AFTER DULY SIGNING THE FINAL BILL ALONG WITH MEASUREMENT BOOKS AND ACCEPTED BY BHEL.</p>
7.4.	SECURED RECOVERABLE ADVANCES:
7.4.1.	Interest Free Secured Mobilization Advance as per GCC Clause No. 2.13.1 will be payable under exceptional circumstances on certification of BHEL Construction Manager at Site. Interest Free Mobilization Advance shall be disbursed in specifically mentioned stages of major respective resource mobilization as specified hereunder:
7.4.2.	<p>A) On Installation and Erection of Site Infrastructure by contractor i.e. site office, site stores, computer with printer.: 1% of Contract value.</p> <p>B) On Mobilization of required manpower at site to start the work: 1% of Contract value</p> <p>C) On Mobilization of Man-Lifter and Ladder (Fixed or Movable) 02 nos. each of required capacity: 1% of Contract value.</p> <p>D) On Mobilization of 01 no. of Hydra / Farana of required capacity: 1% of Contract value.</p> <p>E) On Mobilization of required testing T&Ps: (AC tongue Tester- 02 Nos, Digital Multimeter- 2 Nos, Insulation Tester- 1 No.) at site to start the work: 1% of Contract value.</p> <p>Note:</p> <ol style="list-style-type: none"> 1. BHEL Site-PD/CM shall be the deciding authority for assessing the admissibility of advance payment to contractor. 2. In case contractor do not fulfil the agreed conditions of payment of earlier mobilization advance, BHEL Project Director / Construction Manager will have the authority to not allow the subsequent mobilization advance to contractor.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-VIII: TAXES & DUTIES

8.	TAXES & DUTIES
8.1.	<p>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.</p> <p>However, provisions regarding GST on output supply (goods/service) and TDS/TCS as per Income Tax Act shall be as per following clauses.</p>
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/Debit Note/Credit Note 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 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 to enable BHEL to meet its GST related compliances. 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.	<p>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: -</p> <ol style="list-style-type: none"> I. Supply of goods and/or services have been received by BHEL. II. Original Tax Invoice has been submitted to BHEL.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-VIII: TAXES & DUTIES

	<p>III. Contractor/ Vendor has submitted all the documents required for processing of bill as per contract/ purchase order/ work order.</p> <p>IV. 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.</p> <p>V. 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.</p> <p>VI. 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.</p> <p>Contractor has to submit an undertaking confirming the payment of all due GST in respect of invoices pertaining to BHEL.</p>
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 permit, 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/altere/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.
8.3.	<p>All taxes and duty other than GST & Cess:</p> <p>The contractor shall pay all (except the specific exclusion viz GST & Cess) taxes, fees, license charges, deposits, duties, tools, royalty, commissions, Stamp Duties, or other charges / levies, which may be levied on the input goods & services consumed and output goods & services delivered in course of his operations in executing the contract and the same shall not be reimbursed by BHEL. In case BHEL is forced to pay any of such taxes, BHEL shall have the right to recover the same from his bills or otherwise as deemed fit.</p>

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-VIII: TAXES & DUTIES

8.4.	<p>Variation in Taxes & Duties:</p> <p>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.</p> <p>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 contractor only and within the contractual delivery period only.</p>
8.5.	<p>New Taxes / Levies:</p> <p>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.</p>
8.6.	<p>Direct Tax:</p> <p>BHEL shall not be liable towards Income Tax of whatever nature including variations thereof arising out of this contract as well as tax liability of the bidder and their personnel. Deduction of tax at source at the prevailing rates shall be effected by BHEL before release of payment as a statutory obligation, unless exemption certificate is produced by the bidder. TDS certificate will be issued by BHEL as per the provisions of Income Tax Act, 1961.</p>
8.7.	BOCW Act & Cess Act
8.7.1.	BOCW Cess is not to be borne by contractor. Refer Annexure-I for BOCW Act & Cess Act.
Annexure-I:	
Bidder may please note that the sub-contractor/bidder of BHEL engaging building or construction worker in connection with building or other construction work, are required to follow the procedures enumerated below:	
a)	It shall be the sole responsibility of the contractor as employer to ensure compliance of all the statutory obligations under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.
b)	It shall be sole responsibility of the contractor engaging Building Workers in connection with the building or other construction works in the capacity of employer to apply and obtain registration certificate specifying the scope of work under the relevant provisions of the Building and Other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 from the appropriate Authorities.
c)	It shall be responsibility of the contractor to furnish a copy of such Registration Certificate within a period of one month from the date of commencement of Work.

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d)	It is responsibility of the contractor to register under the Building and other Construction Workers' Welfare Cess Act, 1996 and deposit the required Cess for the purposes of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 at such rate as the Central Government may, by notification in the Official Gazette, from time to time specify. However, before registering and deposit of Cess under the Building and other Construction Workers' Welfare Cess Act, 1996, the contractor will seek written prior approval from the Construction Manager.
e)	It shall be sole responsibility of the contractor as employer to get registered every Building Worker, who is between the age of 18 to 60 years of age and who has been engaged in any building or other construction work for not less than ninety days during the preceding twelve months as Beneficiary under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996.
f)	It shall be sole responsibility of the contractor as employer to maintain all the registers, records, notices and submit returns under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.
g)	It shall be sole responsibility of the contractor as employer to provide notice of poisoning or occupation notifiable diseases, to report of accident and dangerous occurrences to the concerned authorities under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the rules made thereunder and to make payment of all statutory payments & compensation under the Employees' Compensation Act, 1923.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-X: SPECIFIC INCLUSION & EXCLUSIONS

9.	GENERAL CONDITIONS
9.1.	GENERAL GUIDELINES FOR FIELD ACTIVITIES
9.1.1.	Contractor shall execute the works in a professional manner so as to achieve the target schedule without any sacrifice on quality and maintaining highest standards of safety and cleanliness.
9.1.2.	Contractor shall co-operate with BHEL/ owner and other Contractors working in site and arrange to perform their work in a manner so as to minimise interference with other Contractor's works. BHEL shall be notified promptly of any defect in other Contractors' works that could affect Contractor's work. If rescheduling of Contractor's work is requested by BHEL/ customer in the interest of overall site activities, the same shall be compiled with by Contractor. In all cases of controversy, the decision of BHEL shall be final & binding on Contractor without any commercial implication.
9.1.3.	BHEL shall hold weekly meeting of all Contractors working at site at a time and a place to be designated by the engineer. Contractor shall attend such meetings and take notes of discussions during the meeting and the decisions of BHEL and shall strictly adhere to those decisions in performing this work. In addition to weekly meeting, BHEL may call for other meetings either with individual Contractors or with selected number of Contractors and in such a case Contractor, if called will also attend such meetings.
9.1.4.	Time is the essence of the contract and Contractor shall be responsible for performance of their work in accordance with the specified completion period and construction schedule. If at any time Contractor fall behind schedule, they shall take necessary action to recover such delays by increasing their workforce and T&Ps to comply with the time/ schedule and shall communicate such action in writing to BHEL, satisfying that their action will compensate for the delay. Contractor shall not be allowed any extra compensation for such action.
9.1.5.	BHEL shall however not be responsible for provision of additional labour and or materials or supply of any other services to Contractor except for the co-ordination work between various agencies' as set out earlier.
9.1.6.	The works under execution shall be open to inspection & supervision by BHEL/ customer at all times. Contractor shall give reasonable notice to BHEL before covering up or otherwise placing beyond the reach of inspection any work, in order that same may be verified, if so desired by BHEL/ customer.
9.1.7.	Every effort shall be made to maintain the highest quality of workmanship by stringent supervision and inspection at every stage of execution. Manufacturer's instruction manual and guidelines on sequence of erection and precautions shall be strictly followed. Should any error or ambiguity be discovered in such documents the same shall be brought to the notice of BHEL. Manufacturer's interpretation in such cases shall be binding on Contractor.
9.1.8.	Contractor shall comply with all the rules & regulations of local authorities, all statutory laws including Minimum Wages, Workmen Compensation etc. All registration and statutory inspection fees, if any, in respect of the work executed by Contractor shall be to their account.
9.1.9.	All the works such as cleaning, checking, levelling, aligning, assembling, temporary erection for alignment, opening, dismantling of certain equipment for checking & cleaning, surface preparation, edge preparation, as per general engineering practice at site, cutting, grinding, straightening, bolting/ welding, etc as may be applicable in such erection and necessary to complete the work satisfactorily, are to be treated as incidental and the same shall be carried out by Contractor as part of the work.

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9.1.10.	It is the responsibility of Contractor to do the alignment etc if necessary, repeatedly to satisfy engineer, with all the necessary tools & tackles, manpower etc. The alignment will be complete only when jointly certified so, by Contractor's engineer and BHEL. Also Contractor should ensure that the alignment is not disturbed afterwards.
9.1.11.	Equipment and material, in case wrongly installed, shall be removed and reinstalled to comply with the design requirement at Contractor expense, to the satisfaction of BHEL/ customer.
9.1.12.	After identification of erection materials by BHEL at BHEL's store/ storage yard, it shall be the responsibility of Contractor to take delivery of materials from BHEL's store/ storage yard by Contractor's own manpower and re-stack the leftover materials as per erection sequence at BHEL store at their own cost. The entire activities are to be carried out under supervision of BHEL.
9.1.13.	In case of Contractor's failure to meet any of the aforesaid requirements, BHEL will get the same done and cost towards this, along with BHEL's applicable overhead will be recovered from Contractor's RA bill.
9.2.	SITE VISIT
9.2.1.	Bidder should visit site and acquire full knowledge & information about site conditions. The bidder must visit site, to acquaint themselves with the conditions prevailing at site and in & around the plant premises, together with all statutory, obligatory, mandatory requirements of various authorities before submission of bid in line with condition given in NIT.
9.3.	PROTECTION
9.3.1.	Coated surfaces shall be protected against impact, abrasion, discoloration and other damages. Surfaces which are damaged shall be repainted.
9.3.2.	Electrical / Illuminations equipment, controls and insulations shall be protected against moisture and water damages. All external gasket surfaces and flange faces, couplings, rotating equipment shafts, bearings and like items shall be thoroughly cleaned and coated with rust preventive compound and protected with suitable wood, metal or other substantial type covering to ensure their full protection. All exposed threaded parts shall be greased & protected with metallic or other substantial type protectors
9.3.3.	All piping, tubing and conduit connections on equipment and equipment openings shall be closed with rough usage covers or plugs. Female threaded openings shall be closed with rough usage covers or plugs or forged steel plugs. The closures shall be taped to seal the interior of the equipment. Open ends of piping, tubing and conduit shall be sealed and taped. Lighting Fixtures are to be handled with care because of fragile nature.
9.3.4.	All other consumables including wire brush, emery papers, painting brush, CRC, petrol/diesel for cleaning etc to be supplied by Contractor within accepted rate.
9.4.	ELECTRICAL INSPECTORATE'S APPROVAL
9.4.1.	Contractor is responsible for getting Electrical/ Illumination Inspector/statutory authority's approval for all electrical installation covered in their scope. This also includes the Lighting equipment that are erected by mechanical contractor for which commissioning assistance is to be provided by the Electrical contractor.
9.4.2.	All electrical/ illumination installation covered in contractor's scope which also includes equipment covered in commissioning assistance are to be inspected/approved by the electrical inspector/statutory authority. For getting electrical inspector approval, contractor shall arrange the following: <ul style="list-style-type: none"> a. Work Completion certificate for all the equipment covered in the contract b. Details of Equipment (specification).

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CHAPTER-X: SPECIFIC INCLUSION & EXCLUSIONS

	<p>c. Test results conducted at site for all the equipment including electrical equipment erected by Mechanical contractor.</p> <p>Any other documents as required by statutory authority. Any expenditure related to documentation shall be borne by contractor.</p>
9.4.3.	Contractor shall carry out the modifications/rectifications, if any, as suggested by the authority at their cost. However, it is not applicable for equipment erected by Mechanical contractor.
9.4.4.	Contractor shall also have valid electrical / illumination installation license on their company as well as for individuals acceptable to respective state electrical inspectorate requirement.
9.4.5.	The contractor shall arrange necessary statutory inspections and obtain certificate for installation work at their cost. Any Expenditure related to documentation shall be borne by the contractor. Contractor shall pay all fees relates to electrical inspectorate approval. However, BHEL shall reimburse all statutory fees on production of receipts (FEES FOR VISITS, INSPECTION FEES, REGISTRATION FEES and any other statutory fees).
9.4.6.	Any modification work required by inspector shall be attended by the contractor. Modifications which had raised due to execution deficiencies are at the cost of contractor whereas modifications which are due design change shall be treated as extra work.
9.5.	HEALTH, SAFETY & ENVIRONMENT
9.5.1.	HSE shall be guided by a separate volume (Document No. HSEP: 14: Revision: REV02: Date: 22.11.2022, HSE PLAN FOR TALCHER attached as per Annexure-5 of Chapter XI) over and above the below mentioned terms and conditions.
9.5.2.	Round the clock experienced paramedical personnel with first aid facility & ambulance including driver, fuel, etc., at site, shall be arranged by BHEL through other sub-contractors at site. However, expenditure towards above facilities shall be shared by BHEL's sub-contractors working at site (actual cost distribution amongst all Contractors shall be on pro rata basis proportionate to their contract prices). In case of any dispute, Construction Manager decisions in this regard shall be binding. This will be read in conjunction with SCC Chapter-IX.
9.6.	CLEANLINESS
9.6.1.	Contractor shall be responsible for keeping the entire area allotted to him clean & free from rubbish, debris, etc. during the period of contract. Contractor shall employ enough number of special personnel to thoroughly clean his work-area at least once in a day. All such rubbish & scrap material shall be stacked or disposed in a place to be identified by BHEL/ customer. Materials and stores shall be so arranged to permit easy cleaning of area. In areas where equipment might drip oil and cause damage to floor surface, a suitable protective cover of a flame resistant, oil proof sheet shall be provided to protect floor from such damage.
9.6.2.	Similarly, labor colony, the offices and the residential areas of Contractor's employees and workmen shall be kept clean and neat to the entire satisfaction of BHEL/ customer. Proper sanitary arrangements shall be provided by Contractor, in the work-areas, office and residential areas of Contractor.
9.7.	RESPONSIBILITIES WITH REGARD TO EMPLOYMENT OF LABOUR, ETC
9.7.1.	Contractor shall also comply with the requirements of local authorities (Govt. of Odisha) with regard to employment of labours/ workers at project site. They shall comply with any other statutory requirement/ local authority requirement such as police verification of antecedents of the workmen, staff, etc. with regard to employment of labours/workers at project site. In case of workmen / supervisors deployed to project

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	from INDIA / any other country, necessary statutory guidelines issued by Indian Govt./ concerned Govt. authorities shall be strictly complied with in addition to local laws. Skilled labour with experience in construction of large utility thermal power projects shall be deployed (preferably 100% of such skilled labours shall be sourced from India). This shall be read in conjunction with SCC Chapter -V.
9.7.2.	The Contractor shall deploy all the skilled/semiskilled/ unskilled labour including highly skilled workmen etc. These workmen should have previous experience on similar job. They shall hold valid certificates wherever necessary. BHEL reserves the right to insist on removal of any employee of the Contractor at any time if he is found to be unsuitable and the Contractor shall forthwith remove him. Contractor should furnish a tentative deployment plan of his manpower as required in GCC. Also the actual deployment will be so as to satisfy the project schedule of erection and commissioning.
	GATE PASS FORMALITIES
9.7.3.	The contractor shall make his own arrangements of gate pass for his vehicles, T&Ps etc. as prescribed and instructed by the NTPC /CISF at his own cost, each gate pass has to be endorsed by the NTPC / CISF before the pass can be used. In case of termination of the service of any of T&Ps or any vehicle during the contractual period, the contractor shall have to surrender the gate pass to the NTPC /CISF at the end of the project all the gate passes endorsed by the NTPC / CISF for use of the contractor's vehicle, T&Ps shall have to be returned.
9.7.4.	Vehicles equipped with flame arrester will only be allowed inside the premises. Valid RC book, insurance, fitness certificate, road tax certificate, PUC, driving license, etc. is required for gate pass formalities of all vehicles. Goods carrying certificate is also required for goods category vehicles. Gate pass formalities may take some time, so contractor has to plan well in advance accordingly.
9.7.5.	The contractor shall make his own arrangements of gate pass for his employees / workers as prescribed and instructed by the NTPC /CISF at his own cost, each gate pass has to be endorsed by the NTPC / CISF before the pass can be used. In case of termination of the service of any of his employee during the contractual period, the contractor shall have to surrender the gate pass issued to the employees to the PVUNL / CISF. At the end of the project all the gate passes endorsed by the PVUNL / CISF for use of the contractor's employees shall have to be returned.
9.7.6.	Police verification and medical fitness certificate of all workers / employees of agencies is must for gate pass formalities. Contractor has to arrange the same at his own cost. Gate pass formalities may take time, so contractor has to plan well in advance accordingly.
9.7.7.	PPEs and Dangri is must for all workers and staffs working inside NTPC premises. Contractor has to arrange all these for their worker and staffs at their own cost.
9.7.8.	Deployed electricians should have valid qualification & valid electrical license for gate pass.
9.8.	LABOR CODES IMPLEMENTATION w. e. f. 21.11.2025:
9.8.1.	Labor codes implementation w. e. f. 21.11.2025: Bidder to ensure workers' right to minimum wages, the Central Government has amalgamated. A. 4 laws in the Wage Code, B. 9 laws in the Social Security Code, C. 13 laws in the The Occupational Safety, Health and Working Conditions Code, 2020 D. 3 laws in the Industrial Relations Code

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	<p>The Central Government hereby appoints the 21st day of November, 2025 as the date on which the following provisions of the said Codes, shall come into force.</p> <ol style="list-style-type: none"> 1. Social Security Code 2020 2. Occupational Safety, Health and Working Conditions Code, 2020 3. Code on Wages, 2019 4. Industrial Relations Code, 2020
9.9.	DOCUMENTATION
9.9.1.	<p>The following information shall be furnished by the bidder within two weeks of award of contract for purchaser's approval.</p> <ol style="list-style-type: none"> a. Bar chart covering planned activities at site b. Detailed organization chart <p>Details of T&P available with contractors with documents proofs.</p>
9.9.2.	<p>The following information shall be furnished by the bidder after testing and inspection:</p> <p>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.</p> <p>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.</p>
9.10.	PROJECT MANAGEMENT/ CONSTRUCTION MANAGEMENT
9.10.1.	To meet the need of construction management at site, Contractor shall comply Clause No. 6.7 to 6.17 in Chapter-V within their accepted rates.
9.11.	INFRASTRUCTURE
9.11.1.	<p>Contractor shall install 2 nos all in one PCs (multimedia PC work station Core-i3, 2.1 GHz or above, 500 GB HDD, 4 GB RAM, 100/ 1000 MBPS LAN card) of HP/ Compaq/ Lenevo or equivalent make with window 10 or 11 O/S and required software like MS Office 2010 Professional, AutoCAD 2009 or higher, PageMaker (7.0, etc), ADOBE PDF CREATOR and ONE NO. SCANNER (HP Scan Jet Pro 2500 or equivalent), one no laser jet printer compatible for A4 size printing (ink/ cartridge for which to be supplied as & when required) with power backup at places, as per instruction of BHEL for exclusive use of BHEL. These computers/ printers/scanners shall remain Contractor's property and they will be allowed to take out the same after completion of contract period including extension. Contractor shall provide data/ information, etc in prescribed formats for periodical updating of progress reports, material management reports, updating of network pertaining to Contractor's scope of work, etc</p> <p>In case Contractor fails to provide 1 No. computer and 1 No. printer or personnel as per requirement, for a continuous period of fifteen days or more, suitable penalty (as decided by Erection In Charge) may be levied from contractor's RA Bill.</p>
9.11.2.	Contractor's site office must have facilities of communications like, E-mail, and telephone with STD facility within a month from LOI.
9.12.	SITE ORGANIZATION
9.12.1.	Contractor shall maintain a site organization of adequate strength in respect of manpower, construction machinery and other implements at all time for smooth execution of the contract headed by Site In-charge for site operations with sufficient level of authority to take site decisions.

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	Contractor will submit organization chart (showing the name of Site In-charge) with individual bio-data indicating various levels of experts to be posted for supervision in the fields of supervision and execution, quality, material management, planning, safety, etc. The organization shall be reinforced from time to time, as required to make up slippage (if any) from the schedule without any commercial implication to BHEL. The organization chart is to be submitted within 10 days from the date of LOI.	
9.12.2.	Following (minimum) engineering manpower with power plant construction background to be deployed at site by Contractor for proper execution. This requirement is in addition to the normal manpower required for installation, erection, and commissioning activities under the scope of the contract.	
9.12.3.	Following (minimum) engineering manpower with power plant construction background to be deployed at site by Contractor for proper execution. This requirement is in addition to the normal manpower required for installation, erection, and commissioning activities under the scope of the contract.	
9.12.4.	Qualified safety officers with assistants (exclusive for safety supervision for project jobs).	As per relevant HSE clause/manual.
9.12.5.	For planning function of entire scope of work.	1 no with sufficient experience.
9.12.6.	For quality inspection function of entire scope.	1 no engineer. 1 no supervisor.
9.12.7.	Material handling area for follow-up with BHEL for timely putting up material requirement, identification of material for receipt from BHEL store/ storage yard, etc for various systems, ie transformer, cable tray, cable, LDB, panel, etc.	1 no engineer. 1 no supervisor.
9.12.8.	For Conduit & Wires, Fixtures	1 no area engineer. 2 no supervisor.
9.12.9.	For Lighting Transformer, LDB, Lighting Panel & other Misc. Items	1 no area engineer. 1 no supervisor.
9.12.10.	Deputation of above man-power shall be jointly decided at site in line with construction schedule and front availability.	
9.12.11.	Engineer/ supervisor for other functions like store & purchase, material management, planning, finance, administration, etc are to be provided as per site requirement and not considered above.	
9.12.12.	In the event of non-deputation of engineer/ supervisor by the bidder as per above agreed schedule, BHEL shall reserve the right to deduct from RA bills as per prevailing rates applicable along with overheads for Skilled, Semi-skilled & Un-skilled for arranging alternative arrangements.	
9.12.13.	BHEL reserves the right to reject or approve the list of personnel proposed by Contractor. The persons whose bio-data have been approved by BHEL will have to be posted at site and deviation in this regard will not be permitted unless specific & reasonable justification is made.	
9.12.14.	As mentioned above, a well experienced qualified engineer to be designated, as 'Project Co-ordinator, shall be deployed by Contractor. Such engineer shall have adequate exposure on the job and shall remain fully involved in all planning activities, guidance etc to Contractor's own team during the complete execution period of contract.	
9.12.15.	Contractor should also submit to BHEL for approval a list of T&Ps along with their fitness certificates. The tools & tackles shall not be removed from site without written permission of BHEL.	

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9.12.16.	Contractor should also submit network programs for the erection of various items. These networks shall show BHEL/ customer hold points (CHP), which have to be cleared by BHEL/ customer, or their authorized representatives before further erection can take place. These programs for the erection would clearly identify responsibilities of Contractor and BHEL/ customer. It is the responsibility of Contractor to get the networks approved by BHEL within four weeks of the date of finalization of award of work/ placement of LOI.
9.12.17.	There shall be separate Area Engineers having 3 years of Power Plant / Industrial Experience for Conduit/Wiring and LDB /X-Mer /LP work. They shall report to Project Manager. They shall work with required manpower, T&P etc., including storage facilities.
9.12.18.	Each Area Engineer shall have required no. of erection supervisor/technician who shall be package wise in-charge like Lighting Panel & Fixtures.
9.12.19.	Each Area Engineer shall be provided with minimum 2 (Two) supervisors and adequate number of Technicians / electricians and other erection staff and T&P etc. The testing Engineers / supervisors / electricians shall be identified separately for each Unit and the minimum requirement shall be as indicated in previous Clauses. Besides, there shall be separate engineers for Planning, Safety and Quality.
9.12.20.	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.
9.12.21.	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 their authorized representative prior to or immediately on commencement of operations at site.
9.12.22.	The Site In charge shall be present at site during all normal working hours and their 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.
9.12.23.	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.
9.12.24.	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 their duties the contractor shall remove them from site as directed by Site Engineer.
9.12.25.	The contractor shall ensure that all their 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.
9.12.26.	The contractor shall ensure that replacement for such persons removed from site is provided immediately and the work is not allowed to suffer delay on that account.
9.13.	REPORTING DAMAGES AND CARRYING OUT REPAIRS
9.13.1.	Checking all components/ equipment at siding/ site and reporting to transport and/ or insurance authorities of any damages/ losses will be in the scope of Contractor. Necessary

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-X: SPECIFIC INCLUSION & EXCLUSIONS

	assistance for verification/ survey and lodging claims with underwriters and follow up to logical conclusion will also be part of this tender.
9.13.2.	Contractor shall render all help to BHEL in inspection including handling, opening packages, re-packing, re-stacking, assessing and preparing estimates for repairs of components damaged during transit, storage, erection, commissioning and preparing estimates for fabrication of materials lost/ damaged during transit, storage and erection. Contractor shall help BHEL to furnish all the data required by railways, insurance company or their surveyors.
9.13.3.	Contractor shall report to BHEL in writing any lost/ damages to equipment/ components during drawl of the materials from stores, in transit to site and unloading at a place of work and during erection & commissioning. The above report shall be as prescribed by BHEL site. Any consequential loss arising out of noncompliance of this stipulation will be borne by Contractor.
9.13.4.	Contractor shall carry out fabrication of any material lost/ damages as per Instructions from BHEL.
9.13.5.	BHEL, however, reserve the right to award or not to award to Contractor any of the rectification/ rework/ repairs of damages and also fabrication of components.
9.13.6.	All the repairs/ rectification/ rework of damages and fabrication of materials lost, if any, shall be carried out by a separately identifiable gang for certification of man-hours. Daily log sheets should be maintained for each work separately and be signed by Contractor's representative & BHEL. Signing of log sheets does not necessarily mean acceptance of these as extra works for payment purpose.
9.13.7.	All rectification, repairs, reworks and fabrication of components lost, which are minor and incidental to erection work (consuming up to 50 man-hours on each occasion) shall be treated as part of work without any extra cost.
9.13.8.	In case the repairs/ rectification/ rework and fabrication of materials lost, the work has been done by more than one agency including Contractor, payment towards extra charges will be on pro-rata basis and decision of BHEL in this regard is final & binding on the Contractor.
9.14.	ISSUE & HANDLING, USEAGE, RECONCILIATION, RECOVERY, ETC OF BHEL'S FREE ISSUED EQUIPMENT/ MATERIALS
9.14.1.	ISSUE & HANDLING
i)	BHEL will issue various equipment/ materials/ items free of cost to Contractor as per the scope of this tender
ii)	Contractor shall maintain proper store account for all the BHEL issued materials and shall give requisite copies of monthly computerized reconciliation statement of such account to the BHEL.
iii)	Contractor shall solely be responsible for the safety & quality of material after it is handed over and issued to Contractor by BHEL.
iv)	BHEL issued materials shall not under any circumstances taken out of the project site unless otherwise permitted by BHEL.
v)	Necessary lifting tackles, cranes, tools & plants including tractors, Crane, Farana, trailers, trucks, pulley blocks, jacks, winches, wire ropes etc, of suitable capacities and other equipments incidental to carry out this work shall have to be arranged by Contractor within the accepted rates/ price. BHEL reserve the right to inspect lifting tackles and equipment before allowing their use. Such approval however shall not relieve Contractor to ensure safe handling of equipment taking precaution to avoid any accident and damage to other equipment and personnel.

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vi)	Contractor shall satisfy himself of the quality and quantity of the materials at the time of taking delivery from BHEL/ customer store/ storage yard. No claims whatsoever will be entertained by BHEL because of quality or quantity after the materials are taken by Contractor from BHEL/ customer.
vii)	Contractor shall submit to BHEL, a statement indicating estimated quantity of equipment/ materials required atleast 1 month in advance.
viii)	Contractor shall ensure that no lamination materials are taken over by them from BHEL. Wastage, if any due to above, shall not be compensated by BHEL.
ix)	Contractor has to note that all fasteners like MS/ HT/ HSFG bolts/ nuts, lock nuts, washers, etc shall be supplied by Contractor as per applicable item of price schedule of tender.
x)	Contractor to note that steel required for their enabling job like store/ site office, etc shall be arranged at their own cost.
9.14.2.	RETURN
i)	All surplus equipment/ materials issued by BHEL shall be returned by Contractor to BHEL/ customer store/ storage yard.
ii)	Surplus, unused and un-tampered materials shall be sorted and returned separately at a place directed by BHEL within project area; Return of such materials will not be entitled to any handling and incidental charges.
iii)	All wastage/ scrap (including wastage, unusable scrap) shall be returned to stores/ designated area and a receipt obtained from BHEL for material accounting purposes. Return of such material will not be entitled to any additional cost due handling and transportation and incidental charge.
iv)	Scrap for structural steel shall be returned separately.
9.14.3.	USE AND WASTAGE
i)	Unless specified otherwise in the tender, following guidelines shall be applicable.
ii)	Theoretical consumption of various equipment/ materials shall be based on tender provision/ approved drawing/ guidelines/ mutual agreement with BHEL. No extra shall be payable for any deviation for two different procedures adopted for issue and calculation of the theoretical consumption.
iii)	Allowable wastage of the theoretical consumption shall be considered based on tender provision/ approved drawing/ guidelines/ mutual agreement with BHEL. Invisible wastage (loss of materials due to gas cutting, straightening of edges, etc) shall be limited to above specified guidelines and shall be considered for reconciliation purpose. But this invisible wastage shall be considered to be included in allowable wastage.
iv)	All wastage shall be returned to BHEL.
9.14.4.	RECONCILIATION
i)	Contractor shall submit a reconciliation statement of equipment/ materials issued to him, once in two months. The same may be submitted alongwith RA bill.
ii)	Contractor shall properly account for the material issued to him as specified herein to the satisfaction of BHEL certifying that the balance materials are available with Contractor's custody at site.
iii)	If it is noticed by BHEL that the wastage is high and calls recovery at the penal rate, then BHEL will proceed for recovery for the excess wastage as per penal recovery rates as specified from RA bill.
9.14.5.	RECOVERY
i)	If wastage exceeds the specified limit, recovery of excess wastage shall be made from monthly RA bill at the penal rate stipulated tender provision/ approved drawing/ guidelines/ mutual agreement with BHEL.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-X: SPECIFIC INCLUSION & EXCLUSIONS

10.	SPECIFIC INCLUSION & EXCLUSIONS
10.1.	INCLUSIONS
10.1.1.	All Consumables/ items to be arranged by Bidder at his/ her own cost, broad items are mentioned in Chapter-XI (As per Annexure-1)
10.1.2.	Lugs up to 4 sq. mm size.
10.1.3.	Paint, primer and consumables.
10.1.4.	LT cable Straight through jointing kits and termination kits.
10.1.5.	Cable ferruling printing machine along with ferrule rolls.
10.1.6.	Identification tags PVC/ Metals with tying/ fixing material, sleeve and clamps with hardware. PVC ties, SS316 ties, Ferrule, Buttons and tap for cables at both end & field instruments.
10.1.7.	Cable Markers.
10.2.	EXCLUSIONS
10.2.1.	Metallic Cable glands.
10.2.2.	Steel for fabrication.
10.2.3.	Lugs beyond 4 sq. mm size.
10.2.4.	Trefoil Clamps
Note: The consumable should not be construed as exhaustive. They are meant for general guideline. Contractor has to supply the consumable till the Successful completion of the project. Contractor should carry out all such jobs as per the instructions of BHEL Engineer.	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-XI: DRAWINGS / DOCUMENTS

11. Drawings Details (Enclosed with the NIT as Annexure):		
S No	Annexure No	Drawing Description
11.1.	Annexure-1	TENTATIVE LIST OF CONSUMABLES
11.2.	Annexure-2	LIGHTING FIXTURE MOUNTING DRG.
11.3.	Annexure-3	TECHNICAL DATA SHEET OF LIGHTING FIXTURES, LAMPS & MISC. ITEMS
11.4.	Annexure-4	CABLE ERECTION PHILOSOPHY
11.5.	Annexure-5	HSE PLAN FOR TALCHER HSEP: 14: Revision: REV02: Date: 22.11.2022
11.6.	Annexure-6	BHEL T&P Hire Charges BHEL: PW:FM: FAX: T&P Hire: 2023-25
Note: - The above drawings are reference purpose only. These drawings may change and vendor will have to execute the work as per final approved drawings and instruction of BHEL engineer.		

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-XII: SCHEDULE OF ITEMS WITH WEIGHTAGES

12.	SCHEDULE OF ITEMS & WEIGHTAGES									
12.1.	This Chapter consists of Part A & Part B of Volume II “Price bid”:									
12.1.1.	<table border="1" style="width: 100%;"> <thead> <tr> <th colspan="2" style="text-align: left;">CONTENTS</th> </tr> <tr> <th style="width: 50%;">Description</th> <th>Remarks</th> </tr> </thead> <tbody> <tr> <td>Part A: Instructions to the Bidders</td> <td>Instructions</td> </tr> <tr> <td>PART B: % weightage for amount of individual items of Schedule of quantity</td> <td>Refer Latest Chapter-XII: Schedule of items Quantities and Factor for deriving Item Rate from the accepted Lump sum Price</td> </tr> </tbody> </table>		CONTENTS		Description	Remarks	Part A: Instructions to the Bidders	Instructions	PART B: % weightage for amount of individual items of Schedule of quantity	Refer Latest Chapter-XII: Schedule of items Quantities and Factor for deriving Item Rate from the accepted Lump sum Price
CONTENTS										
Description	Remarks									
Part A: Instructions to the Bidders	Instructions									
PART B: % weightage for amount of individual items of Schedule of quantity	Refer Latest Chapter-XII: Schedule of items Quantities and Factor for deriving Item Rate from the accepted Lump sum Price									
12.2.	Part A: Instructions to the Bidders									
12.2.1.	Any other entry elsewhere in the offer of the bidder shall be treated as Null and Void.									
12.2.2.	BHEL has fixed the Factors of individual items of Schedule of Quantity w.r.t. the total lump sum price (as quoted by the bidder). These item wise factors are available in Chapter-XII of Volume I TCC. Also schedule of items & Quantities are also available in Chapter-XII of Volume I TCC.									
12.2.3.	Based on the pre-fixed factors and the quoted total lump sum price, total amount against each item shall be derived by BHEL by multiplying the respective factors with total lump sum price.									
12.2.4.	Unit rate shall be derived by dividing the total amount against each item by total quantity as given in BOQ.									
12.2.5.	Item rates thus derived shall be rounded off to (04) four decimal places. Rounding off may lead to minor variation in the total lump sum price. This will be adjusted by BHEL by very minor adjustment of the derived item rates. This will be done to arrive at the exact quoted/ accepted Lump sum price given by the bidder.									
12.2.6.	For only the convenience of bidders, BHEL shall issue an excel sheet with all requisite formulae as detailed above on request from respective bidder. However, this excel sheet shall not form part of contract document									
12.3.	PART B: Schedule Items & Weightages									
12.3.1.	% weightage for amount of individual items of Schedule of quantity w.r.t. the total price as quoted by the bidder in Vol-II-Price Bid.									

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-XII: SCHEDULE OF ITEMS WITH WEIGHTAGES

Sl.No	DESCRIPTION	UOM	Qty	Weightage
E5J	PLANT ILLUMINATION PACKAGE (LIGHTING SYSTEM)			
E5J.1	LIGHTING DISTRIBUTION BOARD (LDB)			
E5J.1.01	AC LDB Type LDB-H (12) without transformer (including cubicles suitable for 1 No 100kVA transformer)	Nos.	20	0.0043438164
E5J.1.02	100kVA transformer for housing in E5J.1.01 above. Normal encapsulated type.	Nos.	20	0.0020393215
E5J.1.03	AC LDB Type LDB-H (12) without transformer (including cubicles suitable for 2 No 100kVA transformer)	Nos.	6	0.0013031449
E5J.1.04	100kVA transformer for housing in E5J.1.03 above. Normal encapsulated type.	Nos.	12	0.0012235929
E5J.1.05	DCLDB Type LDB-D (12)	Nos.	6	0.0007837912
E5J.1.06	AC WDB Type WDB-H (12) without transformer (including cubicles suitable for 1 No 100kVA transformer)	Nos.	8	0.0017087835
E5J.1.07	100kVA transformer for housing in E5J.1.06 above.	Nos.	8	0.0009748536
E5J.1.08	AC LDB Type LDB-F (8) without transformer (including cubicles suitable for 2 No 50kVA transformer)	Nos.	5	0.0009974143
E5J.1.09	50kVA transformer for housing in E5J.1.08 above.	Nos.	10	0.0010122764
E5J.2	LIGHTING PANELS (LP)			
E5J.2.01	AC Normal /Emergency indoor Type LP – A (12) [with timer]	Nos.	53	0.0023747565
E5J.2.02	AC Normal /Emergency outdoor Type LP – A (12) [with timer]	Nos.	76	0.0037425882
E5J.2.03	AC Normal (Decorative) Type LP – A (12)	Nos.	35	0.0017234470
E5J.2.04	AC Normal /Emergency indoor Type LP – A (18)) [with timer]	Nos.	47	0.0027043889
E5J.2.05	AC Normal /Emergency outdoor Type LP – A (18) [with timer]	Nos.	20	0.0011153076
E5J.2.06	Street Lighting Type LP – S (6)	Nos.	17	0.0006759032
E5J.2.07	DC indoor Type LP – D (12)	Nos.	32	0.0012840977
E5J.2.08	DC outdoor Type LP – D (12)	Nos.	17	0.0006859620
E5J.3	LIGHTING LUMINAIRES (COMPLETE WITH ACCESSORIES)			
E5J.3.01	Luminaire Type FC06	Nos.	4773	0.0422878599
E5J.3.02	Luminaire Type FC07-DC	Nos.	552	0.0046262493
E5J.3.03	Luminaire Type FC30	Nos.	2033	0.0170188675
E5J.3.04	Luminaire Type FC33-DC	Nos.	133	0.0011146721
E5J.3.05	Luminaire Type FC34-DC	Nos.	518	0.0043036565
E5J.3.06	Luminaire Type FC81	Nos.	492	0.0041134939
E5J.3.07	Luminaire Type SF63	Nos.	129	0.0016176641
E5J.3.08	Luminaire Type SF66	Nos.	32	0.0004818677
E5J.3.09	Luminaire Type SB02	Nos.	839	0.0098806252
E5J.3.10	Luminaire Type SB03	Nos.	220	0.0029802914
E5J.3.11	Luminaire Type SB11	Nos.	316	0.0037843650
E5J.3.12	Luminaire Type SS62	Nos.	1054	0.0102920372
E5J.3.13	Luminaire Type SS63	Nos.	385	0.0037594354
E5J.3.14	Luminaire Type SW41	Nos.	7050	0.0610309707
E5J.3.15	Luminaire Type SW42	Nos.	2902	0.0272038958

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-XII: SCHEDULE OF ITEMS WITH WEIGHTAGES

SI.No	DESCRIPTION	UOM	Qty	Weightage
E5J.3.16	Luminaire Type MW96	Nos.	320	0.0034237841
E5J.3.17	Luminaire Dimmable Downlighter (15-18W)	Nos.	28	0.0002726489
E5J.3.18	Luminaire Type Downlighter (15-18W)	Nos.	630	0.0061346001
E5J.3.19	Cove Light- LED (5m strip)	Nos.	530	0.0051608541
E5J.4	SWITCH BOXES			
E5J.4.01	Type SWB1 Decorative	Nos.	84	0.0005450576
E5J.4.02	Type SWB2 Decorative	Nos.	170	0.0011157464
E5J.4.03	Type SWB3 Decorative	Nos.	15	0.0001070675
E5J.4.04	Type SWB4 Decorative	Nos.	117	0.0010953161
E5J.4.05	Type SWB5 Decorative	Nos.	5	0.0000468102
E5J.5	JUNCTION BOXES			
E5J.5.01	Type JB-F	Nos.	21031	0.1051535174
E5J.5.02	Type JB-FE	Nos.	557	0.0029078920
E5J.6	RECEPTACLES			
E5J.6.01	Type RA	Nos.	583	0.0039942990
E5J.6.02	Type RA (Flame proof)	Nos.	2	0.0000148749
E5J.6.03	Type RB	Nos.	805	0.0062540622
E5J.6.04	Type RC	Nos.	336	0.0041627433
E5J.6.05	Type RC (Flame proof)	Nos.	2	0.0000324744
E5J.6.06	Type RD	Nos.	2	0.0000401441
E5J.7	FANS WITH ELECTRONIC REGULATORS			
E5J.7.01	1200 mm sweep	Nos.	20	0.0001507550
E5J.7.02	Pedestal Fans	Nos.	10	0.0000734349
E5J.8	EMERGENCY LIGHTING UNITS INSTALLATION			
E5J.8.01	With Ni-Cd battery and 2x9W fluorescent lamp	Nos.	50	0.0004447952
E5J.9	POLES INSTALLATION INCLUDING ALL ACCESSORIES. (SWAGED, STEEL TUBULAR, GALVANIZED)			
E5J.9.01	Octagonal Pole Type PS1 (9m) Including price of foundation bolt)	Nos.	237	0.0222360537
E5J.9.02	Octagonal Pole Type PS2 (11m) Including price of foundation bolt)	Nos.	327	0.0321285148
E5J.9.03	Octagonal Pole Type PF1 (9m) Including price of foundation bolt)	Nos.	64	0.0064689415
E5J.9.04	Fabrication of J-Poles	Nos.	10	0.0000698404
E5J.10	WIRES (LAYING & TERMINATION)			
E5J.10.01	1x1.5sqmm Cu PVC	Meter	1031200	0.0295272400
E5J.10.02	1x4sqmm Cu PVC	Meter	112800	0.0088766984
E5J.11	HOT DIP GALVANISED RIGID STEEL CONDUITS (HEAVY DUTY)			
E5J.11.01	20 mm dia GI conduit, 1.6 mm thick	Meter	334357	0.4082620727
E5J.11.02	25 mm dia GI conduit, 1.6 mm thick	Meter	41390	0.0546763619
E5J.11.03	40 mm dia GI conduit, 2 mm thick	Meter	18000	0.0279848684
E5J.11.04	20 mm dia GI conduit with epoxy coating, 1.6 mm thick	Meter	5690	0.0081906272
E5J.12	24V SUPPLY MODULE & LAMP UNIT COMPLETE WITH ALL ACCESSORIES			

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-XII: SCHEDULE OF ITEMS WITH WEIGHTAGES

Sl.No	DESCRIPTION	UOM	Qty	Weightage
E5J.12.01	Fixed type 24V supply modules	Nos.	78	0.0006713092
E5J.12.02	Portable type 24V supply modules	Nos.	11	0.0000680415
E5J.12.03	Portable halogen lamp unit	Nos.	11	0.0000505992
E5J.12.04	5A, 24V industrial type sockets	Nos.	178	0.0009897659
E5J.12.05	Exit Sign	Nos.	139	0.0020681637
E5J.12.06	Occupancy Sensor	Nos.	100	0.0002739666
E5J.12.07	Lighting Dimmer System	Nos.	1	0.0001201704
E5J.13	Structure Steel Fabrication & Installation (MS Angle, Channel, Plate Etc)	MT	42	0.0099163719
E5J.14	LAYING & TERMINATION OF CABLES			
E5J.14.01	3.5Cx95sqmm Al	Meter	4000	0.0032585119
E5J.14.02	3.5Cx50sqmm Al	Meter	15000	0.0093715646
E5J.14.03	3Cx2.5sqmm Cu	Meter	500	0.0001070662
E5J.14.04	2Cx95sqmm Al	Meter	1500	0.0007026756
E5J.15	ABOVE GROUND EARTHING & LIGHTNING PROTECTION MATERIALS			
E5J.15.01	14SWG GI wire	Meter	18300	0.0008798465
E5J.15.02	50x6mm GI flat	Meter	660	0.0006849839
E5J.15.03	25x3mm GI flat	Meter	1110	0.0008972150
E5J.15.04	40mm dia MS Rod of 3 Meter length each	Nos.	100	0.0018933860
E5J.16	HUME PIPE			
E5J.16.01	Hume pipe 100 mm dia	Meter	1000	0.0023292870
E5J.17	LAYING & TERMINATION OF CABLES (ARMOURED CABLES TO BE BURIED UNDERGROUND)			
E5J.17.01	3.5Cx25sqmm Al	Meter	500	0.0008316102
E5J.17.02	3.5Cx50sqmm Al	Meter	500	0.0009504661
E5J.17.03	3.5Cx95sqmm Al	Meter	500	0.0010693221
E5J.18	Ladder			
E5J.18.01	Free standing adjustable from 5M to 10M aluminium ladder	Nos.	2	0.0001000855
E5J.18.02	Step ladder (0.5M to 1.5M)	Nos.	2	0.0000240971
ILLUMINATION PACKAGE Talcher Unit # 1 & 2				1.0000000000